

**Bond University**

## **DOCTORAL THESIS**

### **Effective human control over lethal autonomous weapon systems and compliance with international humanitarian law**

Yasin, Tarisa Kramadibrata

*Award date:*  
2023

*Licence:*  
CC BY-NC-ND

[Link to publication](#)

#### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.



**BOND  
UNIVERSITY**

**Effective Human Control over Lethal Autonomous  
Weapon Systems and Compliance with International  
Humanitarian Law**

Tarisa Yasin

Submitted in total fulfilment of the requirements of the degree of Doctor of  
Philosophy

February 2023

Faculty of Law

Professor Jonathan Crowe and Assistant Professor Eugenia Georgiades

*This research was supported by an Australian Government Research Training Program  
Scholarship*

## **ABSTRACT**

International Humanitarian Law (IHL) often must catch up with the fast pace of technological change. A recent example of IHL catching up with technological development concerns lethal weapon systems that possess autonomy-enabling technology, also known as lethal autonomous weapon systems (LAWS). The challenges LAWS raises for IHL have been discussed in forums such as the ICRC expert meetings, the Informal Meeting of Experts on LAWS, and the Group of Governmental Experts on Lethal Autonomous Weapon Systems. From these discussions and the current literature on LAWS, it is widely acknowledged that human control must still be exercised over LAWS to comply with IHL and that it must be 'meaningful' or 'effective'. However, what 'effective human control' means and what exercising effective human control would look like are questions that are yet to be answered.

This thesis looks at how effective human control over LAWS can be conceptualised to ensure that the development and use of such weapon systems can comply with IHL. This is achieved by exploring elements such as 1) current IHL rules and principles; 2) the concepts of state responsibility, individual criminal liability and command responsibility; and 3) discussions on LAWS and human control that have occurred in meetings and the literature. Through the exploration of these elements, five factors are highlighted as important to consider when building a working definition: 1) the principles and rules of IHL; 2) the different types of LAWS; 3) the varying degrees of autonomy different LAWS possess; 4) the different stages in the lifecycle of a LAWS; and 5) accountability to ensure it is clear that the States and their agents are accountable for any misuse of LAWS.

This thesis proposes a working definition of effective human control that incorporates the factors mentioned above to provide a deeper understanding of how autonomy functions in LAWS and how human control is exercised over LAWS. Therefore, it provides a practical and realistic understanding of how human control can be exercised effectively. The working definition has the potential to assist in progressing the ongoing debate on how to regulate LAWS.

## **KEYWORDS**

International humanitarian law, lethal autonomous weapon systems, effective human control

## **DECLARATION BY AUTHOR**

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of Doctor of Philosophy by Research.

I declare that the research presented within this thesis is a product of my own original ideas and work and contains no material which has previously been submitted for a degree at this university or any other institution, except where due acknowledgement has been made.

Name: Tarisa Yasin

Signature:

Date: 26/09/2023

## Research Outputs

### Journal Article

Umair Ghori and Tarisa Yasin, 'A Brave Idea: Using Social Licence to Regulate Development of Lethal Autonomous Weapon Systems'. This has been accepted for publication in the *Special Edition on Social Licence* issue of the *Research in Ethical Issues in Organisations (REIO)* Emerald Journal

### Online Article

Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems' *ANZSIL Perspective* (Editorial, 18 July 2021)  
<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>

### Conferences/Presentations

IEEE International Symposium on Technology and Society 2022 - Ethics Day  
Presentation on 12 November 2022

The Australasian Society of Legal Philosophy Conference (ASLP) from 13-15  
July 2022

The Australian Association for Professional and Applied Ethics (AAPAE) 28th  
Annual Conference from 11-13 August 2021

Australian and New Zealand Society for International Law Postgraduate  
Workshop on 2 December 2020

Asian Law and Society Association (ALSA) 4th Annual Conference from 13-  
15 December 2019

Bond University Research Week Legal Research at the Frontiers on 14  
October 2019

## **COPYRIGHT DECLARATION**

Sections 6.1 to 6.3 in Chapter Six, contain extracts from a blog article entitled “The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems”, published by Australian and New Zealand Society of International Law (ANZIL) *Perspective*. The extracts are reproduced with permission and are fully cited.

## **ACKNOWLEDGEMENTS**

There are many people who helped in contributing to this thesis and my experience as a PhD candidate. First, I would like to thank the Australian Government Research Training Program for providing financial support during my PhD candidature.

I would like to thank my supervisors Professor Jonathan Crowe and Assistant Professor Eugenia Georgiades whose continuous support, feedback and advice have helped me get through the writing process with ease and for making my candidature experience a great one. For all that you have done to help and support me, I cannot thank you both enough. I would also like to thank the panel members at my confirmation presentation for giving me insightful feedback on my thesis.

I would like to thank my family for their support in my decision to pursue a PhD and for their continuous support during my candidature. I want to express my gratitude to my parents whose PhDs have inspired me to pursue a PhD myself and for showing me that it is possible. I also want to express my gratitude to my sister for her help in editing my work, including conference speeches. I greatly appreciate your help.

I would like to thank the academic and professional staff of the Bond University Faculty of Law for allowing me to pursue a PhD as well as for the support and professional development opportunities given during my candidature. I would also like to thank the staff at the Bond University Higher Degree Research Unit for their work in supporting me and all the higher degree research students at Bond University.

I would like to thank Associate Professor Umair Ghori for agreeing to co-write a journal article with me and for his support and advice during the publication journey of the article. I would like to thank Neil Roberts for helping edit my thesis during the final stages. I would like to thank my friends and colleagues for their support, advice and friendship throughout my candidature. All of you have made the PhD experience exciting and eventful. I never felt I was going through the process alone.

Lastly, I would like to thank all the academics, researchers and practitioners from other universities and institutions I met along the way that gave me insightful advice and shared their knowledge on the topic of international humanitarian law and lethal autonomous weapon systems. Your advice and knowledge have helped me understand the topic on a much deeper level. I greatly appreciate your time and help.



# TABLE OF CONTENTS

---

Title Page.....	i
Abstract.....	ii
Keywords.....	iii
Declaration By Author .....	iv
Research Outputs .....	v
Copyright Declaration.....	vi
Acknowledgements .....	vii
Table of Contents .....	viii
List of Tables .....	xiv
List of Figures.....	xv
Abbreviations.....	xvi
Chapter One: Introduction .....	1
1.1 The Topic, Aim and Objective .....	2
1.2 The Scope of the Thesis.....	2
1.3 Background .....	3
1.3.1 The Significance.....	3
1.3.2 Legal Challenges for LAWS .....	5
1.3.3 Autonomy in Weapon Systems .....	9
1.4 Justification for Using the Term ‘Effective’ Human Control.....	11
1.5 Research Questions.....	13
1.6 Methodology.....	13
1.7 Thesis Structure .....	14
Chapter One: Introduction.....	14
Chapter Two: The Puzzle Governing Lethal Autonomous Weapon Systems	15
Chapter Three: The Nature of LAWS: Military Interest, Current Weapon Systems and Compliance with IHL.....	15
Chapter Four: Deliberations on LAWS.....	15
Chapter Five: From Development to Aftermath: Accountability and the Role of Human Control.....	16
Chapter Six: Defining Effective Human Control .....	16

Chapter Seven: The Next Steps for Effective Human Control.....	16
Chapter Two: The Puzzle Governing Lethal Autonomous Weapon Systems...	18
2.1 Introduction.....	19
2.2 Why Revisit the Fundamental Principles of IHL?.....	20
2.3 The Fundamental Principles.....	21
2.3.1 The Principle of Humanity .....	22
2.3.2 The Principle of Military Necessity .....	30
2.3.3 The Principle of Distinction.....	35
2.3.4 The Principle of Proportionality .....	39
2.3.5 Prohibition on Indiscriminate Attacks .....	44
2.4 Article 36 on Legal Review of Weapons.....	49
2.4.1 Drafting Article 36.....	49
2.4.2 Obligations under article 36 .....	52
2.4.3 Article 36 and State Practice .....	54
2.5 The Convention on Certain Conventional Weapons.....	60
2.5.1 The Role of the Convention on Certain Conventional Weapons .....	60
2.5.2 The Convention on Certain Conventional Weapons and State Practice .....	63
2.5.3 Inclusion of Regulations on LAWS in the Convention on Certain Conventional Weapons .....	65
2.6 Conclusion.....	66
Chapter 3: The Nature of LAWS: Military Interest, Current Weapon Systems and Compliance with IHL .....	68
3.1 Introduction.....	69
3.2 Increasing Investment in LAWS .....	70
3.2.1 Why the interest? .....	70
3.2.2 The ‘smart’ arms race .....	72
3.2.3 Hesitancy .....	74
3.3 Current Weapon Systems .....	75
3.3.1 Semi-autonomous weapon systems .....	77
3.3.2 Supervised autonomous weapon systems.....	81
3.3.3 Fully autonomous weapon systems .....	86

3.3.4 A glimpse into the future: More examples of weapon systems in the development Stage .....	88
3.4 Can LAWS Comply with IHL? .....	90
3.5 Conclusion.....	91
Chapter 4: Deliberations on LAWS.....	94
4.1 Introduction.....	95
4.2 Key Issues from the 2014 Informal Meeting of Experts .....	96
4.2.1 The general debate and background of the 2014 Meeting .....	96
4.2.2 Key issue one: Clarifying terminology .....	97
4.2.3 Key Issue two: The technical concept of autonomy .....	98
4.2.4 Key issue three: Understanding the operational and military aspects of LAWS.....	100
4.2.5 Key issue four: Prohibition, moratorium or none?: The ongoing debate .....	101
4.3 Key Issues from the 2015 Informal Meeting .....	104
4.3.1 The general debate and background of the 2015 meeting.....	104
4.3.2 Key issue one: Whether or not to consider existing weapon systems	105
4.3.3 Key issue two: The concept of distributed autonomy .....	106
4.3.4 Key issue three: The characteristics of LAWS .....	108
4.4 Key Issue from the 2016 Meeting.....	110
4.4.1 The general debate and background of the 2016 meeting.....	110
4.4.2 So what is autonomy?.....	111
4.5 Key Themes from the 2017 Meeting .....	113
4.5.1 Theme 1: Emphasising the need to focus on autonomy in the critical functions of weapon systems .....	113
4.5.2 Theme 2: The importance of clarity in the regulation of weapon systems: The ethical and legal lenses.....	115
4.6 The 2018 and 2019 Meetings: Formation of the Guiding Principles .....	115
4.6.1 Guiding principles on LAWS.....	116
4.7 The 2020 GGE on LAWS Meeting: Potential Elements for Consensus Recommendations .....	121
4.8 2021 GGE on LAWS and Beyond .....	124
4.8.1 2021 GGE on LAWS .....	124

4.8.2 2022 GGE on LAWS .....	127
4.8.3 2023 GGE on LAWS .....	129
4.9 Conclusion: Key points to inform the working definition and the future of the GGE on LAWS .....	130
Chapter 5: From Development to Aftermath: Accountability and the Role of Human Control .....	133
5.1 Introduction.....	134
5.2 State Responsibility and Due Diligence .....	136
5.2.1 State Responsibility: Principles and Application to LAWS.....	136
5.2.2 Due Diligence: Principles and Application to LAWS.....	142
5.3 Individual Criminal Responsibility .....	144
5.3.1 The Rules and Principles .....	145
5.3.2 Knowledge and intent as key elements of individual criminal responsibility .....	146
5.3.3 Command responsibility .....	148
5.3.4 War crimes involving the use of LAWS .....	152
5.4 The Role of Human Control.....	153
5.4.1 The research and development stage.....	154
5.4.2 The deployment and operation stage.....	165
5.4.3 A Brief case study of human control of LAWS in Australia.....	168
5.5 Facing the Consequences.....	171
Chapter 6: Defining ‘Effective Human Control’ .....	173
6.1 Introduction.....	174
6.2 The Importance of Flexibility in Regulating LAWS.....	174
6.2.1 The flexible scale .....	175
6.3 Practical Application of Effective Human Control .....	177
6.3.1 Effective human control during the development stage.....	179
6.3.2 Effective human control during the deployment stage.....	182
6.3.3 Effective Human control during the operation stage.....	183
6.4 The Working Definition .....	183
6.4.1 Considering the various forms of human control and human-machine interactions.....	188
6.4.2 Ensuring respect for IHL .....	190

6.4.3 Clarifying who is accountable.....	192
6.5 Benefits and Limitations of the Working Definition .....	192
6.5.1 To codify or not to codify? .....	193
6.5.2 A broad working definition and its consequences .....	194
6.5.3 Situations where not all elements of effective human control can be satisfied.....	197
6.6 Conclusion.....	198
Chapter 7: The Next Steps for Effective Human Control .....	201
7.1 The Answers to the Research Questions .....	202
7.1.1 What current international humanitarian law rules and principles are applicable to LAWS?.....	202
7.1.2 Why are militaries interested in developing and using LAWS? .....	203
7.1.3 What are the current practices of States concerning the development and use of LAWS? .....	203
7.1.4 What are common LAWS used by States today? .....	204
7.1.5 What are some of the legal challenges posed by LAWS?.....	204
7.1.6 What factors should be considered when building a definition of effective human control? .....	205
7.2 Overview of the Working Definition .....	206
7.3 Limitations of the Thesis.....	207
7.4 Recommendations for Further Research.....	208
7.5 Closing Statement .....	208
8. References.....	209
8.1 Articles, Books and Reports.....	210
8.2 Cases.....	218
8.3 Legislation .....	220
8.4 Treaties .....	220
8.5 Others .....	222
9. Appendices.....	243
9.1 Appendix 1 Table 4.1 Summary of Key Issues and Points from the 2014 Meeting .....	244
9.2 Appendix 2: Table 4.2 Summary of Key Issues and Points from the 2015 Meeting .....	245

9.3 Appendix 3: Table 4.3 Summary of The Key Issue and Key Points from the 2016 Meeting .....	246
9.4 Appendix 4: Table 4.4 Summary of Key Themes and Points from the 2017 Meeting .....	247

**LIST OF TABLES**

**Table 6.2:** General Requirements for Human Control over LAWS..... 178

**LIST OF FIGURES**

**Figure 3.1:** Human in the OODA Loop ..... 78

**Figure 3.2:** Human on the OODA Loop ..... 82

**Figure 3.3:** Human out of the OODA Loop..... 87

**Figure 5.1:** Diagram of a Manual Weapon System ..... 166

**Figure 5.2:** Diagram of an Autonomous Weapon System ..... 166

**Figure 6.1:** Automation Scale for LAWS ..... 176



## ABBREVIATIONS

<b>ABBREVIATION</b>	<b>TERM</b>
Alien Torts Claim Act	ATCA
Convention on Certain Conventional Weapons	CCCW
Draft Articles on State Responsibility	DASR
Global Positioning System	GPS
Group of Governmental Experts on Lethal Autonomous Weapon Systems	GGE on LAWS
International Committee of the Red Cross	ICRC
International Court of Justice	ICJ
International Criminal Law	ICL
International Criminal Tribunal for the former Yugoslavia	ICTY
International Humanitarian Law	IHL
International Human Rights Law	IHRL
International Law Commission	ILC
Lethal Autonomous Weapon Systems	LAWS
Observe, Orient, Decide, Act Loop	OODA Loop
Permanent Court of International Justice	PCIJ
United Nations	UN

---

## CHAPTER ONE: INTRODUCTION

---

## **1.1 THE TOPIC, AIM AND OBJECTIVE**

This thesis aims to provide a working definition of 'effective human control' to help States and policy makers answer the question – to what extent should human control be retained over lethal autonomous weapon systems (LAWS)?<sup>1</sup> In building the working definition, this thesis will: 1) revisit the rules and principles of international humanitarian law (IHL), applicable to the development and use of LAWS; 2) discuss why militaries are interested in LAWS and that concerns about the proliferation on LAWS warrants further discussion on LAWS; 3) discuss the nature of LAWS by referring to examples of LAWS that are currently being deployed and developed; 4) analyse prior discussions on LAWS during the informal meetings of experts on LAWS and the meetings of the Group of Governmental Experts on Lethal Autonomous Weapon Systems (GGE on LAWS); and 5) discuss the concept of state responsibility, individual criminal responsibility and command responsibility in the context of using LAWS to investigate its relevance to the development and use of LAWS and to the exercise of human control over LAWS. After examining these elements, the thesis will highlight key factors to incorporate into the working definition of effective human control and that will become foundation of the working definition. The thesis will then present a working definition of effective human control, explain how the key factors were incorporated into the working definition and analyse the benefits and limitations of the working definition.

## **1.2 THE SCOPE OF THE THESIS**

This thesis focuses on defining effective human control and considers existing IHL rules and principles from treaties, case law and customary law, international criminal law (ICL), particularly individual criminal liability, command responsibility and state responsibility. Discussions and Insight about human control and LAWS from experts and diplomats during the Informal Meeting of Experts on LAWS and the meetings of the GGE on LAWS will also be considered to provide a background as to what has already been discussed and to investigate relevant points that can be considered and incorporated into the working definition of effective human control. However, there are four limitations of this thesis that need to be addressed to help define the scope of this thesis.

The first point is that this thesis does not go into depth about the challenges the development and use of LAWS poses to international human rights law (IHRL), it is only considered in the

---

<sup>1</sup> This thesis uses the abbreviation LAWS as a singular noun (a lethal autonomous weapon system) and a plural noun (lethal autonomous weapon systems).

context of the existing IHL rules and principles and is noted as an area for further research. The second point is that it is beyond the scope of this thesis to engage in an in-depth discussion on the moral and ethical aspects of the development and use of LAWS. Engaging in an in-depth discussion on such aspects makes the scope of the thesis too broad since the focus is on practically and realistically defining the term effective human control based on the realities of autonomy and warfare. Therefore, this thesis only acknowledges that there has been discussion on the moral and ethical issues that arise from the development and use of LAWS but will not have an in-depth discussion and analysis of these issues.

The third point is that the role of developers that manufacture LAWS and the concept of corporate liability is discussed in the context of the role of human control since weapon system developers do exercise a form of human control over LAWS. However, it is beyond the scope of this thesis to go into detail about the challenges faced in finding corporations liable for violations of IHL and breaches of provisions of the Rome Statute and how those challenges can be overcome. This issue is also noted as an area for further research.

The fourth point is that this thesis does examine existing LAWS that are currently deployed or under development to build an understanding of what types of LAWS are being developed and used, what autonomous functions have been built into the weapon system and the basic mechanics behind how autonomy in weapon systems works. However, this thesis may not cover all existing LAWS that are employed or developed and information about existing LAWS discussed in this thesis is limited to what is accessible to the general public. This is because there are certain national security implications with certain LAWS currently employed or under development and the methodology of this thesis does not include interview members of organisations that deal with the development and use of LAWS.

## **1.3 BACKGROUND**

### **1.3.1 THE SIGNIFICANCE**

Technological development throughout history has led to new means and methods of warfare. Advancements in technology have allowed military personnel to easily identify targets using artificial intelligence, and to attack more precisely using global positioning systems (GPS) and satellite navigation systems.<sup>2</sup> Overall, technological development has

---

<sup>2</sup> Robert McLaughlin and Hitoshi Nasu, 'Conundrum of New Technologies in the Law of Armed Conflict' in Robert McLaughlin and Hitoshi Nasu (eds) *New Technologies and the Law of Armed Conflict* (T.M.C Asser Press, 2014) ch. 1, pt. 1.1.

been and continues to be motivated by the potential to increase a State's military capability.<sup>3</sup> This is illustrated by the development of weapon systems with autonomous capabilities, commonly referred to as autonomous weapon systems. This thesis will focus on autonomous weapon systems with lethal payloads which are referred to as lethal autonomous weapon systems (LAWS) as opposed to non-lethal autonomous military systems and platforms. This is because of the lethal consequences that result from the use of such weapon systems which pose more immediate challenges to complying with international humanitarian law (IHL), particularly when the use of a LAWS leads to a violation of IHL.

A noted concern regarding LAWS that can make life or death decisions with little to no human intervention is how the lack of human control, and the potential for further reducing the need for human control, over such weapon systems could violate IHL.<sup>4</sup> Other concerns include the limitation of computer systems built into LAWS in processing qualitative data and making qualitative judgements that are required when distinguishing between military objects and civilian objects, active combatants and hors de combat, assessing proportionality and taking necessary precautions.<sup>5</sup> This will be discussed further in the next section regarding the legal challenges for LAWS.

It is important to ensure that the current use and continuing development of LAWS comply with IHL to protect humanitarian principles that form the basis of this body of international law. Focusing on how human control is exercised over LAWS through the human-machine interface would deepen the understanding of the concerns, like those mentioned earlier, that

---

<sup>3</sup> International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 7.

<sup>4</sup> See, eg *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 4, [12]-[13].

<sup>5</sup> See International Committee of the Red Cross, 'Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects' (Expert Meeting Report, 26-28 March 2014) 8; Denise Garcia, 'Technical statement by the International Committee for Robot Arms Control' (Statement, CCCW Informal Meeting of Experts 14 May 2014) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>; Frank Sauer, 'ICRAC statement on technical issues to the 2014 UN CCW Expert Meeting' (Media Release) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>; Marco Sassòli, 'Can autonomous weapon systems respect the principles of distinction, proportionality and precaution?' (Presentation, International Committee of the Red Cross Expert Meeting, 26-28 March 2014) in International Committee of the Red Cross, 'Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects' (Expert Meeting Report, 26-28 March 2014) 41-44.

arise from these weapon systems.<sup>6</sup> Therefore, having a deeper understanding of the role of human control would aid in clarifying what would be considered effective human control. Furthermore, the ICRC and experts agree that maintaining human control over the critical functions of autonomous weapon systems is important to ensure such weapon systems remain compliant with IHL.<sup>7</sup>

### 1.3.2 LEGAL CHALLENGES FOR LAWS

The use of LAWS potentially conflicts with the legal obligations of States to comply with the fundamental principles of international humanitarian law.<sup>8</sup> This is because of the qualitative assessments and judgements required when applying the principles of IHL in a military operation, particularly when applying the principles of distinction and proportionality as well as taking the necessary precautions.<sup>9</sup> Furthermore, weapon systems are not currently programmed to implement those rules.<sup>10</sup> Therefore, human judgement is still relevant, and

---

<sup>6</sup> International Committee of the Red Cross, 'Views of the International Committee of the Red Cross on Autonomous Weapon System' (Working Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems, 11 April 2016) 5.

<sup>7</sup> *The 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems* (Report, 23 October 2018) 14. See also International Committee of the Red Cross, 'Views of the International Committee of the Red Cross on Autonomous Weapon System' (Working Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems, 11 April 2016) 5; International Committee of the Red Cross, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons* (Expert Meeting Report, 15-16 March 2016); Richard Moyes, 'Meaningful human control over individual attacks' (Presentation, International Committee of the Red Cross Expert Meeting, 15 March 2016).

<sup>8</sup> See International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014); International Committee of the Red Cross, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons* (Expert Meeting Report, 15-16 March 2016); Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 7; United States of America, 'Implementing International Humanitarian Law in the Use of Autonomy in Weapon Systems' (Working Paper No 5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, 28 March 2019) 2; Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems', (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1398-1399; Richard Moyes, 'Meaningful human control over individual attacks' (Presentation, International Committee of the Red Cross Expert Meeting, 15 March 2016).

<sup>9</sup> See International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 8; Denise Garcia, 'Technical statement by the International Committee for Robot Arms Control' (Statement, CCCW Informal Meeting of Experts 14 May 2014) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>; Frank Sauer, 'ICRAC statement on technical issues to the 2014 UN CCW Expert Meeting' (Media Release) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>.

<sup>10</sup> See Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 7; Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems', (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1388, 1399.

one of the main issues is ensuring that humans maintain control over the use of lethal force.<sup>11</sup>

Regarding the regulation of LAWS, some principles and rules are used as guidance.<sup>12</sup> The current regulations applicable to the development and use of LAWS can be viewed as puzzle pieces with rules and principles from different treaties and international customary law sources that are put together to help govern the development and use of LAWS. This may make it more complicated to determine what the limit is in developing LAWS and what would be an acceptable use of such weapon systems.

The legal implications of using LAWS have been widely discussed.<sup>13</sup> These implications include a consideration of the 'laws of humanity and the dictates of public conscience', and whether it is ethically appropriate to transfer the right to use lethal force to a machine.<sup>14</sup> James Igoe Walsh and Paola Gaeta have also mentioned an 'accountability gap' that would have political implications since the more autonomous and unpredictable a weapon system becomes, the more difficult it may be to specify who is accountable.<sup>15</sup>

---

<sup>11</sup> Kathleen McKendrick, 'Banning Autonomous Weapons Is Not the Answer', *Chatham House The Royal Institute of International Affairs* (Blog Post, 2 May 2018).

<<https://www.chathamhouse.org/expert/comment/banning-autonomous-weapons-not-answer>>.

<sup>12</sup> Robert McLaughlin and Hitoshi Nasu, 'Conundrum of New Technologies in the Law of Armed Conflict' in Robert McLaughlin and Hitoshi Nasu (eds) *New Technologies and the Law of Armed Conflict* (T.M.C Asser Press, 2014) ch 1, pt 1.2.

<sup>13</sup> See generally International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014); International Committee of the Red Cross, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons* (Expert Meeting Report, 15-16 March 2016). See especially 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems', (2014) 47(5) *Vanderbilt Transnational Law* 1371; Christof Heyns 'Increasing autonomous weapon systems; Accountability and responsibility' (Presentation, International Committee of the Red Cross Expert Meeting, 28-26 March 2014); Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016); Zhang Xinli, 'Legal issues concerning autonomous weapon systems' (Presentation, International Committee of the Red Cross Expert Meeting, 15-16 March 2016); James Igoe Walsh, 'Political accountability and autonomous weapons' (2015) 2(4) *Research & Politics* 1; Peter Asaro, 'Ethical Issues Raised by Autonomous Weapon Systems' (Presentation, International Committee of the Red Cross Expert Meeting, 28-26 March 2014); Ronald Arkin, 'Ethical restraint of lethal autonomous robotic systems: Requirements, research and implications' (Presentation, International Committee of the Red Cross Expert Meeting, 28-26 March 2014); Peter Lee 'Autonomous weapon systems and ethics' (Presentation, International Committee of the Red Cross Expert Meeting, 28-26 March 2014).

<sup>14</sup> Christine Chinkin and Mary Kaldor, *International Law and new Wars* (Cambridge University Press, 2017) 322; *Hague Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land*, opened for signature 29 July 1899, 187 CTS 429 (entered into force 4 September 1900).

<sup>15</sup> See James Igoe Walsh, 'Political accountability and autonomous weapons' (2015) 2(4) *Research & Politics* 1; Paola Gaeta, 'Autonomous weapon systems and the alleged responsibility gap' (Presentation, International Committee of the Red Cross Expert Meeting, 15-16 March 2016).

This research will build upon the discussions related to the implications of the development and use of LAWS. It will attempt to clarify the legal limits of autonomy in weapon systems by examining the concept of human control over weapon systems and what retaining effective human control would entail. This thesis aims to fill the gap in the literature regarding the ambiguity of this term. It will expand upon the contributions already made in the area of autonomous weapon systems and international humanitarian law and will add to the literature that has analysed and examined ways to better regulate LAWS.

#### 1.3.2.1 PROGRAMMING IHL INTO LAWS

One way for LAWS to comply with the fundamental principles of IHL is to have those principles programmed into the weapon system itself. However, there are problems with this approach which is discussed later in this section. A weapon system would need to be programmed with the ability to distinguish between military and civilian targets. The computer system of weapon systems would also need to reconcile several pre-programmed characteristics with legal targets before the weapon could be activated.<sup>16</sup> Considering that the principles of distinction and proportionality require elements of qualitative assessment, computer systems for autonomous weapon systems would need to also be capable of conducting qualitative assessments in a complex environment.<sup>17</sup>

Programming the computer in a weapon system to calculate collateral damage estimates may be one way to program a LAWS to comply with IHL, particularly with the principle of proportionality. The United States air force uses a computer model that has been designed to carry out a collateral damage estimate.<sup>18</sup> The computer model would calculate the collateral damage estimate by determining 'the weapon, fuze, attack angle and time of day' that would maximize the damage to the target with minimal civilian casualties.<sup>19</sup> However, collateral damage estimate calculations are carried out on pre-planned targets and involve relevant military personnel reviewing the calculations and authorising targets. For instance,

---

<sup>16</sup> Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems', (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1391.

<sup>17</sup> See Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems', (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1388; International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 8.

<sup>18</sup> Human Rights Watch, 'Off Target: The Conduct of the War and Civilian Casualties in Iraq' (Report, Human Rights Watch, 2003) 18-20.

<sup>19</sup> *Ibid* 19.



it has been reported that an attack that is estimated to result in 30 or more civilian deaths had to be authorised by Defense Secretary Donald H. Rumsfeld.<sup>20</sup>

There are advantages in increasing autonomy in weapon systems and programming the ability for the weapon system to comply with international humanitarian law rules and principles. For example, it would increase the safety of soldiers as less harm would come to them if they were at a distance from the line of fire. LAWS may also have a faster reaction time compared to humans. They could also be able to continue with an operation in environments with poor or no communication available. Lastly, it could be more cost-effective to use autonomous weapon systems and reduce personnel burden.<sup>21</sup> However, the reliability and predictability of the autonomous weapon system may still be in question.

If a party to an armed conflict intends to employ a LAWS, the developer should ensure that the programming of the LAWS will enable the commander and or operator of the weapon system to take the necessary precautions, apply international humanitarian law principles and be confident that the use of the weapon system will comply with IHL should the commander decide to deploy it.<sup>22</sup> The reliability and predictability of weapon systems will depend on an adequate understanding of the weapon system and the way its critical functions are programmed to plan and acquire information.<sup>23</sup> Understanding the 'values and constraints' that are coded into the weapon system's programming is therefore important.<sup>24</sup>

There is currently no code or software capability to enable weapon systems to process large amounts of qualitative data which would be necessary when applying the fundamental principles.<sup>25</sup> It seems practically impossible for weapon systems to process the qualitative data, apply the principles and make decisions with the current technology. Furthermore,

---

<sup>20</sup> Bradley Graham, 'U.S. Moved Early for Air Supremacy', *The Washington Post* (online, 20 July 2003) <<https://www.washingtonpost.com/archive/politics/2003/07/20/us-moved-early-for-air-supremacy/366576c0-d064-4ee8-a9ed-9efeaf1c0740/>> cited in Human Rights Watch, 'Off Target: The Conduct of the War and Civilian Casualties in Iraq' (Report, Human Rights Watch, 2003) 19.

<sup>21</sup> Brian K. Hall, 'Autonomous Weapon Systems Safety' [2017] (86) *Joint Force Quarterly* 86, 87.

<sup>22</sup> Vivek Sehrawat, 'Autonomous weapon systems: Law of armed conflict (LOAC) and other legal challenges' (2017) 33(1) *Computer Law & Security Review: The International Journal of Technology Law and Practice* 38, 47.

<sup>23</sup> Heather M. Roff and David Danks, "'Trust but Verify": The Difficulty of Trusting Autonomous Weapon Systems' (2018) 17(1) *Journal of Military Ethics* 2, 10.

<sup>24</sup> *Ibid.*

<sup>25</sup> Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems', (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1397-1399.

existing weapon systems used are usually highly constrained in the tasks they carry out, the types of targets they can attack and the type of environment they are used in.<sup>26</sup>

### 1.3.3 AUTONOMY IN WEAPON SYSTEMS

According to the SIPRI report, *Mapping the Development of Autonomy in Weapon Systems*, the ‘technological foundations of autonomy’ can be summarised in three key points. First, the term ‘autonomy’ can be interpreted in various ways; however, it is best understood as the ability of a machine to perform particular tasks with no human intervention.<sup>27</sup> Second, autonomy depends on various technologies, but mainly software.<sup>28</sup> For it to operate successfully would depend on the programmers’ competency to code the algorithm into the system for it to perform the intended task, and the ability to map the ‘operational environment’ before deployment.<sup>29</sup> Third is that, through machine learning, one can create or improve the autonomy of weapon systems. However, this is at the experimental stage since applying machine learning to weapon systems may still pose predictability issues.<sup>30</sup> The term ‘autonomy’ will be elaborated upon further in Chapter Four, particularly in sections 4.3.3 and 4.4.2, where discussion on autonomy in weapon systems has occurred in the 2015 GGE on LAWS.

It should be re-emphasised that this thesis is looking particularly at LAWS due to the lethal consequences of its use. The following reference to the ICRC definition of autonomous weapon systems and Dr Davison’s explanation of autonomous weapon systems is made with the assumption that its definition can also be used to describe LAWS. Therefore, this thesis will use the terms autonomous weapon systems, LAWS and weapon systems interchangeably to convey the same meaning. If it becomes necessary to be pedantic about defining terms, the only additional detail to incorporate into a definition of LAWS is the fact that the weapon system is lethal.

Regarding the meaning of (lethal) autonomous weapon systems, the term is generally defined as weapon systems that are designed to have the capacity to identify, select and

---

<sup>26</sup> International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 8.

<sup>27</sup> Vincent Boulanin and Maaïke Verbruggen, *Mapping the Development of Autonomy in Weapon Systems* (SIPRI Report, November 2017) vii.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.

attack targets with little to no human input.<sup>31</sup> The ICRC defines an autonomous weapon system as:

Any weapon system with autonomy in its critical functions. That is, a weapon system that can select (i.e. search for, detect, identify, track or select) and attack (i.e. use force against, neutralize, damage or destroy) targets without human intervention.<sup>32</sup>

Dr Neil Davison goes on to explain that once the autonomous weapon system has been activated by a human operator, it is the weapon system that takes over the targeting functions which would usually be controlled by a human.<sup>33</sup> The autonomous weapon system would use its sensors, software programming and weaponry to achieve its programmed objective.<sup>34</sup>

The ICRC has proposed that 'autonomous weapon systems' should be used as an umbrella term which would encompass any weapon system that has autonomy in its critical functions of selecting and attacking targets.<sup>35</sup> The working definition was purposely created to be broad.<sup>36</sup> This enables the consideration of existing LAWS, the experience and lessons learned from them, what makes LAWS acceptable and the emerging technologies related to LAWS that could raise concerns.<sup>37</sup> Keeping the definition of LAWS broad would also help determine the boundaries of what is an acceptable use of LAWS under international

---

<sup>31</sup> James Igoe Walsh, 'Political accountability and autonomous weapons' (2015) 2(4) *Research & Politics* 1, 1-2.

<sup>32</sup> International Committee of the Red Cross, 'Views of the International Committee of the Red Cross on Autonomous Weapon System' (Working Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems, 11 April 2016). See also International Committee of the Red Cross, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons* (Expert Meeting Report, 15-16 March 2016) 8.

<sup>33</sup> Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 6.

<sup>34</sup> Ibid.

<sup>35</sup> International Committee of the Red Cross, 'Views of the International Committee of the Red Cross on Autonomous Weapon System' (Working Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems, 11 April 2016) 2.

<sup>36</sup> International Committee of the Red Cross, 'Autonomous weapons: Decisions to kill and destroy are a human responsibility' *International Committee of the Red Cross* (Online article, 11 April 2016) <<https://www.icrc.org/en/document/statement-icrc-lethal-autonomous-weapons-systems>>

<sup>37</sup> See International Committee of the Red Cross, 'Autonomous weapons: Decisions to kill and destroy are a human responsibility' *International Committee of the Red Cross* (Online article, 11 April 2016) <<https://www.icrc.org/en/document/statement-icrc-lethal-autonomous-weapons-systems>>; International Committee of the Red Cross, 'Views of the International Committee of the Red Cross on Autonomous Weapon System' (Working Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems, 11 April 2016).

humanitarian law, without being too restrictive as to what would be considered a LAWS.<sup>38</sup> Therefore, the definition of LAWS would be flexible enough to make room for future weapon systems with autonomous functions and lethal payloads.

The United States Department of Defense has a similar definition of an autonomous weapon system defining it as 'a weapon system that, once activated, can select and engage targets without further intervention by a human operator'.<sup>39</sup> The key component in both definitions is that there is no further human intervention. As the two definitions of 'autonomous weapon system' are similar in content, this thesis will acknowledge and use aspects of both definitions. For the purposes of this thesis, autonomy in the context of AWS is the ability of a weapon system to identify, select and attack targets with little to no human interaction.

#### **1.4 JUSTIFICATION FOR USING THE TERM 'EFFECTIVE' HUMAN CONTROL**

In the existing literature, the term 'meaningful human control' has been suggested and used by organisations, practitioners, scholars and diplomats representing State parties in multilateral meetings.<sup>40</sup> However, the term 'meaningful' can lead to very subjective interpretations when the goal is to develop an objective and practical understanding of how human control should be exercised over LAWS.<sup>41</sup> For example, if the term meaningful human control is used to describe the type of human control that should be exercised over LAWS, it raises the question – what does 'meaningful' mean, and for whom? To avoid that question and having various, conflicting, subjective interpretations that can prolong action being taken to regulate LAWS, a more objective term to describe the kind of human control exercised by LAWS should be used. This is where the term 'effective' comes in.

---

<sup>38</sup> International Committee of the Red Cross, 'Autonomous weapons: Decisions to kill and destroy are a human responsibility' International Committee of the Red Cross (Online article, 11 April 2016) <<https://www.icrc.org/en/document/statement-icrc-lethal-autonomous-weapons-systems>>.

<sup>39</sup> See United States Department of Defense, 'Autonomy in Weapon Systems' (Directive No 3000.09, 21 November 2012) 13; James Igoe Walsh, 'Political accountability and autonomous weapons' (2015) 2(4) *Research & Politics* 1, 1-2.

<sup>40</sup> See, eg, Article 36, 'Key areas for debate on autonomous weapons systems' (Briefing Paper, Article 36, 13-16 May 2014); Denise Garcia, 'Technical statement by the International Committee for Robot Arms Control' (Statement, CCCW Informal Meeting of Experts 14 May 2014) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>; Frank Sauer, 'ICRAC statement on technical issues to the 2014 UN CCW Expert Meeting' (Media Release) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>.

<sup>41</sup> See Rebecca Crotoof, 'A Meaningful Floor for Meaningful Human Control' (2016) 30(1) *Temple International & Comparative Law Journal*, 54 for hypothetical examples of how various and subjective interpretations of meaningful human control.

The delegation from Ireland in their general statement at the 2014 Informal Meeting of Experts expressed that it is important to ensure that the control exercised over weapon systems is 'effective and not merely nominal'.<sup>42</sup> If human control over LAWS should be exercised effectively and not just nominally, then exercising meaningful human control would essentially mean exercising effective human control. With that in mind, it would be simpler to proceed with using the term effective human control rather than meaningful human control.

Furthermore, the term effective human control can also encompass a broader range of human activity that occurs when developing or acquiring, deploying and operating a LAWS which includes the commander's or operator's knowledge of the weapon system's functions and their judgement to deploy it. As the delegate of the United States in the 2014 Convention on Certain Conventional Weapons (CCW) Informal Meeting stated, 'the formulation [of meaningful human control that has been discussed] does not sufficiently capture the full range of human activity –'.<sup>43</sup> Although the term effective human control, or meaningful human control for that matter, has not been used in recent statements, the term effective human control can encompass the various meanings and terms that have been recently used. This includes terms such as human judgement, involvement, human-machine interaction and human responsibility.<sup>44</sup>

For the purposes of this thesis, the term effective human control takes into consideration the human judgement required to conduct the IHL assessments, human involvement, the responsibility to take the necessary precautionary measures and human-machine interaction when operating the weapon systems. Therefore, human judgement, human responsibility, human involvement and human-machine interaction will be reflected in the proposed working definition of effective human control.

---

<sup>42</sup> Ireland, 'Irish General Statement at the CCW Informal Consultations on Lethal Autonomous Weapons' (Statement, CCCW Informal Meeting of Experts on LAWS, 13 May 2014).

<sup>43</sup> Stephen Townley, 'Statement by the United States' (Audio Speech, CCCW Informal Meeting of Experts on LAWS, 16 May 2014) quoted in Thompson Chengeta, 'Defining the Emerging Notion of Meaningful Human Control in Weapon Systems' (2017) 49(3) *New York University Journal of International Law and Politics* 833, 859. See also Karl Chang, 'Intervention by the United States' (Statement, CCW Group of Governmental Experts on LAWS, 21-25 September 2020).

<sup>44</sup> See Austria, 'Joint Statement on Lethal Autonomous Weapons Systems' (Statement, United Nations General Assembly, 77th session, First Committee 21 October 2022); *Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, CCW/GGE.1/2019/3, 2nd sess, Agenda Item 6, (25 September 2019) 13.

## 1.5 RESEARCH QUESTIONS

The questions that will focus and guide the research are as follows:

1. What current international humanitarian law rules and principles apply to LAWS?
2. Why are militaries interested in developing and using LAWS?
3. What are the current practices of States concerning the development and use of LAWS?
4. What are common LAWS used by States today?
5. What are some of the legal challenges posed by LAWS?
6. What factors should be considered when building a definition of effective human control?

## 1.6 METHODOLOGY

To answer the research questions, the research method employed will primarily be a doctrinal approach. This would involve locating relevant sources of international humanitarian law which includes international treaties, customary international humanitarian law, judicial decisions from international courts and tribunals as well as literature on international humanitarian law written by prominent scholars. These sources are outlined in the *Statute of the International Court of Justice* under article 38(1) and are considered credible sources of international law. Article 38(1) provides that when deciding on matters brought to the International Court of Justice, the Court 'shall apply' international treaties or conventions recognised by the State parties' (art 38(1)(a)), international customary law (art 38(1)(b)) and 'the general principles of law recognised by State parties (art 38(1)(c)). Article 38(1)(d) provides that subsidiary sources such as judicial decisions and publications of prominent scholars can also be considered and applied.<sup>45</sup> However, previous judicial decision by the International Court of Justice, or any court for that matter, is neither binding nor considered precedent; they are merely persuasive sources. Publications of prominent scholars are also merely persuasive sources.

Customary international humanitarian law is an important source to consider for this research as it outlines practices that are accepted as law by States. Although customary international law rules are not necessarily in writing, States are still obliged to act in accordance with these rules because they have been accepted as legally binding by

---

<sup>45</sup> *Statute of the International Court of Justice* art 38(1)(a)-(d).

States.<sup>46</sup> Two elements are required for rules to be considered as customary international law. One, there must be evidence of state practice. Two, there must be the element of *opinio juris*, States have to believe that the practice is 'required, prohibited or allowed'.<sup>47</sup> Overall, the rules of customary international humanitarian law and its binding nature are important when researching principles and rules relevant to the governance of autonomous weapon systems.

Secondary sources such as webpages of companies that develop weapon systems will be used to obtain information on LAWS that are currently being deployed or under development. Academic blogs run by organisations such as the ICRC will be used to obtain further information about relevant rules and principles and to locate commentary on the development and use of LAWS. Journal articles from international law scholars will be used to help analyse how IHL and ICL, regarding accountability, apply to the development and use of weapon systems which will then inform the development of the working definition of effective human control. Furthermore, journal articles from engineering scholars will be used to provide an accurate and realistic portrayal of how autonomy works in weapon systems.

Reports and statements from the GGE on LAWS will help ensure that the working definition of effective human control proposed by the thesis is informed by the discussions within the GGE on LAWS meetings. Furthermore, sources such as military manuals, domestic legislation, policy documents and statements from States, organisations and experts will also be used to inform the analysis in this thesis. These sources will also contribute to the development of a practical and implementable working definition of effective human control.

## 1.7 THESIS STRUCTURE

### CHAPTER ONE: INTRODUCTION

Chapter one will outline the importance of the research by providing background information on the development and use of autonomous weapon systems, as well as the challenges

---

<sup>46</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) xvi, xxxvi; International Committee of the Red Cross, 'Customary International Humanitarian Law' (Online article, 29 October 2010) <<https://www.icrc.org/en/document/customary-international-humanitarian-law-0>>.

<sup>47</sup> *Statute of the International Court of Justice* 38(1)(b); Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) xxxvii-xxxviii; *Continental Shelf Case (Libyan Arab Jamahiriya v. Malta) (Judgment)* [1985] ICJ Rep 13, 29-30, [27]; *North Sea Continental Shelf Cases (Federal Republic of Germany v Denmark/ Federal Republic of Germany v Netherlands) (Judgement)* [1969] ICJ Rep 4, 3; *Prosecutor v Tadić (Decision on the Defence Motion for Interlocutory Appeal on Jurisdiction)* (International Criminal Court for the Former Yugoslavia, Appeals Chamber, Case No IT-94-1, 2 October 1995) 99.

they pose to armed conflict and the enforcement of international humanitarian law. It will outline the main arguments that will be addressed and the limitations of the research. It will explain that there is no scope for a detailed discussion about the limitations of international humanitarian law in governing autonomous weapon systems. The thesis focuses on providing a working definition of 'effective human control' to retain over autonomous weapon systems.

#### CHAPTER TWO: THE PUZZLE GOVERNING LETHAL AUTONOMOUS WEAPON SYSTEMS

Chapter two will provide an overview of the rules and principles of IHL. This overview will refer to sources of IHL such as the Geneva Conventions and its Additional Protocols, the Hague Conventions, the *Convention on Certain Conventional Weapons* ('the CCCW'),<sup>48</sup> customary IHL and judicial decisions. It will examine the principles and rules of international humanitarian law that apply to the development and use of LAWS. The overview will include discussions on current State practices in implementing such rules and principles and address current procedures set by certain States for conducting legal reviews of weapons.

#### CHAPTER THREE: THE NATURE OF LAWS: MILITARY INTEREST, CURRENT WEAPON SYSTEMS AND COMPLIANCE WITH IHL

Chapter three will begin by exploring the reasons why State militaries are increasingly investing in artificial intelligence and the use of autonomous weapon systems. This chapter will also examine current and emerging LAWS and how they would pose a legal challenge in complying with international humanitarian law. There will be a discussion of the features of LAWS such as the sensors, cameras, GPS and algorithms. This will help identify how these features may, or may not, enable such weapon systems to properly comply with international humanitarian law. This will be followed by a discussion on whether LAWS, on the face of it, can comply with IHL and if its development or use would have any potential issues in complying with IHL.

#### CHAPTER FOUR: DELIBERATIONS ON LAWS

Chapter four will explore and reflect upon the discussions that have occurred so far during the three informal meetings of experts on LAWS and the three meetings of the GGE on LAWS. This is to better understand what should be considered in the working definition of

---

<sup>48</sup> *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*, opened for signature 10 April 1981, 1342 UNTS 137 (entered into force 2 December 1983).



effective human control. Analysing the content of the meetings will provide insight into how the discussion on LAWS has developed, in particular how the delegates and experts are approaching the concept of autonomy in weapon systems and human control over LAWS.

#### CHAPTER FIVE: FROM DEVELOPMENT TO AFTERMATH: ACCOUNTABILITY AND THE ROLE OF HUMAN CONTROL

Chapter five will examine the role of human decision-making in international humanitarian law. It will emphasise that international humanitarian law has been written for human discretion to be a key component when engaging in an attack. It will discuss the necessity of human control and discretion when planning and launching an attack on military targets to comply with international humanitarian law. This chapter will examine Australia's process of exercising human control throughout a weapon system's lifecycle as the main case study with comparisons to other States whose process is publicly available. This chapter will also link human control to the issue of international criminal responsibility that may arise when the use of autonomous weapon systems leads to a violation of international humanitarian law. It will consider to what extent the use of autonomous weapon systems will alter the traditional sense of command and control and the concept of command responsibility, as well as examine the consequences that may follow.

#### CHAPTER SIX: DEFINING EFFECTIVE HUMAN CONTROL

Chapter six will draw upon the analyses and discussions of earlier chapters. The chapter will highlight three key factors that demonstrate the need for flexibility in regulating LAWS. These are 1) the various types of LAWS; 2) the varying levels of autonomy of the different types of LAWS, and 3) the varying forms of human control that can be exercised over LAWS throughout their lifecycle. A working definition of effective human control that incorporates these key factors is then proposed. Rules and principles regarding state responsibility, individual criminal responsibility and command responsibility will also form part of the foundation of the working definition. The chapter will conclude by analysing the benefits and limitations of the working definition and implementing it.

#### CHAPTER SEVEN: THE NEXT STEPS FOR EFFECTIVE HUMAN CONTROL

Chapter Seven, the concluding chapter, will draw upon the analyses in chapters two to six to demonstrate how the working definition of effective human control was constructed. The chapter will summarise the answers to the research questions that have guided the analyses and discussions in this thesis, restate the working definition and provide an overview of its

benefits and limitations. The chapter will conclude by discussing some limitations of the thesis and recommendations for further research.

---

## CHAPTER TWO: THE PUZZLE GOVERNING LETHAL AUTONOMOUS WEAPON SYSTEMS

---

## 2.1 INTRODUCTION

Chapter two lays the foundation for the discussions in the following chapters by reviewing the principles and rules of international humanitarian law (IHL). The chapter examines the current situation regarding the governance of lethal autonomous weapon systems (LAWS). Chapter two answers the question: What current IHL rules and principles govern LAWS? This chapter argues that the principles and rules relevant to governing the development and use of LAWS are like pieces of puzzles located in various sources of IHL, and when all the pieces are put together, that is when one can see the overall picture of how LAWS are currently governed under IHL. This chapter also argues that it is necessary to consider these rules and principles when building the working definition of effective human control.

Chapter two will first examine the fundamental principles of international humanitarian law and how they are referred to as a guide for the development and use of weapon systems. Through the examination of the fundamental principles, this chapter will refer to key treaties such as the Geneva Conventions and the Additional Protocols as well as the Hague Conventions.<sup>1</sup> The chapter will then explore the role and significance of legal reviews of weapons under article 36 of the *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)* ('*Additional Protocol I*') as it is one of the key rules and mechanisms relevant to

---

<sup>1</sup> *Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field*, opened for signature 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950); *Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea*, opened for signature 12 August 1949, 75 UNTS 85 (entered into force 21 October 1950); *Geneva Convention (III) Relative to the Treatment of Prisoners of War*, opened for signature 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950); *Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War*, opened for signature 12 August 1949, 75 UNTS 287 (entered into force 21 October 1950); *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978); *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of non-international armed conflicts (Protocol II)*, opened for signature 7 December 1977, 1125 UNTS 609 (entered into force 7 December 1978); *Hague Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land*, opened for signature 29 July 1899, 187 CTS 429 (entered into force 4 September 1900); *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910).

the governance of LAWS.<sup>2</sup> Chapter two will conclude with a discussion of the *Convention on Certain Conventional Weapons* regarding the current role it plays in governing the development and use of weapons in addition to the potential role it could play in governing the development and use of LAWS.

## 2.2 WHY REVISIT THE FUNDAMENTAL PRINCIPLES OF IHL?

It is first necessary to revisit the fundamental principles of IHL as these principles apply to the development and use of LAWS due to their customary status in IHL which will be further explained below. This has been acknowledged by the GGE on LAWS Guiding Principles published in the Report of the 2019 Session.<sup>3</sup> Furthermore, it is acknowledged that the States who have ratified existing IHL treaties are bound by those treaty obligations. Nevertheless, there are still States that have not ratified all relevant IHL treaties. Therefore, to account for that, it is reasonable to proceed with discussing the fundamental principles of IHL with reference to the relevant articles and treaties that have codified those principles, as well as their customary status in international law.

The fundamental principles include the principles of humanity, military necessity, distinction, proportionality and the prohibition on indiscriminate attacks. These principles are codified in articles from various treaties and customary IHL sources that are put together to help govern the use and development of LAWS. Therefore, it makes it more complicated to determine what the limit is in developing LAWS, and what would be an acceptable use of such weapon systems. In addition, none of the principles provides a clear expression of the limits of autonomy, only a guideline that could be interpreted in several ways.

While revisiting the fundamental principles of international humanitarian law, this chapter will also examine the State practice of these principles. However, it is important to keep in mind that the evidence of widespread state practice, or lack

---

<sup>2</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 36.

<sup>3</sup> *Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, CCW/GGE.1/2019/3, 2nd sess, Agenda Item 6, (25 September 2019) 13 (Annex IV). See also *Report of the 2021 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, 3rd sess, Agenda Item 7, UN Doc CCW/GGE.1/2021/3 (22 February 2022) 10, [12].

thereof, of a rule in customary international law or a treaty, does not necessarily determine the relevance and significance of that rule or treaty. Nevertheless, it is still necessary to understand how principles and rules of international humanitarian law applicable to the governance of autonomous weapon systems are put into practice by States. This will enable an examination of how States have interpreted the concept of human control through their practices that will in turn aid in building a suitable working definition and description of effective human control. Overall, reviewing existing rules, principles and State practices are necessary since new regulations and standards for LAWS should draw on those existing rules, principles and practice.<sup>4</sup>

### **2.3 THE FUNDAMENTAL PRINCIPLES**

There are fundamental principles of international humanitarian law that all States must abide by when engaged in armed conflict, as they are not only encoded into treaty law but also considered part of customary international law. Rules of customary international law do not require the consent of States to be binding. The reason why these established customary rules and principles are binding upon all States is that they have been, and still continue to be, widely practiced and accepted as legally binding by States.<sup>5</sup> Therefore, the development and use of LAWS must comply with the fundamental principles of IHL.

This sentiment has been made clear by the International Court of Justice (ICJ) in their advisory opinion regarding the legality of the threat or use of nuclear weapons. The Court stated that many international humanitarian law rules ‘...are so fundamental to the respect of the human person [that]...these fundamental rules are to be observed by all States whether or not they have ratified the conventions that contain them...’.<sup>6</sup> The Court added that States should observe these fundamental principles ‘...because they constitute intransgressible principles of international customary law’.<sup>7</sup> The application of these fundamental and intransgressible principles of international humanitarian law is relevant to the

---

<sup>4</sup> Vincent Boulanin et al, 'Limits on Autonomy in Weapon Systems' (Report, June 2020) x, 38.

<sup>5</sup> See *Statute of the International Court of Justice* art 38 (1)(b); Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) xxxvii-xxxviii.

<sup>6</sup> *Legality of the Threat or Use of Nuclear Weapons* (Advisory Opinion) [1996] ICJ Rep 226, [79].

<sup>7</sup> *Ibid.*

development and use of LAWS since the ICJ determined that those principles apply ‘to all forms of warfare and to all kinds of weapons’ of the past, present and future.<sup>8</sup>

As a result of no specific regulations of LAWS as well as the reluctance of States to develop and adopt new regulations, military personnel and lawyers use the existing fundamental principles of international humanitarian law as a guide for their operational activities.<sup>9</sup>

### 2.3.1 THE PRINCIPLE OF HUMANITY

The underlying principle of humanity ensures that civilians, combatants and belligerents — individuals who do not have combatant status but have taken up arms — continue to be protected by international humanitarian law even in situations not addressed, or insufficiently addressed, by treaty law.<sup>10</sup> Its aim is also to ‘minimise suffering in armed conflict’ and to ensure that no unnecessary suffering is inflicted on protected persons under international humanitarian law.<sup>11</sup> The Martens Clause, which is part of the preamble in *Hague Convention (II)* and *(IV)*, embodies this principle and will be the focus of this discussion. It provides that:

Until a more complete code of the laws of war has been issued, the High Contracting Parties deem it expedient to declare that, in cases not included in the Regulations adopted by them, the inhabitants and the belligerents remain under the protection and the rule of the principles of the law of nations, as they result from the usages established among civilized peoples, from the laws of humanity, and the dictates of the public conscience.<sup>12</sup>

---

<sup>8</sup> Ibid [86].

<sup>9</sup> Robert McLaughlin and Hitoshi Nasu, ‘Conundrum of New Technologies in the Law of Armed Conflict’ in Robert McLaughlin and Hitoshi Nasu (eds) *New Technologies and the Law of Armed Conflict* (T.M.C Asser Press, 2014) ch 1, pt 1.2.

<sup>10</sup> Laurie R. Blank and Gregory P. Noone, *International Law and Armed Conflicts: Fundamental Principles and Contemporary Challenges in the Law of War* (Wolters Kluwer, 2016) 29.

<sup>11</sup> Ibid.

<sup>12</sup> See *Hague Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land*, opened for signature 29 July 1899, 187 CTS 429 (entered into force 4 September 1900); *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910); Nicholas Tsagourias and Alasdair Morrison, *International Humanitarian Law: Cases, Materials and Commentary* (Cambridge University Press, 2018) 40.

Thus, the principle of humanity implies that there is 'an inherent worth and dignity of the person, and by extension, the right to life' and promotes the safety and protection of civilians.<sup>13</sup>

An important point to note regarding the meaning of dictates of public conscience is that it can be viewed as public opinion or viewed as a reflection of *opinio juris*.<sup>14</sup> Judge Shahabuddeen held that UN General Assembly Resolutions would be an appropriate source for the ICJ to take judicial notice of when determining what the dictates of the public conscience are concerning a particular matter.<sup>15</sup> This is because the ICJ 'must confine its attention to sources which speak with authority' despite not being bound by the 'technical rules of evidence'.<sup>16</sup> Furthermore, human rights standards play a large role in shaping the dictates of public conscience.<sup>17</sup> For example, Australia's oral submissions regarding the legality of nuclear weapons, highlighted the importance of human rights when determining the dictates of public conscience.<sup>18</sup>

As there has not been any conclusive United Nations (UN) General Assembly resolution on LAWS, it would be intriguing to see what the ICJ would look to when determining the dictates of the public conscience on the development and use of LAWS. One would consider that statements and presentations from the GGE on LAWS would be sources that would help provide an insight into the public conscience on LAWS. However, it may not be sufficient as the ICJ may not see them as authoritative sources, or an accurate reflection of the public conscience

---

<sup>13</sup> Larissa Fast, 'Unpacking the principle of humanity: Tensions and implications' (2016) 97(897/898) *International Review of the Red Cross* 111, 112.

<sup>14</sup> Theodor Meron, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78, 84-85.

<sup>15</sup> See *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 410 (Judge Shahabuddeen); Rupert Ticehurst, 'The Martens Clause and the Laws of Armed Conflict' (1997) 37(317) *International Review of the Red Cross* 125.

<sup>16</sup> *Ibid.*

<sup>17</sup> Theodor Meron, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78, 84.

<sup>18</sup> See Sarah Roberts, Greg Eggins and Caroline Ireland, 'International Court of Justice - Requests for Advisory Opinions on the Legality of Nuclear Weapons - Australian Statement' (1996) 17 *Australian Year Book of International Law* 685, 699 cited in Theodor Meron, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78, 84.



since the statements and presentations do not reflect the views of the majority of states.

This principle is also reflected in article 1(2) of *Additional Protocol I*.

In cases not covered by this protocol or by other international agreements, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience.<sup>19</sup>

It can be concluded that article 1(2) of *Additional Protocol I* is a reiteration of the Martens Clause based on how the wording of the clause and the preamble are similar.<sup>20</sup> However, it should be noted that the wording of the Martens Clause is interpreted differently in the Hague Conventions compared to *Additional Protocol I*, which has caused some concern. Meron points out that the Martens Clause in article 1(2) of *Additional Protocol I* replaced the term 'usages' from the Martens Clause in the Hague Conventions with the term 'established custom'.<sup>21</sup> According to Meron, this conflates the emerging product of the Martens clause, which is a principle of international law, with one of its components, which is established customs. This conflation creates more questions about the role and function of the uncodified principles of humanity and the dictates of public conscience.<sup>22</sup> Thus, the logic and coherence of the Martens Clause are eroded by the wording in article 1(2) of *Additional Protocol I*.<sup>23</sup>

Nevertheless, the Martens Clause stresses the importance of customary norms when there are no written rules as well as 'provides authority to look beyond treaty

---

<sup>19</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 1(2). See also Nicholas Tsagourias and Alasdair Morrison, *International Humanitarian Law: Cases, Materials and Commentary* (Cambridge University Press, 2018) 40.

<sup>20</sup> See *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 1(2); Theodor, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78; Rupert Ticehurst, 'The Martens Clause and the Laws of Armed Conflict' (1997) 37(317) *International Review of the Red Cross* 125.

<sup>21</sup> Theodor Meron, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78, 81.

<sup>22</sup> *Ibid.*

<sup>23</sup> *Ibid.*

and custom to consider the principles of humanity and the dictates of public conscience'.<sup>24</sup> What is important here when considering new weapons technology such as LAWS is that if there is doubt about what rules and principles apply to the development and use of LAWS, then the Martens Clause provides that the interpretation of IHL should be consistent with the principles of humanity and the dictates of public conscience.<sup>25</sup>

The Geneva Conventions also have a version of the Martens Clause that acts as a warning to State parties that if a State party denounces the Geneva Conventions, the State party is still bound to customary international law that results from the 'usages established among civilized peoples, from the laws of humanity, and the dictates of the public conscience.'<sup>26</sup> Moreover, the Trial Chamber of the International Criminal Tribunal for the former Yugoslavia (ICTY), held that the principle of humanity 'has by now become part of customary international law' according to 'the authoritative view of the International Court of Justice' and 'international practice'.<sup>27</sup>

---

<sup>24</sup> Rupert Ticehurst, 'The Martens Clause and the Laws of Armed Conflict' (1997) 37(317) *International Review of the Red Cross* 125; Meron, Theodor, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78; 80-81; *Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226, 406 (Judge Shahabuddeen).

<sup>25</sup> Theodor Meron, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78,87-88.

<sup>26</sup> *Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field*, opened for signature 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950) arts 62-63, 142, 158; *Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea*, opened for signature 12 August 1949, 75 UNTS 85 (entered into force 21 October 1950) arts 62-63, 142, 158; *Geneva Convention (III) Relative to the Treatment of Prisoners of War*, opened for signature 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950) arts 62-63, 142, 158; *Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War*, opened for signature 12 August 1949, 75 UNTS 287 (entered into force 21 October 1950) arts 62-63, 142, 158; Theodor Meron, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78, 80; *Hague Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land*, opened for signature 29 July 1899, 187 CTS 429 (entered into force 4 September 1900); *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910).

<sup>27</sup> *Prosecutor v Kupreškić (Trial Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Trial Chamber, Case No IT-95-16-T, 14 January 2000) [525]. See also Nicholas Tsagourias and Alasdair Morrison, *International Humanitarian Law: Cases, Materials and Commentary* (Cambridge University Press, 2018) 41.

The ICJ, in the *Corfu Channel Case* and the *Military and Paramilitary Activities in and against Nicaragua Case (Nicaragua Case)*, explored the principle of humanity and the principles of due diligence and no harm. In the *Corfu Channel Case*, the ICJ considered that Albania's obligations to notify the British authorities regarding the mines in the Corfu Channel are based on:

[C]ertain general and well-recognised principles, namely; elementary considerations of humanity, even more exacting in peace than in war; the principle of the freedom of maritime communication; and every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.<sup>28</sup>

The mention of 'elementary considerations of humanity' is noted to be an echo of the Martens Clause, as well as an adaptation of the laws of humanity for peacetime.<sup>29</sup> This transforms the Martens Clause, and the laws of humanity, into a 'free-standing general principle of international law'.<sup>30</sup> However, no further explanation regarding the content, scope and methodology for future application was provided by the ICJ in its judgment of 9 April 1949.<sup>31</sup>

On 27 June 1986, in the judgment of the *Nicaragua Case*, the ICJ elaborated on the concept of the elementary considerations of humanity. The ICJ held that '...the conduct of the United States may be judged according to the fundamental general principles of humanitarian law'.<sup>32</sup> The ICJ explained that, in its opinion, the Geneva Conventions embody those fundamental general principles.<sup>33</sup> The Court specifically drew attention to article three, common to all four of the Geneva Conventions, which outlined the minimum standards to be applied in armed conflicts. The Court opined that the principles and rules set out in common article

---

<sup>28</sup> *The Corfu Channel Case (United Kingdom of Great Britain and Northern Ireland v Albania) (Judgment)* [1949] ICJ Rep 4, 22.

<sup>29</sup> Matthew Zagor, 'Elementary Considerations of Humanity' in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group 1st ed, 2012) 264, 264.

<sup>30</sup> *Ibid*,

<sup>31</sup> *Ibid* 266.

<sup>32</sup> *Military and Paramilitary Activities in and against Nicaragua Case (Nicaragua v United States of America) (Judgment)* [1986] ICJ 14, 113, [218].

<sup>33</sup> *Ibid*.

three were what the Court in the *Corfu Channel Case* meant by 'elementary considerations of humanity'.<sup>34</sup>

It was also noted by the ICTY that customary norms, such as 'the prohibition against attacking the civilian population...and the general principle limiting the means and methods of warfare' are drawn from the elementary considerations of humanity that are reflected in the Martens Clause.<sup>35</sup> Therefore, the elementary considerations of humanity form the foundation for the other customary norms; thus, the foundation for IHL.

Since the ICJ had specifically referenced common article three of the Geneva Conventions, it is appropriate to take a closer look at common article three. This provides the minimum standards to be applied in non-international armed conflicts.<sup>36</sup> As the ICJ said in the *Nicaragua Case*, 'there is no doubt...in the event of international armed conflicts, these rules also constitute a minimum yardstick...'.<sup>37</sup> These minimum standards include treating people who are not active participants in hostilities (civilians, combatants who have surrendered and combatants who are *hors de combat*) humanely and provide that the following are prohibited:

- a) violence to life and person, in particular murder of all kinds, mutilation, cruel treatment and torture;
- b) taking of hostages;
- c) outrages upon personal dignity, in particular humiliating and degrading treatment;
- d) the passing of sentences and the carrying out of executions without previous judgment pronounced by a regularly constituted court, affording all

---

<sup>34</sup> Ibid 114, [218].

<sup>35</sup> *Prosecutor v Martić (Decision)* (International Criminal Tribunal for the Former Yugoslavia, Trial Chamber, Case No IT-95-11-R61, 8 March 1996) [13] ('*Prosecutor v Martić*').

<sup>36</sup> *Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field*, opened for signature 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950) art 3; *Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea*, opened for signature 12 August 1949, 75 UNTS 85 (entered into force 21 October 1950) art 3; *Geneva Convention (III) Relative to the Treatment of Prisoners of War*, opened for signature 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950) art 3; *Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War*, opened for signature 12 August 1949, 75 UNTS 287 (entered into force 21 October 1950) art 3.

<sup>37</sup> *Military and Paramilitary Activities in and against Nicaragua Case (Nicaragua v United States of America) (Judgment)* [1986] ICJ 14, 114, [218].

the judicial guarantees which are recognized as indispensable by civilized peoples.<sup>38</sup>

Common article three also provides that '[t]he wounded and sick shall be collected and cared for' and that 'an impartial humanitarian body.... may offer its services to the Parties to the conflict'.<sup>39</sup> According to the ICJ, this minimum standard of humane treatment during armed conflict is the foundation of the elementary considerations of humanity that apply to international and non-international armed conflicts.

The elementary considerations of humanity are also reflected in the fundamental guarantees outlined in article 75 of *Additional Protocol I*. Article 75 ensures minimum protection under the Geneva Conventions and *Additional Protocol I* to those 'who do not benefit from more favourable treatment' unlike combatants and civilians who do benefit from more specific protections.<sup>40</sup> Article 75 prohibits actions such as 'violence to life, health, or physical or mental well-being of persons' specifying the prohibition of murder, torture of any kind, corporal punishment and mutilation.<sup>41</sup> Article 75 also contains details on what a Party to a conflict should and should not do concerning due process, people whose liberty has been restricted (ensuring that women are held in separate quarters to men in particular) and people who are detained for reasons related are guaranteed to enjoy protection under common article three until 'final release, reparation or re-establishment' even after the armed conflict has ended'.<sup>42</sup> Thus, article 75 elaborates further on the fundamental protections outlined in common article three that apply to international armed conflicts.

---

<sup>38</sup> *Geneva Convention (I) For the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field*, opened for signature 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950) art 3; *Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea*, opened for signature 12 August 1949, 75 UNTS 85 (entered into force 21 October 1950) art 3; *Geneva Convention (III) Relative to the Treatment of Prisoners of War*, opened for signature 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950) art 3; *Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War*, opened for signature 12 August 1949 75 UNTS 287 (entered into force 21 October 1950) art 3.

<sup>39</sup> *Ibid* art 3(2).

<sup>40</sup> *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 75(1).

<sup>41</sup> *Ibid* art 75(2).

<sup>42</sup> *Ibid* art 75(3)-(8).

Article four of *Additional Protocol II* also elaborates on the fundamental guarantees applicable in non-international armed conflicts. Article 4(1) provides that:

All persons who do not take a direct part or who have ceased to take part in hostilities, whether or not their liberty has been restricted, are entitled to respect for their person, honour and convictions and religious practices. They shall in all circumstances be treated humanely, without any adverse distinction. It is prohibited to order that there shall be no survivors.<sup>43</sup>

This statement ensures that anyone who is not specially protected under the Geneva Conventions and its Additional Protocols still receives basic protections during armed conflict.

The principle of humanity along with the elementary considerations of humanity expressed in the Martens Clause and other similar articles play an important role in regulating new weapons technology such as LAWS. They are both foundational to the core purpose of international humanitarian law and can apply to situations not addressed, or not sufficiently addressed, by treaties indicating that customary law still applies. It is an expression of the most basic laws of humanity which is embedded in the Geneva Conventions and other treaties governing the conduct of nations during war and peacetime.

As the delegation from Brazil stated in its opening remarks at the 2014 Meeting of Experts, the principle of humanity and the Martens Clause ‘allows us to navigate safely new and dangerous waters....’<sup>44</sup> Human rights groups and others opposing the development and use of fully lethal autonomous weapon systems have argued that if humans were removed from the life and death decision-making process, this would be inherently contradictory to the principle of

---

<sup>43</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of non-international armed conflicts (Protocol II)*, opened for signature 7 December 1977, 1125 UNTS 609 (entered into force 7 December 1978) (*‘Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of non-international armed conflicts (Protocol II)’*) art 4(1).

<sup>44</sup> Pedro Motta Pinto Coelho, ‘Statement by H.E Ambassador Pedro Motta Pino Coelho’ (Speech, CCW Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014) 2.

humanity and the dictates of public conscience.<sup>45</sup> Furthermore, it was noted in the 2019 GGE on LAWS, and re-emphasised by some delegates in the 2021 GGE on LAWS that:

In cases involving weapons systems based on emerging technologies in the area of lethal autonomous weapons systems not covered by the CCW and its annexed Protocols or by other international agreements, the civilian population and the combatants shall at all times remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience.<sup>46</sup>

This demonstrates the importance of the principle of humanity and the dictates of public conscience in the Martens Clause to the development and use of LAWS.

### 2.3.2 THE PRINCIPLE OF MILITARY NECESSITY

The principle of military necessity permits armed forces to use force that is not prohibited by international humanitarian law and to use force that is necessary to achieve a legitimate military objective.<sup>47</sup> Furthermore, the measures needed to minimize unnecessary force and harm are determined by what amount of force would be acceptable for a particular operation.<sup>48</sup> This is when the principle of proportionality comes into play. To demonstrate the interaction between the principles of military necessity and proportionality, Boothby and Von Heinegg referred to paragraph 2.2.1 of the US Department of Defence Law of War Manual which states that 'military necessity "also justifies certain incidental harms that

---

<sup>45</sup> Michael T. Klare, 'Autonomous Weapon Systems and the Laws of War' 49 (March 2019) *Arms Control Today*.

<sup>46</sup> See *Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, CCW/GGE.1/2019/3, 2nd sess, Agenda Item 6, (25 September 2019) 14, [17(g)]; Australia et al, 'Building on Chile's Proposed Four Elements of Further Work for the Convention on Certain Conventional Weapons (CCW) Group of Governmental Experts (GGE) on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems (LAWS)' (Statement, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon System 27 September 2021) 2.

<sup>47</sup> See Nicholas Tsagourias and Alasdair Morrison, *International Humanitarian Law: Cases, Materials and Commentary* (Cambridge University Press, 2018) 41-45; William H. Boothby and Wolff Heintschel von Heinegg, *The Law of War* (Cambridge University Press, 2018) 31; Laurie R. Blank and Gregory P. Noone, *International Law and Armed Conflicts: Fundamental Principles and Contemporary Challenges in the Law of War* (Wolters Kluwer, 2016) 26.

<sup>48</sup> *Ibid.*

inevitably result from the actions it justifies”<sup>49</sup> Boothby and Von Heinegg then point out that ‘...it is the principle of proportionality that determines the extent to which military necessity justifies such harms’.<sup>50</sup>

There is also a connection between the principle of military necessity and the prohibition on the use of means and methods of warfare which are of a nature to cause superfluous injury or unnecessary suffering. States have pointed out that there needs to be a balance struck between the principle of military necessity on one hand, and the expected harm or suffering inflicted on a person on the other hand.<sup>51</sup> Should the harm or suffering inflicted on a person be excessive and out of proportion compared to the military advantage expected to be gained, then there is a violation of the prohibition on superfluous injury and unnecessary suffering.<sup>52</sup>

It has been noted that the prohibition on the infliction of superfluous injury and unnecessary suffering was created to apply to combatants rather than civilians.<sup>53</sup> Moreover, the prohibition is occasionally considered to be part of the principle of humanity discussed earlier.<sup>54</sup> Article 23(e) of *Hague Convention (IV)* is an example of how the prohibition is incorporated into treaties. Article 23(e) of the *Regulations* prohibits the employment of ‘arms, projectiles, or material calculated to cause unnecessary suffering’.<sup>55</sup>

The principle of military necessity is encoded in military manuals as far back as the *Lieber Code* from the United States adopted in April 1863 and as current as

---

<sup>49</sup> William H. Boothby and Wolff Heintschel von Heinegg, *The Law of War* (Cambridge University Press, 2018) 32.

<sup>50</sup> *Ibid.*

<sup>51</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 70 (see pg 240).

<sup>52</sup> *Ibid.*

<sup>53</sup> Emily Crawford and Alison Pert, *International Humanitarian Law* (Cambridge University Press, 2015) 46.

<sup>54</sup> See Emily Crawford and Alison Pert, *International Humanitarian Law* (Cambridge University Press, 2015) 47; Laurie R Blank and Gregory P. Noone, *International Law and Armed Conflicts: Fundamental Principles and Contemporary Challenges in the Law of War* (Wolters Kluwer, 2016) 29.

<sup>55</sup> *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910) art 23(e).



*The Joint Service Manual of the Law of Armed Conflict* from the United Kingdom. It has also been discussed in several international cases such as *US v. Wilhelm List et al* in the US Military Tribunal in Nuremberg, the ICJ Advisory Opinion on *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory*, the ICTY case of *Prosecutor v Martić* and the International Criminal Court (ICC) case of *The Prosecutor v. Germain Katanga*.<sup>56</sup>

These manuals and cases emphasise that State military forces must only target military objectives and use force that is enough to weaken the opposition. Another instrument that emphasises this notion is the *Declaration of Saint Petersburg*. It provides that ‘...the only legitimate object which States should endeavour to accomplish during war is to weaken the military forces of the enemy’.<sup>57</sup> The US Military Tribunal in *US v. Wilhelm List et al* remarked that ‘military necessity permits a belligerent, subject to the laws of war, to apply any amount and kind of force to compel the complete submission of the enemy with the least possible expenditure of time, life and money’.<sup>58</sup> Therefore, State armed forces and belligerents must ensure that their objective is limited to military targets, and the force used should not go beyond what is needed to weaken or subdue the opposition.

Some states and courts have interpreted the principle of military necessity in a broad way that gives states ‘the right to do anything that contributes to the winning of war’.<sup>59</sup> One example comes from The Supreme Court of Israel, sitting as the High Court of Justice at the time, in *Beit Sourik Village Council v. The Government of Israel and the Commander of the IDF*. The High Court held that ‘our opinion is that the military commander is authorised – by international law applicable to an area under belligerent occupation – to take possession of land, if this is necessary for the needs of the army...’ and that ‘it is permitted, by international law... to take

---

<sup>56</sup> Nicholas Tsagourias and Alasdair Morrison, *International Humanitarian Law: Cases, Materials and Commentary* (Cambridge University Press, 2018) 41-45.

<sup>57</sup> *Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight (Declaration of Saint Petersburg)*, opened for signature 11 December 1868, ILM (entered into force 11 December 1868)

<sup>58</sup> *United States v Wilhelm List et al (Judgment)* (1949) 8 LRTWC 34, 66 (United States Military Tribunal, Nuremberg).

<sup>59</sup> *United States v Wilhelm Von Leeb et al (Judgment)* (1949) 12 LRTWC 1, 93-94 (United States Military Tribunal, Nuremberg).

possession of an individual's land...to erect the separation fence... on the condition that this is necessitated by military needs'.<sup>60</sup> Thus, taking a broader approach to military necessity.

However, the ICJ, concerning the construction of a wall in occupied Palestinian territory, took a different position compared to the High Court of Justice. The ICJ commented that it is '...not convinced that the destructions carried out contrary to the prohibition in Article 53 of the Fourth Geneva Convention were rendered absolutely necessary by military operations'.<sup>61</sup> This opinion reaffirms the narrower interpretation of the principle mentioned in *US v Wilhelm List et al*, where militaries are permitted to use force that costs the least number of civilian lives and does not exceed the amount necessary to subdue enemy forces.

Furthermore, the Tribunal in *US v Wilhelm Von Leeb et al* remarked that 'such a view [where a State has the right to do anything necessary to win the war] would eliminate all humanity and decency and all law from the conduct of war'.<sup>62</sup> Nevertheless, there are situations when the destruction of civilian objects cannot be avoided. For example, if the target of an attack is a military objective but civilians and civilian objects are within the surrounding area, collateral damage to civilians and civilian objects may not be avoidable.<sup>63</sup> However, this type of situation does not provide an excuse to ignore the prohibition on indiscriminate attacks. The prohibition, discussed in more detail later in the chapter, must still be considered and the military personnel in charge must ensure that the effects of the attack can still be contained to military objectives and not be indiscriminate.<sup>64</sup> Furthermore, the principle of proportionality, also discussed in

---

<sup>60</sup> *Beit Sourik Village Council v The Government of Israel and the Commander of the IDF* [Supreme Court of Israel sitting as the High Court of Justice], HCJ 2056/04, 4 May 2004, [32].

<sup>61</sup> *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory (Advisory Opinion)* [2004] ICJ Rep 136, [135].

<sup>62</sup> *United States v Wilhelm Von Leeb et al (Judgment)* (1949) 12 LRTWC 1, 93 (United States Military Tribunal, Nuremberg) 93.

<sup>63</sup> See *Prosecutor v Hadžihasanović v Kubura (Trial Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Trial Chamber, Case No IT-01-47-T, 15 March 2006) [45]; *Prosecutor v Kupreškić (Trial Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Trial Chamber, Case No IT-95-16-T, 14 January 2000) [522].

<sup>64</sup> Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers, 1987) 625-626, [1979].

more detail later in the chapter, will also need to be considered. If the attack may lead to excessive collateral harm and damage to civilians and or civilian objects, then the military personnel in charge must exercise the necessary precautions outlined in article 57(2) of *Additional Protocol I*.<sup>65</sup>

The ICTY observed that ‘the protection of civilian objects may cease entirely or be reduced or suspended when belligerents [or any other armed forces] cannot avoid causing collateral damage to civilian property even though the object of a military attack is comprised of military objectives’.<sup>66</sup> Nevertheless, the ICC also observed that ‘only “imperative” reasons of military necessity, where the perpetrator has no other option...could justify acts of destruction...’.<sup>67</sup> This indicates the inclination of international tribunals and courts to adopt a definition of military necessity that is more conscientious of the principle of humanity. Thus, the narrow interpretation of military necessity ensures the protection of civilians and civilian objects.

The military manuals of States such as the United Kingdom have also adopted an interpretation of military necessity consistent with the ICJ, ICC and ICTY. It provides that:

[m]ilitary necessity permits a state engaged in an armed conflict to use only that degree and kind of force, not otherwise prohibited by the law of armed conflict, that is required in order to achieve the legitimate purpose of the conflict, namely the complete or partial submission of the enemy at the earliest possible moment with the minimum expenditure of life and resources.<sup>68</sup>

Similarly, the United States *Law of War Manual* defines military necessity ‘as the principle that justifies the use of all measures needed to defeat the enemy as quickly and efficiently as possible that are not prohibited by the law of war’.<sup>69</sup> It

---

<sup>65</sup> Ibid.

<sup>66</sup> *Prosecutor v Martić (Trial Judgment)* (International Criminal Tribunal for the former Yugoslavia, Trial Chamber I, Case No IT-95-11-T, 12 June 2007) [93].

<sup>67</sup> *Prosecutor v Katanga (Judgment Pursuant to Article 74 of the Statute)* (International Criminal Court, Trial Chamber II, Case No. ICC-01/04-01/07, 7 March 2014) [894].

<sup>68</sup> United Kingdom Ministry of Defence, *The Joint Service Manual of the Law of Armed Conflict* (Joint Service Publication No 383, 23 October 2004) [2.2].

<sup>69</sup> United States Department of Defense, *Law of War Manual* (Manual, December 2016) 52 [2.2].

states what justifies military necessity. For example, objectives being the object of attack, the destruction of military objectives, and subduing enemy forces. It also states that 'military necessity does not justify actions prohibited by the law of war'.<sup>70</sup>

The principle of military necessity applies to the use of LAWS since military personnel would still need to consider whether the use of a particular LAWS, and the amount of force that would result from its deployment, is necessary and appropriate given the circumstances. Therefore, before initiating an offensive or defensive attack, the officer in charge would need to determine whether the type and amount of force used by a LAWS he or she intends to deploy are necessary to achieve the objective of subduing enemy forces.<sup>71</sup>

### 2.3.3 THE PRINCIPLE OF DISTINCTION

The principle of distinction requires military personnel to distinguish military objects such as weapon systems, combatants and military bases from civilians and civilian objects. This is encoded in many articles within the Geneva Conventions and its Additional Protocols, specifically *Geneva Convention III Relative to the Treatment of Prisoners of War* ('*Geneva Convention III*') and *Additional Protocol I*. Article 4 of *Geneva Convention III* defines a prisoner of war which in turn describes what a combatant is.<sup>72</sup> Article 43(2) provides a further explanation as to who would be considered combatants. It states that '[m]embers of the armed forces of a Party to a conflict (other than medical personnel and chaplains covered by Article 33 of the Third Convention) are combatants, that is to say, they have the right to participate directly in hostilities'.<sup>73</sup> In summary, a combatant is a member of an armed force of a party to an armed conflict, including members of an armed force of a non-state party to the conflict.

---

<sup>70</sup> Ibid 52-53.

<sup>71</sup> Henckaerts, Jean-Marie and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 17.

<sup>72</sup> *Geneva Convention (III) Relative to the Treatment of Prisoners of War*, opened for signature 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950) art 4.

<sup>73</sup> *Protocol additional to the Geneva Conventions of 12 August 1949 and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 43(2).

Article 48 of *Additional Protocol I* provides that the distinction between civilians and civilian objects, as well as combatants and military objectives, must be adhered to at all times.<sup>74</sup> Thus, military attacks and defensive operations must only be directed against military objectives.<sup>75</sup> This article emphasises that it is an absolute prohibition to deliberately attack and harm civilians and civilian objects.<sup>76</sup> Moreover, the ICJ states that ‘States must never make civilians the object of attack and must consequently never use weapons that are incapable of distinguishing between civilian and military targets’.<sup>77</sup> Thus, reiterating the vital nature of the principle of distinction in international humanitarian law. It is important to note that the statement made by the ICJ should also be given weight when developing and using LAWS as it expressly mentioned that a weapon that cannot accurately distinguish civilians and civilian objects from combatants and military objectives should never be used.<sup>78</sup>

The principle of distinction is also incorporated in the *Regulations of Hague Convention (IV)*. Article 25 of the *Regulations* provides that ‘[t]he attack or bombardment, by whatever means, of towns, villages, dwellings, or buildings which are undefended is prohibited’.<sup>79</sup> It is also provided in article 27 of the *Regulations* that any and all precautionary steps must be taken to avoid the destruction of:

buildings dedicated to religion, art science, or charitable purposes, historic monuments, hospitals and places where the sick and wounded are collected, provided that they are not being used at the time for military purposes.<sup>80</sup>

As a result, it is encoded in the *Regulations of the Hague Convention (IV)* that to attack civilian buildings or locations where it is mainly populated by civilians is

---

<sup>74</sup> Ibid 48.

<sup>75</sup> Ibid.

<sup>76</sup> See *Prosecutor v Blaškić (Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Appeals Chamber, Case No IT-95-14-A, 29 July 2004) 38, [109]; *Prosecutor v Sessay (Judgment)* (Special Court of Sierra Leone, Trial Chamber I, 2 March 2009), 28, [81].

<sup>77</sup> *Legality of the Threat or Use of Nuclear Weapons* (Advisory Opinion) [1996] ICJ Rep 226, 257 [78].

<sup>78</sup> Ibid.

<sup>79</sup> Ibid art 25.

<sup>80</sup> Ibid art 27.

prohibited. Furthermore, targeting significant cultural buildings and hospitals not being used for military purposes is also prohibited.

It has been asserted that because of widespread State practice, the principle of distinction is established 'as a norm of customary international law applicable to both international and non-international armed conflicts'.<sup>81</sup> This is demonstrated by the inclusion of the principle in articles 13 and 14 of *Additional Protocol II* concerning non-international armed conflicts. Articles 13 and 14, in summary, provide that civilians are considered protected from the dangers of armed conflict and shall not be the object of attack so long as they do not directly participate in hostilities.<sup>82</sup> Furthermore, any attack on objects 'indispensable to the survival of the civilian population' which includes sources of food and water is prohibited.<sup>83</sup> The principle of distinction is also expressed in rules 1 and 7 of the ICRC study on customary international humanitarian law (*'the ICRC study'*).<sup>84</sup>

States such as Mexico and the United Kingdom have acknowledged that articles 51 and 52 of *Additional Protocol I* codified the principle of distinction and reaffirmed the importance of the principle.<sup>85</sup> Furthermore, several military manuals also instruct that there must be a distinction between civilians and combatants and that it is prohibited to attack civilians.<sup>86</sup> For example, the Australian Law of Armed Conflict Manual acknowledges that international humanitarian law establishes an obligation on all parties of a conflict to distinguish between civilians and combatants as well as civilian objects and military

---

<sup>81</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 1. See especially, page three.

<sup>82</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of non-international armed conflicts (Protocol II)*, opened for signature 7 December 1977, 1125 UNTS 609 (entered into force 7 December 1978) art 13.

<sup>83</sup> *Ibid* art 14.

<sup>84</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 1, 7.

<sup>85</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 1, pg 4; *Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflict Volume VI*, (Report, Swiss Federal Council for the Preparation of Two Protocols to the Geneva Conventions, 17 March - 10 June 1997) 164, 192-193.

<sup>86</sup> *Ibid*.

objectives.<sup>87</sup> The International Humanitarian Law Manual of Sweden expressly recognises the principle of distinction as customary international law.<sup>88</sup> Not only is this principle mentioned in military manuals, but numerous States have enacted domestic legislation which criminalises the act of attacking civilians as well.<sup>89</sup> These States include Argentina, Australia, Azerbaijan, Canada, China, Indonesia, Ireland and many more.<sup>90</sup> This evidence of State practice indicates the willingness of States to be bound by this rule.

The principle of distinction is a fundamental principle of international humanitarian law as demonstrated by widespread State practice and the willingness of States to be bound by the principle of distinction. The principle of distinction should not only be considered when initiating attacks but also when developing or acquiring new weapons. Therefore, both programmers and military personnel need to consider the principle of distinction and ensure that while using a weapon system, there is a way to distinguish between military targets and civilians, including civilian objects.<sup>91</sup>

It could be possible to program LAWS to identify targets that are military objects such as tanks or military bases. However, Paul Scharre notes that objects which are used for both civilian and military purposes would be much more difficult for weapon systems to distinguish and identify as appropriate military targets;

---

<sup>87</sup> Australian Defence Force, *The Manual on Law of Armed Conflict* (Australian Defence Doctrine Publication 06.4, 2006) s 5.4. See also Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 5.

<sup>88</sup> Swedish Ministry of Defence, *International Humanitarian Law in Armed Conflict* (IHL Manual, January 1991) s 2.2.3. See also Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 1; Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 6.

<sup>89</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 29.

<sup>90</sup> *Ibid* 29-34.

<sup>91</sup> Switzerland, 'A "compliance-based" approach to Autonomous Weapon Systems' (Working Paper No 9, 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, 10 November 2017) 2, [9].

whether the object is a legal target or not would depend on the context.<sup>92</sup> This would be a situation in which human judgment would play an important role.

#### 2.3.4 THE PRINCIPLE OF PROPORTIONALITY

It is recognised in international humanitarian law that there is often a potential for civilians to be harmed even though the military target has been identified and the attack is not intentionally aimed at civilians. Therefore, the principle of proportionality mentioned in article 51(5)(b) of *Additional Protocol I* addresses those situations in which there may be civilian casualties. It states that an attack that does not adhere to the principle of proportionality is:

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.<sup>93</sup>

This principle is also mentioned in article 57(1) of *Additional Protocol I* about precautions in attack. It emphasises the ongoing obligation to apply the principle of proportionality when initiating attacks. It states that:

In the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects.<sup>94</sup>

Furthermore, article 85(3)(b) of *Additional Protocol I* provides that if a combatant or belligerent knows that an attack would be disproportionate, but still initiates the attack, it would be a grave breach of the Geneva Conventions and its Additional Protocols.

This principle is also mentioned in *Additional Protocol II* in articles 13 to 16 which protect civilians, civilian objects important to their survival, and objects that contain dangerous forces and could harm the civilian population and the environment. These articles also incorporate the prohibition on indiscriminate attacks. The principle of proportionality is also written in *Amended Protocol II* of

---

<sup>92</sup> Paul Scharre, *Army of None: Autonomous Weapons and the Future of War*, (W.W. Norton & Company, 2018) 253.

<sup>93</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 51(5)(b)

<sup>94</sup> *Ibid* art 57(1).



the *Convention on Conventional Weapons*<sup>95</sup> as well as the ICRC study under rules 14 and 15.<sup>96</sup>

There are times when the definition of the principle of proportionality has come into question. Although it is simple to say that the principle of proportionality means that there must be ‘an acceptable relation between the legitimate destructive effect and undesirable collateral effects...’, it can be difficult to assess whether the lives of humans are more valuable compared to achieving the military objective.<sup>97</sup> Some points must be considered when applying the principle of proportionality: 1) determining the values to be given to the potential injury of civilians and damage to civilian objects compared to the military advantage that is anticipated; 2) what to include or exclude when calculating the proportions; 3) what would be the ‘standard measurement in time and space’ in terms of whether the weapon would have a short-term effect on the surrounding area or a long-term effect such as an atomic bomb or any nuclear weapon;<sup>98</sup> and 4) whether a military commander is obligated to expose his or her soldiers to harm to avoid or limit civilian casualties.<sup>99</sup>

The ICTY Final Report noted that the answers to the questions may vary depending on the values and background of the decision-maker.<sup>100</sup> The example given was that a human rights lawyer would not assign the same values to military advantage and injury to civilians compared to a military commander.<sup>101</sup> However, this example may be misleading as it will always be a military official who will be the decision-maker on the battlefield. The answers to each of those questions mentioned earlier are not straightforward.<sup>102</sup> It could be posited that enabling the computers in weapon systems to calculate collateral damage estimates,

---

<sup>95</sup> See *Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 (Protocol II to the 1980 CCW Convention as amended on 3 May 1996)*, opened for signature 3 May 1996, 2048 UNTS 93 (entered into force 3 December 1998) art 3(8);

<sup>96</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) rr 14-15.

<sup>97</sup> International Criminal Tribunal for the former Yugoslavia, *Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of Yugoslavia* (Report) [48].

<sup>98</sup> *Ibid* [49].

<sup>99</sup> *Ibid*.

<sup>100</sup> *Ibid* [50].

<sup>101</sup> *Ibid*.

<sup>102</sup> *Ibid*.

mentioned in section 1.2.2.1 in Chapter One, could provide a more objective way to assess the principle of distinction.<sup>103</sup> However, there is still human judgment involved as relevant military personnel often review the calculations and decide whether or not to authorise the attack on a target.<sup>104</sup>

The case of *Prosecutor v Galić* focused on the principle of distinction and whether civilians were deliberately and knowingly attacked or were attacked as a result of recklessness. However, in the judgment, the ICTY Trial Chamber did contemplate the principle of proportionality. The Trial Chamber stated early in its judgment that ‘certain apparently disproportionate attacks may give rise to the inference that civilians were actually the object of attack’.<sup>105</sup> Therefore, this approach by the ICTY was to determine whether the attack, in this case the attack in and around Sarajevo, was disproportionate, and if so, whether that was an indication that civilians and civilian objects were deliberately targeted. The Trial Chamber quoted article 51(5)(b) and emphasised that it is on those who plan or launch an attack to take all feasible precautions not to target civilians and or civilian objects. Therefore, if those who plan or launch an attack do so wilfully, deliberately and with the knowledge that the attack would lead to excessive civilian casualty, then that would be a violation of the principle of proportionality, and possibly the principle of distinction as well if the intention was to direct the attack at civilian and civilian objects.

The Trial Chamber further noted that ‘the basic obligation to spare civilians and civilian objects as much as possible must guide the attacking party when considering the proportionality of an attack’.<sup>106</sup>

The Trial Chamber undertook an assessment of whether the attack was proportionate or disproportionate and had intentionally targeted civilians

---

<sup>103</sup> See Gregory S. McNeal, “Targeted Killing and Accountability” (2014) 102(3) *Georgetown Law Journal* 681, 740-745; Human Rights Watch, ‘Off Target: The Conduct of the War and Civilian Casualties in Iraq’ (Report, Human Rights Watch, 2003) 18-20.

<sup>104</sup> Bradley Graham, ‘U.S. Moved Early for Air Supremacy’, *The Washington Post* (online, 20 July 2003) <<https://www.washingtonpost.com/archive/politics/2003/07/20/us-moved-early-for-air-supremacy/366576c0-d064-4ee8-a9ed-9efeaf1c0740/>> cited in Human Rights Watch, ‘Off Target: The Conduct of the War and Civilian Casualties in Iraq’ (Report, Human Rights Watch, 2003) 19.

<sup>105</sup> *Prosecutor v Galić (Trial Judgment and Opinion)* (International Criminal Tribunal for the former Yugoslavia, Trial Chamber I, Case No IT-98-29-T, 5 December 2003) [60].

<sup>106</sup> *Ibid.*

indiscriminately. The factors considered in the assessment were, the amount of damage there was to civilian objects, whether civilians were deliberately attacked and harmed and what military advantage could have been gained from the attack.<sup>107</sup> The Trial Chamber concluded that the attack was wilfully directed against civilians and indiscriminate.<sup>108</sup> Although the principle of proportionality was not the focus of the case, the Trial Chamber did consider the principle and the factors, such as the amount of harm and damage caused to civilians and civilian objects that the Trial Chamber considered in their proportionality assessment are useful to note. This is because it helps in understanding how the Courts assessed the proportionality of the attack(s) in question and reached their conclusion; thus, providing insight into what factors should generally be considered when assessing proportionality.

Another case that further demonstrates the complexity of applying the principle of proportionality is *Prosecutor v Boškoski and Tarčulovski*. The Trial Chamber found that setting fire to several houses in the village of Ljuboten was disproportionate and that the police who set fire to those houses 'acted with intent to destroy the property to which they set fire'.<sup>109</sup> There were many factors that the Trial Chamber had to reflect upon such as the amount of damage that was caused to the houses, whether it was caused by the police, whether the police willingly caused the damage to the houses, and the size of the village to assess whether there was damage 'on a large scale'.<sup>110</sup>

The principle of proportionality is present in several military manuals. The United Kingdom's Joint Service Manual acknowledges that 'the application of the proportionality principle is not always straightforward'.<sup>111</sup> It explains that assessing proportionality will be a question of fact about whether there would be another practical method of attack that would reduce the collateral risks since the

---

<sup>107</sup> Ibid [178]-[602]. See also International Criminal Tribunal for the Former Yugoslavia, 'Judgement in the Case the Prosecutor v. Stanislav Galic: Stanislav Galic Sentenced to 20 Years' Imprisonment' (Press Release 5 December 2003) <<https://www.icty.org/en/sid/8148>>.

<sup>108</sup> Ibid [345], [387], [410], [595]-[597].

<sup>109</sup> *Prosecutor v Boškoski and Tarčulovski (Trial Judgment)* (International Criminal Tribunal for the former Yugoslavia, Trial Chamber I, Case No IT-04-82-T, 10 July 2008) [380].

<sup>110</sup> Ibid.

<sup>111</sup> United Kingdom Ministry of Defence, *The Joint Service Manual of the Law of Armed Conflict* (Joint Service Publication No 383, 23 October 2004) 25 [2.7.1]

principle of proportionality requires the attacking force to refrain from carrying out attacks which are expected to cause excessive collateral damage.<sup>112</sup>

The United States Naval Handbook states that 'it is not unlawful to cause incidental injury to civilians, or collateral damage to civilian objects, during an attack upon a legitimate military objective'.<sup>113</sup> It further states that it is important for Naval commanders to bear in mind both military and humanitarian considerations to reduce collateral damage and civilian casualties.<sup>114</sup> In addition, the principle of proportionality is restated in other US military manuals such as the US Field Manual and the US Air Force Commander's Handbook.<sup>115</sup>

The French Law of Armed Conflict Manual provides that an attack 'which may be expected to cause incidental loss of civilian lives, injuries to civilians, damage to civilian objects, or a combination thereof, which would be excessive concerning the concrete and direct military advantage anticipated' must not be launched.<sup>116</sup> It explains that 'the application of this principle raises the question of the balance between the means used and the desired military effect'. Several other military manuals include the same message such as Ecuador's Naval Manual and Indonesia's *Directive on Human Rights in Irian Jaya and Maluku*.<sup>117</sup>

A weapon system would need to be able to consider several factors to assess the proportionality of an attack before executing it. It would need to weigh the balance between humanitarian considerations, such as avoiding excessive collateral damage as well as the military necessity of the attack in terms of its direct military advantage. This would require a considerable amount of human judgment which would make it difficult for a LAWS to assess the proportionality of an attack on its own.

---

<sup>112</sup> Ibid.

<sup>113</sup> United States Department of the Navy, *The Commander's Handbook on the Law of Naval Operations* (Manual, NWP-14M, August 2017) [8.3.1]

<sup>114</sup> Ibid.

<sup>115</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 304-305.

<sup>116</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 301; Ministère de la Défense, *Manuel de droit des conflits armés* (Manual, 2001).

<sup>117</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 301.

### 2.3.5 PROHIBITION ON INDISCRIMINATE ATTACKS

Article 51(4) of *Additional Protocol I* provides that '[i]ndiscriminate attacks are prohibited' and defines an indiscriminate attack as attacks that:

- a) are 'not directed at a specific military objective', or
- b) 'employ a method or means of combat which cannot be directed at a specific military objective', or
- c) 'employ a method or means of combat the effects of which cannot be limited as required by this Protocol'.<sup>118</sup>

Article 51(5)(a) of *Additional Protocol I* also states that an attack would be considered as indiscriminate if it is:

- (a) an attack by bombardment by any methods or means which treats as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area containing a similar concentration of civilians or civilian objects.<sup>119</sup>

This article clearly expresses that bombardment attacks that are not aimed at a specific military target, also known as carpet bombing, is an indiscriminate attack and is prohibited under article 51(4) of *Additional Protocol I*.<sup>120</sup>

Earlier in this chapter, article 51(5)(b) of *Additional Protocol I*<sup>121</sup> was discussed within the context of the principle of proportionality. However, article 51(5)(b) can also be discussed within the context of the prohibition on indiscriminate attacks since it provides another example of an attack that would be considered indiscriminate, which is also prohibited under article 51(4). Therefore, if a military determines that an attack using LAWS might be indiscriminate in accordance with article 51(5)(a) or (b), then the military officer would need to '[t]ake all feasible

---

<sup>118</sup> *Protocol additional to the Geneva Conventions of 12 August 1949 and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125, UNTS 3 (entered into force 7 December 1978) art 51(4).

<sup>119</sup> *Ibid* art 51(5)(a).

<sup>120</sup> See Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 624, [1968].

<sup>121</sup> *Protocol additional to the Geneva Conventions of 12 August 1949 and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125, UNTS 3 (entered into force 7 December 1978) art 51(5)(b).

precautions in the choice of means and methods of attack with the view to avoiding [and minimizing] incidental loss of civilian life, injury to civilians and damage to civilian objects'<sup>122</sup> or refrain from launching the attack.<sup>123</sup>

It is noted in the Commentary on the Additional Protocols that the wording of article 51(5)(b) is based on the wording of article 57 (regarding taking precautionary measures).<sup>124</sup> The Drafting Committee had decided to reformulate article 57 in the context of protecting civilians and incorporate that reformulation into article 51(5) as an example of an indiscriminate attack.<sup>125</sup> Nevertheless, when reading article 51(5)(b), article 57 can still be referred to for more details on what precautions.<sup>126</sup>

Furthermore, the prohibition on indiscriminate attacks is mentioned in the ICRC study on customary IHL under rules 11, 12 and 71.<sup>127</sup> Rule eleven outlines the prohibition on indiscriminate attacks; meanwhile, rule 12 describes what would be considered indiscriminate attacks and rule 71 prohibits the use of weapons that are by nature indiscriminate.

The *Regulations respecting the laws and customs of war on land (Regulations)* annexed to the *Hague Convention (IV)* have also integrated the prohibition on indiscriminate attacks as it notes that the means and methods of warfare are limited.<sup>128</sup> Moreover, article 23 provides that:

In addition to the prohibitions provided by special Conventions, it is especially forbidden:

(a) To employ poison or poisoned weapons;...

---

<sup>122</sup> Ibid 57(2)(a)(ii).

<sup>123</sup> Ibid 57(2)(a)(iii).

<sup>124</sup> See Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 625, [1976].

<sup>125</sup> Ibid.

<sup>126</sup> Ibid. See article 57(2)(a)(iii) of *Additional Protocol I* in particular.

<sup>127</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) rr 11-12, 71.

<sup>128</sup> *Annex to the Convention: Regulations respecting the laws and customs of war on land* opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910) art 22.

(g) To destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war;....<sup>129</sup>

It can be argued that it would be prohibited, in accordance with article 23(a), for a lethal autonomous weapon system to release poison gas or payloads that contain poison. Should there be a way for the poison to escape from the targeted area and into civilian areas, it is unlikely that the poison could be contained within the military target it was initially directed at. In addition, it can be argued that any weapon system that indiscriminately destroys property which belongs to the opposing party of an armed conflict would be prohibited in accordance with article 23(g).

The prohibition on indiscriminate attacks has been implemented in several military manuals. Moreover, some States have established this prohibition as an offence if such attacks are carried out by criminalising it through legislation or military manuals.<sup>130</sup> For example, the Australian Law of Armed Conflict Manual provides that if an indiscriminate attack is initiated and has caused excessive harm and damage, it would constitute 'grave breaches or serious war crimes likely to warrant institution of criminal proceedings'.<sup>131</sup> Other military manuals such as Spain's Law of Armed Conflict Manual, South Africa's Manual and New Zealand's Military Manual express the same message and consider the launching of an indiscriminate attack as a grave breach of the Geneva Conventions.<sup>132</sup>

International humanitarian law also addresses the use of indiscriminate weapons. Rule 71 in the ICRC's study on customary international humanitarian law states that 'the use of weapons which are by nature indiscriminate is prohibited'.<sup>133</sup> This is linked to article 51(4) of *Additional Protocol I* regarding the prohibition on

---

<sup>129</sup> Ibid art 23.

<sup>130</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 11.

<sup>131</sup> Australian Defence Force, *The Manual on Law of Armed Conflict* (Australian Defence Doctrine Publication 06.4, 2006) s 13.26. See also Australian Defence Force Publication, *Law of Armed Conflict Commanders' Guide* (Operation Series ADFP 37 Supplement 1, 7 March 1994) s 1305(h); Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 249.

<sup>132</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 250.

<sup>133</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 71.

indiscriminate attacks. The US Navy Commander's Handbook ('the Handbook') provides that '[w]eapons that are incapable of being directed at a military objective are forbidden as being indiscriminate in their effect'.<sup>134</sup> These weapons include 'drifting armed contact mines and long-range unguided missiles'.<sup>135</sup> The Australian Law of Armed Conflict Manual also similarly states this principle.<sup>136</sup>

The US Navy Commander's Handbook further states that 'a weapon is not indiscriminate simply because it may cause incidental or collateral civilian casualties when directed at a military objective'.<sup>137</sup> The Handbook then explains that 'there is no obligation to employ the most precise weapon available, so long as the weapon employed is capable of discrimination'.<sup>138</sup> Therefore, as long as the weapon selected can adhere to article 51(4) of *Additional Protocol I*, there should be no issue in using that particular weapon.

Examples of alleged indiscriminate attacks that provide insight into what State authorities, in this case Bosnia and Herzegovina, consider indiscriminate attacks are mentioned in the *Letter to the Headquarters of the Yugoslav Army*. These alleged examples include artillery shelling of Sarajevo and attacks by aircraft over the Tuzla region where several residential buildings were destroyed and several civilians were killed or harmed.<sup>139</sup> The artillery shelling in Srebrenica and a Croatian army helicopter attack in Mostar were also mentioned.<sup>140</sup>

---

<sup>134</sup> United States Department of the Navy, *The Commander's Handbook on the Law of Naval Operations* (Manual NWP-14M, August 2017) [9.1.2].

<sup>135</sup> *Ibid.*

<sup>136</sup> Australian Defence Force, *The Manual on Law of Armed Conflict* (Australian Defence Doctrine Publication 06.4, 2006) s 4.1, 4.4. See also Australian Defence Force Publication, *Law of Armed Conflict Commanders' Guide* (Operation Series ADFP 37 Supplement 1, 7 March 1994) s 304; Australian Defence Force Publication, *Manual on Law of Armed Conflict* (Defence Force Manual Operation Series ADFP 37, 1994) s 304; Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 1556.

<sup>137</sup> United States Department of the Navy, *The Commander's Handbook on the Law of Naval Operations* (Manual, NWP-14M, August 2017) [9.1.2].

<sup>138</sup> *Ibid.*

<sup>139</sup> See Bosnia and Herzegovina Ministry of Defence, *Letter to the Headquarters of the Yugoslav Army in Belgrade* (Report on the Practice of Bosnia and Herzegovina 2000 No 02/333-232, 17 May 1992) ch 1.4 cited in Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 255-256, [66].

<sup>140</sup> *Ibid.*



There have also been other agreements and treaties that include the prohibition on indiscriminate attacks. For example, article 42 of the *San Remo Manual on International Law Applicable to Armed Conflicts at Sea* provides that ‘it is forbidden to employ methods or means of warfare which...b) are indiscriminate, in that: (i) they are not, or cannot be, directed against a specific military objective; or ii) their effects cannot be limited as required by international law as reflected in this document’.<sup>141</sup> The *Comprehensive Agreement on Respect for Human Rights and IHL* in the Philippines also mentions the prohibition on indiscriminate attacks in Part III article 2(4). It provides that the Government of the Philippines and the National Democratic Front of the Philippines agree to ‘uphold, protect and promote the full scope of human rights and fundamental freedoms including; ...4. The right to life, ...against indiscriminate bombardments of communities...’.<sup>142</sup>

It has been noted that the more autonomous a weapon becomes, the more accurate the targeting system needs to be.<sup>143</sup> This is due to the likely increase in uncertainty of a weapon system’s reaction to a constantly changing and complex environment.<sup>144</sup> Developers of LAWS need to keep this principle in mind when developing future weapon systems. They should make sure the targeting system of the weapon is highly accurate. The other option is to keep the element of human supervision and intervention to ensure the accuracy of the weapon’s targeting system, or to discontinue the attack if it is no longer legally feasible.

It is important to ensure that the development and use of LAWS comply with these fundamental principles. Article 36 of *Additional Protocol I* provide a mechanism for States to review whether weapons under development can comply with IHL.

---

<sup>141</sup> Louise Doswald-Beck, *San Remo Manual on International Law Applicable to Armed Conflict at Sea* (Cambridge University Press, 1995) art 42.

<sup>142</sup> *Comprehensive Agreement on Respect for Human Rights and International Humanitarian Law, Government of the Republic of the Philippines and the National Democratic Front of the Philippines*, ILM (signed and entered into force 16 March 1998), pt II, art 2(4).

<sup>143</sup> See Neil Davison, ‘A legal perspective: Autonomous weapon systems under international humanitarian law’ (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 15-16; Heather M. Roff and David Danks, ‘“Trust but Verify”: The Difficulty of Trusting Autonomous Weapon Systems’ (2018) 17(1) *Journal of Military Ethics* 2, 7.

<sup>144</sup> International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 12-13.

Therefore, it is necessary to look at article 36 as an opportunity where States can review and test weapon systems to ensure that their use can comply with IHL.

## 2.4 ARTICLE 36 ON LEGAL REVIEW OF WEAPONS

Article 36 of *Additional Protocol I* places an obligation on State parties to conduct legal reviews of any weapon a State intends to develop, acquire or significantly modify.<sup>145</sup> The purpose of article 36 is to ensure that the weapons adhere to the rules and principles of international humanitarian law. It does not provide or establish a standard method to review 'new' weapons but compels States to prudently examine the legality of employing such weapons.<sup>146</sup>

The legal review of weapons is an important component of international humanitarian law which States should use as a tool to comply with and respect international humanitarian law.<sup>147</sup> It is also an important tool for determining whether there is effective human control over LAWS. It provides an opportunity to ensure the weapon system under review is reliable, to ensure that its actions are predictable, to avoid potential mechanical and operational malfunctions and to promote transparency so that operators understand how the weapon system functions. However, focusing on article 36 weapon reviews should not be the only solution to resolving the challenges that LAWS bring to IHL.<sup>148</sup> There are other factors to consider which will be discussed in the subsequent chapters.

### 2.4.1 DRAFTING ARTICLE 36

When examining article 36, it is necessary to discuss the drafting process of the article and the context surrounding it. The debate during the drafting of article 36

---

<sup>145</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 36.

<sup>146</sup> *Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts Volume XV*, (Report No CDDH/215/Rev.1, 3 February-18 April) 370. See section titled 'Article 34'

<sup>147</sup> International Committee of the Red Cross, 'Legal review of new weapons: Scope of the obligation and best practices,' *Humanitarian Law and Policy* (Blog Post, 6 October 2016) <<https://blogs.icrc.org/law-and-policy/2016/10/06/legal-review-new-weapons/>>.

<sup>148</sup> See Article 36, 'Article 36 reviews and addressing Lethal Autonomous Weapon Systems' (Briefing Paper, Convention on Certain Conventional Weapons (CCW) Meeting of Experts on Lethal Autonomous Weapon Systems (LAWS), 11 April 2016) 4; 'Chairperson's Summary', (Working Paper No CCW/GGE.1/2020/WP.7, Group of Governmental Experts on Lethal Autonomous Weapon Systems, 19 April 2021) 4-5, [10].

was quite rigorous. Even before debating the contents of article 36, there were differing views on creating a mechanism that would help implement article 35 of *Additional Protocol I* which outlined the basic rules regarding means and methods of warfare.<sup>149</sup> The International Committee of the Red Cross (ICRC) has noted that a nexus between article 35 and the ‘concrete’ prohibitions and restrictions were needed.<sup>150</sup> Many delegates sought to establish controls over the use of certain weapons and avoid unnecessary suffering and superfluous injury.<sup>151</sup> However, this was faced with criticism as delegates opposing establishing controls viewed it as implying disarmament, a topic not for the Diplomatic Conference.<sup>152</sup> This resulted in a compromise in which Resolution 22, concerning a follow-up on the topic of prohibition or restriction of certain weapons, was passed.<sup>153</sup>

It was during the 1972 conference of government experts that the participants agreed on the general proposition that is now article 36.<sup>154</sup> Furthermore, during a discussion regarding the content of article 26, the most popular suggestion was to leave the compliance of article 36 under the control of the States.<sup>155</sup> This enables States to determine for themselves the extent of their compliance with the obligation under article 36.

Some experts also opposed the establishment of controls and the creation of a list of prohibited weapons. It was noted that a ‘list of prohibited weapons was bound to be incomplete and provisional’.<sup>156</sup> Furthermore, it was stated that

---

<sup>149</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 35 (*‘Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)’*); Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 421-423.

<sup>150</sup> Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 421-422, [1463].

<sup>151</sup> *Ibid.*

<sup>152</sup> *Ibid* 422, [1464].

<sup>153</sup> *Ibid* 424, [1486]

<sup>154</sup> *Ibid.*

<sup>155</sup> *Ibid* 423, [1467] n 8.

<sup>156</sup> International Committee of the Red Cross, *Conference of Governmental Experts on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflict: Second Session 3 May – 3 June 1972* (Report on the Work of the Conference Volume I, July 1972) 129, [3.21]

'...effective, widely acceptable arms limitations could not be accomplished except on the basis of an agreement on underlying principles entered into by at least some of the major powers, in conjunction with lengthy study and consultations among allies and non-aligned nations'.<sup>157</sup>

Delegates and drafters also ensured that the difference between prohibited in terms of possession and prohibited in terms of use was clarified, and that article 36 addressed the latter.<sup>158</sup> In other words, article 36 deals with weapons that, when employed, would be considered prohibited by international humanitarian law. Thus, it ensures that States consider the legality of deploying such weapons. Article 36 does not deal with the legality of a State having a weapon that is prohibited.

Commentary on the October 1973 draft Protocols states that '[i]n this connection too, reference should be made to the last paragraph in the Declaration of St. Petersburg'.<sup>159</sup> The last paragraph of the Declaration of St. Petersburg provides that:

The Contracting or Acceding Parties reserve to themselves to come hereafter to an understanding whenever a precise proposition shall be drawn up in view of future improvements which science may effect in the armament of troops, in order to maintain the principles which they have established, and to conciliate the necessities of war with the laws of humanity.<sup>160</sup>

This suggests that the drafters of the Additional Protocols intended that any development and use of new weapons conform to the established principles of international humanitarian law. They sought to balance the necessities of war with the laws of humanity and for it to always be considered when developing and using new weapons. Overall, article 36 provides a mechanism for the basic rules

---

<sup>157</sup> Ibid.

<sup>158</sup> Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 424, [1471].

<sup>159</sup> International Committee of the Red Cross, *Draft Additional Protocols to the Geneva Conventions of August 12, 1949* (Commentary, October 1973) 42. This commentary was made under the section 'Article 34 – New Weapons'.

<sup>160</sup> *Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight* (St Petersburg Declaration) opened for signature 11 December 1868, ILM (entered into force 11 December 1868).

outlined in article 35<sup>161</sup> to be implemented when developing weapons including LAWS.<sup>162</sup>

#### 2.4.2 OBLIGATIONS UNDER ARTICLE 36

The legal review of weapons stated in article 36 of *Additional Protocol I* compels States to examine any new weapon a State intends to acquire or develop and to determine if they meet the legal requirements of international humanitarian law. States that are not a party to *Additional Protocol I* do not have a legal duty to review new means and methods of warfare. However, they do have an implied obligation based on common article one of the Geneva Conventions and article one of *Hague Convention IV* to review new weapons and ensure that the laws and customs of war are respected.<sup>163</sup>

According to the ICRC, the term 'methods and means' in article 36 is to be interpreted broadly.<sup>164</sup> Therefore, the scope of article 36 includes:

- all types of weapons,
- the method in which the weapons are used,
- all newly developed weapons States acquire,
- weapons that are not newly developed but are acquired by States for the first time, and

---

<sup>161</sup> *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 35.

<sup>162</sup> Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 423, [1466]. See also *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) arts 35, 36 for more details on the content of the articles.

<sup>163</sup> See Williams Boothby, 'Dehumanization: Is There a Legal Problem with Article 36' in Wolff Heintschel von Heinegg, Robert Frau and Tassilo Singer (eds), *Dehumanization of Warfare: Legal Implications of New Weapon Technologies* (Springer, 2017) 21, 22; *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910) art 1. See also common article one of the Geneva Conventions.

<sup>164</sup> International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931, 936-937.

- modified weapons in which its functions are different than originally designed.<sup>165</sup>

Situations in which States enter into a new treaty that could affect the legal status of an existing weapon that the State party possesses are also covered under article 36.<sup>166</sup> The obligation to review weapons applies to both purchasing and manufacturing States.<sup>167</sup> Thus, States purchasing weapons should not rely on the States manufacturing them to determine that the use of the weapon abides by international humanitarian law.<sup>168</sup> States should conduct their own, separate reviews.

Article 36 does not provide a specific method of conducting legal reviews of weapons and the responsibility is left to the States to legislate and adopt measures to implement the obligation effectively.<sup>169</sup> Therefore, no standard for the legal review of weapons has been established. In addition, the measures taken to implement the obligation under article 36 can vary between States.<sup>170</sup> It was not the intention of the drafters behind *Additional Protocol I* and article 36 to create a standard or a binding effect if a State determines that the use of a weapon is allowed or prohibited.<sup>171</sup> However, it was hoped that the obligation to review weapons would ensure that the legality of using the weapon would be carefully explored first and before being deployed.<sup>172</sup> Article 36 also does not

---

<sup>165</sup> Ibid 937.

<sup>166</sup> Ibid.

<sup>167</sup> Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 426, [1473].

<sup>168</sup> Ibid.

<sup>169</sup> International Committee of the Red Cross, 'Legal review of new weapons: Scope of the obligation and best practices', *Humanitarian Law & Policy* (Blog Post, 6 October 2016) <<https://blogs.icrc.org/law-and-policy/2016/10/06/legal-review-new-weapons/>>.

<sup>170</sup> Ibid.

<sup>171</sup> *Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts Volume XV* (Second Session Report CDDH/215/Rev.1, 3 February-18 April 1975) 269, [30]. See also Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 424, [1469].

<sup>172</sup> *Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts Volume XV* (Second Session Report CDDH/215/Rev.1, 3 February-18 April 1975) 269, [30]. See Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 424, [1469].

require States to publish their findings and make them public after conducting a legal review of a weapon.<sup>173</sup> Thus, the result of the weapons review would not be known to the public. However, having the obligation to review weapons is a step in the right direction as it provides a means for States to consider and clarify the legality of the weapons under review.

Nevertheless, there are essential questions to consider when conducting a legal review of newly developed, modified or acquired weapons. The first question is whether the weapon under review is prohibited or restricted by international customary law, or a treaty that the State conducting the review is bound by. The second question is whether the use of the weapon under review would comply with general rules and principles of international humanitarian law. If there are no applicable treaties for the use of the weapon under review, then the principles of humanity and the dictates of public conscience should be considered.<sup>174</sup>

#### 2.4.3 ARTICLE 36 AND STATE PRACTICE

States have implemented article 36 by incorporating it into their military manuals and guides. However, of 174 States that have ratified *Additional Protocol I* only a small number of States have indicated that they conduct their own legal reviews. These States include but are not limited to Australia, the United Kingdom, the United States, Sweden, Norway, Belgium and the Netherlands.<sup>175</sup>

For example, on the direction of Australia's Chief of the Defence Force, any weapon that the Australian Defence Force intends to research, develop or acquire must be reviewed in accordance with article 36.<sup>176</sup> This must be done

---

<sup>173</sup> Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 424, [1470]

<sup>174</sup> International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 39 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931, 938-939. See also *Hague Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land*, opened for signature 29 July 1899, 187 CTS 429 (entered into force 4 September 1900).

<sup>175</sup> International Committee of the Red Cross, 'Legal review of new weapons: Scope of the obligation and best practices', *Humanitarian Law & Policy* (Blog Post, 6 October 2016) <<https://blogs.icrc.org/law-and-policy/2016/10/06/legal-review-new-weapons/>>.

<sup>176</sup> Australia, 'The Australian Article 36 Review Process' (Working paper No 6, 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, 30 August 2018) 1-2.

before the weapon is put into service. The Directorate of Operations and Security Law is in charge of the legal review of weapons, which is conducted by weapons law experts in conjunction with all those involved in the procurement of the weapon.<sup>177</sup> The majority of the reviews are conducted in a multi-stage process and legal reviews begin in the early ‘capability development process’. Interim legal reviews are then conducted throughout the capability development process during key points of the ‘capability life cycle’ phases called ‘gates’.<sup>178</sup>

The United Kingdom Joint Service Manual (‘The Manual’) provides that parties to *Additional Protocol I* should review weapons to ensure it is compliant with international law. The Manual then restates article 36 and further explains that:

in the study, development, acquisition or adoption of a new weapon, means or method of warfare . . . to determine whether its employment would, in some or all circumstances, be prohibited by [Additional Protocol I] or by any other rule of international law.<sup>179</sup>

The Manual adds that ‘[t]o this end each state is required to have effective review procedures operating in accordance with the rules of international law...’.<sup>180</sup> Under section 6.20.1 of the Joint Service Manual, the review process for the United Kingdom is to be conducted by the Ministry of Defence ‘in a progressive manner’ in which a review of the weapon is done in several steps as the ‘process moves towards procurement’. This is similar to Australia’s multi-stage process and interim reviews. The review also involves legal staff members who take part in the weapon development and procurement process. In addition, the review considers the law at the time and any possible future developments in international humanitarian law.<sup>181</sup> There are three stages in the legal review process: firstly, the ‘[i]nitial gate’ in which the Ministry of Defence decides to ‘commit funds to developing a specific capability’; secondly, when the Ministry of

---

<sup>177</sup> Ibid 2.

<sup>178</sup> Ibid 4.

<sup>179</sup> United Kingdom Ministry of Defence, *The Joint Service Manual of the Law of Armed Conflict* (Joint Service Publication No 383, 23 October 2004) 119 [6.20].

<sup>180</sup> Ibid 119 [6.20.1].

<sup>181</sup> Ibid.



Defence decides to commit to the procurement of a weapon or other equipment; thirdly, when the procured weapon or equipment is put in service.<sup>182</sup>

The policies on the legal review of autonomous weapon systems for the United States are outlined in the Department of Defense *Directive 3000.09*.<sup>183</sup> It provides that autonomous weapon systems 'will go through rigorous hardware and software verification and validation (V&V) and realistic system developmental and operational test and evaluation (T&E) in accordance with the guidelines...'.<sup>184</sup> Instructions for legal review of weapons, in general, are found in Department of Defense *Instruction No 5500.15*, Department of Defense *Directive 5000.1*, Department of Defense *Instruction 5000.2* as well as legal review of weapons instructions for the Air Force, Army and Navy.<sup>185</sup>

Regarding when the legal review of weapons is to take place, section IV(A)(1) of the *Department of Defense Instruction 5500.15* states that 'the legal review will take place prior to the award of an initial contract for production'.<sup>186</sup> The Judge Advocate General may require further legal reviews if she or he has determined it necessary.<sup>187</sup> The Secretaries of each military branch are to ensure that a legal review undertaken by the respective Judge Advocate General is conducted 'of all weapons intended to meet a military requirement' of the respective branch.<sup>188</sup>

In Sweden, an inter-departmental organisation called the Delegation for International Law Monitoring of Arms Projects ('the Delegation') was established by the Swedish government to implement the legal review mechanism.<sup>189</sup> This is

---

<sup>182</sup> United Kingdom Ministry of Defence Development, Concepts and Doctrine Centre, *UK Weapon Reviews* (Report, 11 March 2016) 4.

<sup>183</sup> United States Department of Defense, 'Autonomy in Weapon Systems' (Directive No 3000.09, 21 November 2012).

<sup>184</sup> *Ibid* 2 [4(a)].

<sup>185</sup> International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931, 934 n 8. See also United States Department of Defense, 'Operation of the Defense Acquisition System' (Instruction No 5000.2, 12 May 2003).

<sup>186</sup> United States Department of Defense, 'Review of Legality of Weapons Under International Law' (Instruction No 5500.15, 16 October 1974) 2.

<sup>187</sup> *Ibid*.

<sup>188</sup> *Ibid* 1.

<sup>189</sup> See International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931, 949; *Förordning (2007:936)*

in accordance with *Ordinance (2007:936) on international law review of weapons projects* ('the Ordinance').<sup>190</sup> This replaced the previous version which was *Ordinance (1994:536) on international law review of weapons projects*. Section 1 of the *Ordinance* provides that 'the review shall be conducted in accordance with article 36 of the 1977 *Additional Protocol I...*'.<sup>191</sup> The rest of the *Ordinance* outlines how the Delegation is to be established, as well as the scope of the Delegation's responsibilities and tasks. In terms of the legal review, the Delegation is required to examine the planned acquisition, development or modification of a weapon and decide on whether or not the weapon complies with applicable international law. If the weapon does not comply, the Delegation can:

1. make design changes;
2. consider other weapons projects;
3. issue restrictions on the operational use of the weapon; or
4. modify the combat method.<sup>192</sup>

This is similar to legal advice the Australian Directorate of Operations and Security Law can provide when determining the outcome of the legal review. The Directorate of Operations and Security law usually draws one of the following conclusions:

1. Article 36 clearance,
2. Article 36 clearance, but with conditions or limitations; or
3. The weapon does not have Article 36 clearance.<sup>193</sup>

Furthermore, if the legal advice involves clearance with conditions or no clearance at all, the Directorate of Operations and Security Law can include

---

*om folkrättslig granskning av vapenprojekt* [Ordinance (2007:936) on international law review of weapons projects] (Sweden) 15 November 2007.

<sup>190</sup> *Förordning (2007:936) om folkrättslig granskning av vapenprojekt* [Ordinance (2007:936) on international law review of weapons projects] (Sweden) 15 November 2007.

<sup>191</sup> *Ibid* s 1.

<sup>192</sup> *Ibid* s 7.

<sup>193</sup> Australia, 'The Australian Article 36 Review Process' (Working paper No 6, 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, 30 August 2018) 5, [15(f)].

guidance on what needs to be done for the weapon under review to obtain unconditional Article 36 clearance in the advice.<sup>194</sup>

In Norway, the *Directive on the Legal Review on Weapons, Methods and Means of Warfare* outlines the process for reviewing new weapons in accordance with article 36. The responsibility for implementing Norway's obligation under article 36 lies with the Chief of Defence and the Defence Military Organisation. The Chief of Defence is required to 'provide advice and report on important issues related to the legal review on weapons, means and methods of warfare...'.<sup>195</sup> The legal review is also to be conducted early in the procurement or development processes and should usually be conducted during the concept phase.<sup>196</sup> Furthermore, a legal review is to be conducted based on current international law applicable to Norway, and international law about to enter into force that applies to Norway must also be considered.<sup>197</sup>

In Belgium, the Commission for the Legal Review of New Weapons ('the Commission'), established by General Order J/836, is the organisational body that conducts the legal review and advises the Chief of Defence whether the employment of the weapon under review is, either partially or completely, prohibited by any applicable international law.<sup>198</sup> The process of the legal review has to begin at 'the earliest stage of the process and, in any case, before any acquisition'.<sup>199</sup> The application of General Order J/836 is broad and incorporates the language used in article 36. The Commission is comprised of six members and chaired by the Legal Advisor. The members are recruited from different disciplines and possess various relevant expertise. This is to ensure that the Commission takes a multidisciplinary approach.<sup>200</sup>

---

<sup>194</sup> Ibid 5, [16].

<sup>195</sup> Norwegian Ministry of Defence, *Direktiv om folkerettslig vurdering av våpen, krigføringsmetoder og krigføringsvirkemidler* [*Directive on the legal review on weapons, methods and means of warfare*] (Directive, 18 June 2003) [2.1].

<sup>196</sup> Ibid [2.3].

<sup>197</sup> Ibid [2.6].

<sup>198</sup> Pauline Warnotte, 'Belgian Commission for the Legal Review of new Weapons' (Presentation, CCW Informal Meeting of Experts on Laws, 13 April 2016) 3.

<sup>199</sup> Ibid.

<sup>200</sup> Ibid 5.

Whoever is responsible for a weapon development or the acquisition program, must notify the General Director of the Ministry of Defence Legal Department of the intention to develop or acquire weapons as soon as possible.<sup>201</sup> The General Director then either requests the Commission to begin the legal review process and provide legal advice as to the weapon's legality or, after a thorough investigation, determines that the new device does not fall under the definition of weapons, means or methods of warfare.<sup>202</sup> The legal review process usually involves the Commission hearing expert opinions to help determine the legality of the weapon under review. Once all relevant information is collected, the Secretary drafts the legal advice which will then be decided upon by the Commission unanimously.<sup>203</sup>

In the Netherlands, the *Directive of the Minister of Defence number 458.614/A (Beschikking van de Minister van Defensie nr 458.614/A)* sets out the policy and process for legal review. It established the Committee for International Law and the Use of Conventional Weapons (Adviescomissie Internationaal Recht en Conventioneel Wapengebruik) which is the body responsible for conducting the legal review of weapons.<sup>204</sup> Therefore, the Netherlands is similar to the United States and Norway in that they outlined their policies and processes for the legal review of weapons in the form of a directive.<sup>205</sup> The Netherlands is also similar to Sweden and Belgium since it has delegated the responsibility to review weapons to a separate committee or organisation.

Comparing the seven States, there are similarities in their legal review processes. First, for six of the seven States, the legal review of a weapon is to start early on in the research and or acquisition process. Second, the legal review policies provide that several interim legal reviews throughout the development or acquisition process can be conducted if necessary. Third, the mechanism for legal review is kept under the Department (or Ministry) of Defence in collaboration and or consultation with experts of different disciplines. Fourth, if the responsibility

---

<sup>201</sup> Ibid.

<sup>202</sup> Ibid.

<sup>203</sup> Ibid 5-6.

<sup>204</sup> International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931, 834 n 8.

<sup>205</sup> Ibid 949.

of conducting legal reviews of weapons does not lie with the Department (or Ministry) of Defence, it is delegated to a committee or organisation that works closely with the Department (or Ministry) of Defence.

Although there are similarities, it is still up to each State to develop its legal review process, and the results of determining whether a weapon is legally appropriate to use may still vary between States.<sup>206</sup> As mentioned before, only a few States are known to have implemented a legal review process, and even fewer have published their process for the public.<sup>207</sup> Consequently, there is limited evidence of State practice of article 36. This may hinder the ability to accurately assess the effectiveness of the legal review processes of those few States that have implemented them. Notwithstanding limited State practice, the obligation to review weapons and consider their legality under article 36 is still a necessary and important aspect of international humanitarian law in regulating the development and use of weapons. Conducting a legal review of weapons allows States to take the opportunity and ensure that the weapon under review will conform to the fundamental principles of international humanitarian law. This includes LAWS.

## **2.5 THE CONVENTION ON CERTAIN CONVENTIONAL WEAPONS**

### **2.5.1 THE ROLE OF THE CONVENTION ON CERTAIN CONVENTIONAL WEAPONS**

Another important treaty governing the use of weapons is the *Convention on Certain Conventional Weapons* ('the CCCW').<sup>208</sup> The general aim of the CCCW

---

<sup>206</sup> See International Committee of the Red Cross, 'Legal review of new weapons: Scope of the obligation and best practices', *Humanitarian Law & Policy* (Blog Post, 6 October 2016) <<https://blogs.icrc.org/law-and-policy/2016/10/06/legal-review-new-weapons/>>; International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931, 933-934 ; Kathleen Lawand, 'Reviewing the Legality of New Weapons, Means and Methods of Warfare' (2006) 88(864) *International Review of the Red Cross* 925.

<sup>207</sup> See International Committee of the Red Cross, 'Legal review of new weapons: Scope of the obligation and best practices', *Humanitarian Law & Policy* (Blog Post, 6 October 2016) <<https://blogs.icrc.org/law-and-policy/2016/10/06/legal-review-new-weapons/>>; International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931, 934; Kathleen Lawand, 'Reviewing the Legality of New Weapons, Means and Methods of Warfare' (2006) 88(864) *International Review of the Red Cross* 925, 930.

<sup>208</sup> *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*, opened for signature 10 April 1981, 1342 UNTS 137 (entered into force 2 December 1983).

is to protect civilians and combatants from suffering harm excessive to the military advantage anticipated. The CCCW ensures that the weapons used are not indiscriminate or cause superfluous injury.<sup>209</sup> Thus, the CCCW focuses on two fundamental principles of IHL. The first principle is the prohibition on indiscriminate attacks in the context of using weapons that are considered indiscriminate.<sup>210</sup> The second principle is the prohibition on causing superfluous injury and unnecessary suffering, connected to the principle of military necessity, in the context of using weapons that would cause such injury and suffering.<sup>211</sup> Perhaps one can also add that the CCCW also focuses on the principle of proportionality as one of its aims is to protect civilians, and it also re-emphasizes the prohibition on directing attacks against civilians.<sup>212</sup>

Although none of the five protocols that form the CCCW specifically addresses LAWS, the general principles underlying each of those protocols could be used to provide the foundation for the rules governing their use. This would be relevant when considering drafting an additional protocol to the CCCW addressing the use of LAWS.

In terms of the scope of the application of the CCCW, it 'shall apply in the situations referred to in Article 2 common to the Geneva Conventions...'.<sup>213</sup> The situations include 'all cases of declared war or of any other armed conflict', and 'partial or total occupation' of the territory of a State Party.<sup>214</sup> Its protocols address the prohibition or restriction on using weapons with non-detectable fragments, the

---

<sup>209</sup> ICRC Advisory Service on International Humanitarian Law, '1980 Convention on Certain Conventional Weapons' (Fact Sheet, International Committee of the Red Cross, 30 June 2018) 1.

<sup>210</sup> *Ibid.*

<sup>211</sup> *Ibid.*

<sup>212</sup> *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*, opened for signature 10 April 1981, 1342 UNTS 137 (entered into force 2 December 1983) Amended Protocol II art 3(7), Protocol III art 2(1), Protocol V art 5.

<sup>213</sup> *Ibid.* art 1.

<sup>214</sup> *Geneva Convention (I) For the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field*, opened for signature 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950) art 2; *Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea*, opened for signature 12 August 1949, 75 UNTS 85 (entered into force 21 October 1950) art 2; *Geneva Convention (III) Relative to the Treatment of Prisoners of War*, opened for signature 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950) art 2; *Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War*, opened for signature 12 August 1949 75 UNTS 287 (entered into force 21 October 1950) art 2.

use of mines, booby-traps and other similar devices, the use of incendiary weapons, the use of blinding laser weapons and explosive remnants of war.

This CCCW is relevant to the regulation of LAWS since conversations on such weapon systems have occurred during the meetings of the GGE on LAWS. It is a platform tied to the CCCW that enables discussions about issues arising from the development and use of LAWS. The first official meeting of the GGE on LAWS was held in November of 2017 and has continued to be held annually, except in 2020 when the GGE on LAWS had to be postponed due to the COVID-19 pandemic.<sup>215</sup> However, there were preliminary 'meetings of experts' starting in 2014.<sup>216</sup>

The CCCW and forums such as the GGE on LAWS, and even the Review Conferences of the High Contracting Parties to the Convention on Certain Conventional Weapons, play an important role in providing a platform where questions relating to the regulation of LAWS can be discussed and negotiated.<sup>217</sup> During these meetings, delegations from State parties to the CCCW and experts have engaged in discussions on the definition of LAWS and the need to establish limits on the use of autonomous weapons.<sup>218</sup> It is noted by Michael Møller, the Acting Director-General of the United Nations Office in Geneva at the time, that these meetings of governmental experts on lethal autonomous weapon systems

---

<sup>215</sup> See '2017 Group of Governmental Experts on Lethal Autonomous Weapon Systems (LAWS)', *United Nations Geneva* (Webpage) <[https://www.unog.ch/80256EE600585943/\(httpPages\)/F027DAA4966EB9C7C12580CD0039D7B5?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/F027DAA4966EB9C7C12580CD0039D7B5?OpenDocument)>.

<sup>216</sup> *Ibid.* For more information on the meetings, see the United Nations Geneva official website <[unog.ch/80256EE600585943/\(httpPages\)/5535B644C2AE8F28C1258433002BBF14?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/5535B644C2AE8F28C1258433002BBF14?OpenDocument)>.

<sup>217</sup> Michael Møller, 'Opening Remarks: Convention on Certain Conventional Weapons (CCW)' (Speech, Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014) 1.

<sup>218</sup> See, eg Netherlands, 'Examination of various dimensions of emerging technologies in the area of lethal autonomous weapons systems, in the context of the objectives and purposes of the Convention' (Working Paper No 2, 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, 9 October 2017); Belgium, 'Towards a definition of lethal autonomous weapon systems' (Working Paper No 3, 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, 7 November 2017); France and Germany, 'For consideration by the Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS)' (Working Paper No 4, 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, 7 November 2017)

provide an opportunity for the participants to take pre-emptive measures to ensure that the use of lethal force ‘remains firmly under human control’.<sup>219</sup>

#### 2.5.2 THE CONVENTION ON CERTAIN CONVENTIONAL WEAPONS AND STATE PRACTICE

A deeper examination of the CCCW and State practice of its rules is also necessary to gain a better understanding of the role it currently plays in governing the means and methods of warfare, and the role it can potentially play in governing the development and use of LAWS. This can provide insight into how effective the implementation of treaty obligations regarding LAWS could be and the implementation of the working definition of effective human control that will be proposed later in the thesis.

Several articles from the CCCW have been mentioned as customary international law by the ICRC customary international humanitarian law study. The ICRC study includes rules regarding the prohibition of the use of weapons with non-detectable fragments, as well as the prohibition and or restriction of mines, booby-traps, incendiary weapons and blinding lasers.<sup>220</sup> Therefore, the rules from the CCCW that are included in the ICRC Study are binding on all States even though some are not party to the CCCW. The customary status of these rules is supported by widespread State practice and States accepting to be bound by those rules.<sup>221</sup>

Many states have incorporated the prohibition of using weapons that would cause superfluous injury and unnecessary suffering in their military manuals. This is a reflection of the underlying principle of the CCCW. It also reflects rule 71 regarding the prohibition on the use of weapons that are by nature indiscriminate from the ICRC study.<sup>222</sup>

---

<sup>219</sup> Michael Møller, ‘Opening Remarks: Convention on Certain Conventional Weapons (CCW)’ (Speech, Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014) 3.

<sup>220</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) Part IV r 70-86; Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) Pt IV, 1505-1982.

<sup>221</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) Part IV r 70-86; Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) Pt IV, 1509-1982.

<sup>222</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 71.



Australia's Law of Armed Conflict Manual provides that there are weapons that are prohibited due to them being indiscriminate and or causing unnecessary suffering and harm.<sup>223</sup> It also prohibits the use of chemical and biological weapons as they could cause unnecessary suffering and affect civilians indiscriminately.<sup>224</sup> In addition to incorporating this prohibition in the military manual, Australia has enacted legislation that criminalises the development, production or acquisition of 'microbial or other biological agents, or other toxins...' which cannot be justified or has no peaceful or protective purposes.<sup>225</sup>

Argentina's manual on the law of war provides that 'the use of weapons, projectiles, materials and methods of warfare of a nature to cause superfluous injury or unnecessary suffering is prohibited'.<sup>226</sup> The rule on the prohibition on the use of weapons that cause unnecessary suffering and damage has also been referred to in the *Military Junta* case by the Argentinian National Court of Appeal.<sup>227</sup> Several other States have also incorporated a similarly worded section in their military manuals.<sup>228</sup>

Some States have incorporated the prohibition on the use of indiscriminate weapons in disciplinary regulations, summary notes or defence pamphlets.<sup>229</sup> In accordance with the CCCW, the State Parties and others who have decided to

---

<sup>223</sup> Australian Defence Force, *The Manual on Law of Armed Conflict* (Australian Defence Doctrine Publication 06.4, 2006). See also Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 1509;

<sup>224</sup> Australian Defence Force, *The Manual on Law of Armed Conflict* (Australian Defence Doctrine Publication 06.4, 2006) s 4.20.

<sup>225</sup> *Crimes (Biological Weapons) Act 1976* (Cth) s 8(1).

<sup>226</sup> Estado Mayor Conjunto de las Fuerzas Armadas Argentina, *Leyes de Guerra* (Manual, 1989) s 1.04(2). See also Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 1509.

<sup>227</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 1523; *Military Juntas Case* [National Court of Appeals of Argentina] 13/84, 9 December 1985.

<sup>228</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 1510-1520.

<sup>229</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 1513, 1517-1518. See also Ministère de la Défense Etat-Major de l'Armée de Terre Bureau Emploi (France), *Règlement de Discipline Générale dans les Armées* (Decree No 75-675, 28 July 1975) art 9 bis (2); Senegal Ministry of Defence, *Règlement de Discipline dans les Forces Armées* (Decree No 90-1159, 12 October 1990); Général de Corps d'Armée Voinot (France), *Fiche de Synthèse sur les Règles Applicables dans les Conflits Armés* (Summary Note No 432/DEF/EMA/OL.2/NP, 1992); United States Department of the Air Force, *International Law – The Conduct of Armed Conflict and Air Operations* (Air Force Pamphlet 110-31, 1976).

implement the rules of the CCCW have prohibited biological weapons, chemical weapons, dum-dum bullets, anti-personnel mines, blinding laser weapons and other projectiles with expanding heads.<sup>230</sup> There are also States, such as New Zealand, which have banned other weapons and materials like 'lances with a barbed head' and 'projectiles filled with broken glass'.<sup>231</sup>

Overall, with 125 signatures and principles in the CCCW that are considered to be part of customary IHL, an argument can be made that a decent portion, if not all, of the rules are binding upon both State parties and States that are not a party to the CCCW.

### 2.5.3 INCLUSION OF REGULATIONS ON LAWS IN THE CONVENTION ON CERTAIN CONVENTIONAL WEAPONS

The issue of LAWS has only been addressed, and discussed, in meetings and informal gatherings of experts. A treaty specifically governing LAWS has yet to be introduced to the body of treaties that form international humanitarian law. There is still a lot to discuss on LAWS and its impact on international humanitarian law, but adding regulations specific to such weapon systems to the CCCW would be a step towards ensuring that these weapon systems will be developed and used according to international humanitarian law.

Generally speaking, using the current principles in the CCCW, other treaties, as well as the ICRC study as the foundation, could help bring consensus as to what regulations should be established to govern LAWS. The definition of effective human control should also be amongst the regulations governing LAWS to provide a clear guideline regarding the limits on autonomy for States during the development and use of such weapon systems. Therefore, through review conferences of the CCCW, regulations for LAWS can be incorporated as another

---

<sup>230</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) Pt IV, 1505-1982.

<sup>231</sup> See New Zealand Defence Force Directorate of Legal Services, *Interim Law of Armed Conflict Manual* (Manual, November 1992) s 510(1)(a); Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 1516.

protocol to the CCCW and article 8(3)(b) of the CCCW provides for that opportunity.<sup>232</sup>

## 2.6 CONCLUSION

It can be concluded that the rules and principles discussed in this chapter are all pieces from various sources of public international law (i.e. treaties and customary IHL). When pieced together, they form the puzzle that governs the development and use of LAWS. This puzzle provides an overall picture of what IHL rules and principles currently govern the development and use of LAWS. It can also be concluded that article 36 of *Additional Protocol I*, the fundamental principles of IHL, as well as the CCCW, are key sources in the governance of new weapon technologies such as LAWS. Therefore, these rules and principles of IHL are important to incorporate in the working definition of effective human control.

However, it is important to note that focusing on article 36 weapons reviews as the only potential solution will not be an effective way to address the underlying legal issues that arise from the development and use of LAWS. Nevertheless, it is still necessary to consider these sources of IHL as they are still relevant to the development and use of LAWS. Furthermore, reviewing the rules and principles of IHL from the various sources of IHL will help determine how best to define effective human control.

The CCCW is another source of international law that is important in governing the use of weapons. The treaty has already provided a platform for State parties to the CCCW, experts, observers and other participants to discuss the challenges of LAWS. It can also be a way in which to introduce regulations on LAWS, should they be developed, by way of drafting another protocol to the CCCW that addresses the development and use of LAWS. This would be similar to the other protocols that are already a part of the CCCW that prohibit or restrict the use of certain weapons such as blinding lasers, mines and booby traps as well as incendiary weapons. Therefore, the CCCW is a source of international law that is

---

<sup>232</sup> *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*, opened for signature 10 April 1981, 1342 UNTS 137 (entered into force 2 December 1983) art 8(3)(b).

important to consider when discussing LAWS, options for regulating them and establishing regulations that would include a definition of effective human control.

---

CHAPTER 3: THE NATURE OF LAWS: MILITARY  
INTEREST, CURRENT WEAPON SYSTEMS AND  
COMPLIANCE WITH IHL

---

### **3.1 INTRODUCTION**

Chapter three will explore the nature of LAWS by discussing why they have caught the interest of militaries, some hesitancy in developing LAWS that could be classified as fully autonomous, current weapon systems in use and whether they can comply with IHL. The first part of the chapter will discuss the increasing investment States and their defence forces have made in automating weapon systems, why they are interested in such an investment and why some defence forces may be hesitant in developing and using weapons that are fully autonomous despite the interest. Nevertheless, the fact that there are defence forces that are funding research into LAWS warrants a continuation of discussions on the challenges of such weapon systems.

The second part of this chapter aims to provide realistic, contextual information about current weapon systems that would aid in developing a practical definition of effective human control that can be widely accepted and implemented in regulations. The second part of this chapter will discuss current weapon systems according to the categories suggested by the United States Department of Defence: semi-autonomous weapon systems, supervised weapon systems and fully autonomous weapon systems. This is to demonstrate what weapons are currently being considered lethal 'autonomous' weapon systems. It is also to illustrate the kind of automated functions current weapon systems possess as well as the types of human-machine interfaces those weapon systems have.

The third part of the chapter is a brief discussion on whether LAWS, on the face of it, can comply with IHL and how to ensure that such weapon systems are compliant. The discussion takes into consideration current weapon systems, where the challenges may lie and what can be done to overcome those challenges to ensure that the development and use of LAWS comply with IHL. The third part confirms that, on the face of it, the development and use of LAWS does not violate IHL, and that it can comply with IHL. However, the context of the functions of the LAWS as well as how and when the LAWS is used is an important consideration to determine whether their use violates IHL.

## 3.2 INCREASING INVESTMENT IN LAWS

### 3.2.1 WHY THE INTEREST?

Technological development is often driven by military interests and requirements, although civilian technological developments have also influenced warfare.<sup>1</sup> Nevertheless, both military interest and civilian technological developments inform and influence militaries in making existing methods of warfare more precise and or destructive.<sup>2</sup> Technological development, in general, provides opportunities to create new means and methods of warfare.<sup>3</sup> An example of such technological development is demonstrated by LAWS. There are several reasons why developing and using LAWS are appealing to State militaries. One reason concerns economic factors since State militaries can reduce operational costs and personnel burden; thus, making it cheaper for militaries to conduct operations.<sup>4</sup>

A second reason concerns operational factors such as increasing the speed of the decision-making process and reducing the dependency on communication and human errors. It has been argued that LAWS do not succumb to emotions, battle fatigue or any other human needs that would make a human soldier's behaviour unpredictable.<sup>5</sup> However, this does not mean that all behaviours of a weapon system can be predictable. The more autonomy a weapon system has, the more complex the weapon system's software design would become. Consequently, the behaviour of the weapon system would become less predictable.<sup>6</sup>

A third reason concerns security and safety factors since weapon systems can be used to protect combatants. The use of certain LAWS can increase the safety of soldiers as less harm will come to them if they are away from the line of fire. LAWS can also have a quicker reaction time compared to humans. They could

---

<sup>1</sup> Robert McLaughlin and Hitoshi Nasu, 'Conundrum of New Technologies in the Law of Armed Conflict' in Robert McLaughlin and Hitoshi Nasu (eds) *New Technologies and the Law of Armed Conflict* (T.M.C Asser Press, 2014) ch. 1, pt. 1.1.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> Brian K. Hall, 'Autonomous Weapon Systems Safety' [2017] (86) *Joint Force Quarterly* 86, 87.

<sup>5</sup> Michal Klincewicz, 'Autonomous Weapons Systems, the Frame Problem and Computer Security' (2015) 14(2) *Journal of Military Ethics* 162, 164.

<sup>6</sup> Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 32.

also be able to continue with an operation in environments with poor to no communication available.<sup>7</sup>

Furthermore, uncrewed systems can perform several tasks that would be considered risky to combatants or are simply easier and more efficient to conduct with such systems. For example, there are uncrewed systems that detect mines, engage in long-range and long hours of reconnaissance to gather intelligence and are capable of precision guidance.<sup>8</sup> Therefore, there are fewer lives at risk, issues of battle fatigue and limitations of the human body can be avoided, more information can be gathered about the target and the targeting itself can be more accurate. Efficient 'communications and data relay' is also noted to be a key interest for military commanders.<sup>9</sup>

A fourth reason is humanitarian factors in which LAWS can be programmed to respect international humanitarian law better than humans.<sup>10</sup> For example, it is noted that '[s]atellite navigation and global position systems (GPS) have enabled the use of precision-guided munitions and the remote operation of [uncrewed] aerial vehicles'.<sup>11</sup> Therefore, GPS technology allows State militaries to target military objectives more accurately, which can provide support for the argument that such weapon systems could adhere to the principle of distinction better than a human combatant. Therefore, Autonomous technologies in weapon systems could 'improve compliance with IHL' and reduce the occurrence of human error.<sup>12</sup>

The disadvantages of increased automation in weapon systems include the fact that human judgment is involved when analysing situations on the battlefield, and when making judgments based on an ever-changing environment. Given that the principles of distinction and proportionality require qualitative assessment,

---

<sup>7</sup> Brian K. Hall, 'Autonomous Weapon Systems Safety' [2017] (86) *Joint Force Quarterly* 86, 87.

<sup>8</sup> United States Department of Defense, *Unmanned Systems Roadmap 2007-2032* (Memorandum, 10 December 2007) i.

<sup>9</sup> *Ibid.*

<sup>10</sup> See Louis A. Del Monte, *Genius Weapons: Artificial Intelligence, Autonomous Weaponry, and the Future of Warfare* (Prometheus Books, 2018) 12; Brian K. Hall, 'Autonomous Weapon Systems Safety' [2017] (86) *Joint Force Quarterly* 86, 87.

<sup>11</sup> Robert McLaughlin and Hitoshi Nasu, 'Conundrum of New Technologies in the Law of Armed Conflict' in Robert McLaughlin and Hitoshi Nasu (eds) *New Technologies and the Law of Armed Conflict* (T.M.C Asser Press, 2014) ch. 1, pt. 1.1.

<sup>12</sup> 'Chairperson's Summary', (Working Paper No CCW/GGE.1/2020/WP.7, Group of Governmental Experts on Lethal Autonomous Weapon Systems, 19 April 2021) 5, [12].



computer systems for LAWS would need to also be capable of processing large amounts of qualitative data in a complex and ever-changing environment.<sup>13</sup> It would be difficult for computers to conduct sophisticated qualitative assessments, as they are usually limited to quantitative assessments.<sup>14</sup> Moreover, there is no code or software capability currently for weapon systems to process large amounts of qualitative data.<sup>15</sup> Nevertheless, the advantages of developing and deploying LAWS outweigh the disadvantages of increased automation in weapon systems. In addition, increasing the automation of weapon systems can be considered a way to make a State's armed forces more effective.<sup>16</sup> This makes continued investment in LAWS attractive to militaries.

### 3.2.2 THE 'SMART' ARMS RACE

Paul Scharre provides an example of how technological developments are driven by military interest. He explains how rockets, missiles and bombs developed into some of the first smart weapons.<sup>17</sup> When the range of missiles, rockets and bombs increased, there was interest in increasing the accuracy of these weapons which led militaries to develop techniques and systems for precision guidance.<sup>18</sup> What followed was the creation of precision-guided munitions (PGMs) which are considered to be the first 'smart' weapons.<sup>19</sup>

The development and proliferation of PGMs is a good example of numerous States' desire to keep up with other State militaries, and their interest in improving their defence capabilities which has spurred technological development in the

---

<sup>13</sup> See Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems' (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1388; International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 8.

<sup>14</sup> See Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems' (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1388; International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 8.

<sup>15</sup> Markus Wagner, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems' (2014) 47(5) *Vanderbilt Transnational Law* 1371, 1397-1399.

<sup>16</sup> Tony Gillespie, *Systems Engineering for Ethical Autonomous Systems* (Institution of Engineering & Technology, 2019) 10.

<sup>17</sup> Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018). See chapter three of the book titled 'Machines that Kill'.

<sup>18</sup> *Ibid* 39.

<sup>19</sup> *Ibid*.

automation of weapons. As one State created PGMs other States followed for fear of falling behind in weapon technology that would certainly bring benefits. In addition, the development of countermeasures to avoid being hit by PGMs spurred technological advancement to improve PGMs and counter the countermeasures.<sup>20</sup>

Furthermore, the United States Department of Defense provides a good example of why there is greater interest in technology which enables weapons to be automated. In its 2007 Unmanned Systems Roadmap, the Department of Defense set a goal for processor technology to substitute human operators with machines or 'mechanical facsimile' which would possess 'equal or superior thinking speed, memory capacity, and responses gained from training and experience'.<sup>21</sup> Some of the reasons underlying this goal include reducing risk to human life, the prior successes with uncrewed systems (air, ground and maritime systems) and the benefits they would bring in the fight against terrorism.<sup>22</sup> The United States Department of Defense also noted other points to consider when conducting research into uncrewed systems in the future. This includes:

- reconnaissance and surveillance that is both electronic and visual to 'better support the broad range of DoD users';
- target identification and designation with increased precision in positive identification of targets in real-time;
- counter-mine warfare and improved ability to 'find, tag, and destroy both land and sea mines'; and
- chemical, biological, radiological, nuclear and explosive (CBRNE) reconnaissance with the ability to find biological and chemical agents as well as survey affected areas.<sup>23</sup>

---

<sup>20</sup> Ibid 40.

<sup>21</sup> See United States Department of Defense, *Unmanned Systems Roadmap 2007-2032* (Memorandum, 10 December 2007) 53, [6.6.12]; Jürgen Altmann and Frank Sauer, *Autonomous Weapon Systems and Strategic Stability* (2017) 59(5) *Survival Global Politics and Strategy* 117, 122.

<sup>22</sup> United States Department of Defense, *Unmanned Systems Roadmap 2007-2032* (Memorandum, 10 December 2007) i.

<sup>23</sup> Ibid i-ii.

Therefore, States are well aware of each other's ambitions in developing LAWS and do not want to fall behind their perceived competitors.<sup>24</sup> The desire to expand military capabilities and conduct tasks more efficiently to accommodate today's armed conflicts has led to an arms race for smart weapons. As a result, investment into the research of technology that enables weapon systems to possess autonomous capabilities has increased.

### 3.2.3 HESITANCY

Despite the interest in developing more LAWS, some State militaries are hesitant to employ fully lethal autonomous weapon systems. For example, some of the hesitations of the US Defence Force stem from commanders wanting to keep some control over weapon systems and not wanting to waste the limited amount of munitions they have available.<sup>25</sup> Therefore, operational risk when using LAWS is a concern for militaries and there may be a chance for an operational malfunction to occur that cannot be fixed if a human is not in the 'chain of decision-making'.<sup>26</sup> This concern has 'incentivise[d] militaries to avoid full autonomy in weapon systems'.<sup>27</sup> Therefore, the hesitancy in employing such weapon systems may help counteract the 'smart' arms race.

For example, there was a lack of confidence in the accuracy of the Tomahawk Anti-Ship Missile (TASM), an autonomous loitering munition, targeting moving military objectives.<sup>28</sup> This is because of the uncertainty in 'how the targeting picture would change' between the time the TASM was fired and the time it would hit the moving target.<sup>29</sup> Although the TASM was able to search for targets over a large area, it was not able to distinguish 'enemy' military vessels from commercial vessels.<sup>30</sup> Therefore, fully autonomous loitering munitions are not widely used

---

<sup>24</sup> Michael T. Klare, 'Autonomous Weapon Systems and the Laws of War' 49 (March 2019) *Arms Control Today* 49; Frank Sauer, 'ICRAC statement on technical issues to the 2014 UN CCW Expert Meeting' (Media Release) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>.

<sup>25</sup> Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 53-54.

<sup>26</sup> Jürgen Altmann and Frank Sauer, 'Autonomous Weapon Systems and Strategic Stability' (2017) 59(5) *Survival Global Politics and Strategy* 117, 120.

<sup>27</sup> *Ibid.*

<sup>28</sup> *Ibid* 53.

<sup>29</sup> *Ibid* 53.

<sup>30</sup> *Ibid* 54.

since there are uncertainties, including the fact that these munitions are launched with imprecise targeting data, which can lead to the wrong object being hit and or munitions being wasted.<sup>31</sup>

Hesitancy in creating fully lethal autonomous weapon systems could be one reason why many autonomous weapon systems under development in the United States are not created for combat. For example, the purpose of the US Navy's 'first operational carrier-based drone', the MQ-25 Stingray, is to primarily be a fuel tanker for combat aircraft with a possible ancillary function as a reconnaissance drone.<sup>32</sup> However, it cannot be denied that there is an increased interest in developing and using LAWS not only from the United States but other countries. As a result, there is growing concern about the proliferation of LAWS, and it has become important to discuss how to regulate current weapon systems and ensure that the development and use of LAWS will continue to conform with IHL.

### 3.3 CURRENT WEAPON SYSTEMS

An understanding of how autonomy is used in weapon systems at present is imperative before taking the next steps in establishing regulations for LAWS that would be effective.<sup>33</sup> This warrants an examination of current weapon systems being employed by armed forces and how their autonomous features operate.

Not all weapon systems have the same level of autonomy. For example, a Phalanx Missile Close-In Weapon System, which only requires supervision, maybe more autonomous than an MQ-9 Reaper drone, which would still be remotely operated by military personnel.<sup>34</sup> Most weapon systems currently used are either semi-autonomous or supervised weapon systems. This is because human operators still have to select and engage specific targets or there is some

---

<sup>31</sup> Ibid.

<sup>32</sup> Ibid 60.

<sup>33</sup> See Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for aNew American Security, February 2015); Kenneth Anderson, Daniel Reisner and Matthew Waxman, 'Adapting the Law of Armed Conflict to Autonomous Weapon Systems' (2014) 90 *International Law Studies* 386; Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 28.

<sup>34</sup> See See Air Combat Command, Public Affairs Office, 'MQ-1B Predator', *U.S. Air Force* (Website 23 September 2015) <<https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104469/mq-1b-predator/>>; 'MK 15 – Phalanx Close-In Weapon System (CIWS)', *US Department of the Navy* (Website, 15 January 2019) <[https://www.navy.mil/navydata/fact\\_display.asp?cid=2100&tid=487&ct=2](https://www.navy.mil/navydata/fact_display.asp?cid=2100&tid=487&ct=2)>.

form of human supervision and interaction within the Observe, Orient, Decide, Act loop (OODA loop).<sup>35</sup>

To accommodate for the various levels of autonomy in weapon systems, the United States Department of Defense *Directive 3000.09* has categorised weapon systems into the following:

- semi-autonomous weapon system – where human operators must still select targets and initiate the attack;
- supervised autonomous weapon system – where human operators are still able to intervene and ‘terminate engagements’; and
- *Fully* autonomous weapon system – where there is little to no need for human intervention once the weapon system is activated.<sup>36</sup>

There are two ways to conceptualise autonomy in LAWS. The US Department of Defense's description of autonomy under each type of autonomous weapon system focuses on the role of the human operator and the human-machine interaction, and ‘highlights what is different about an autonomous weapon from the perspective of a human operator’.<sup>37</sup> This is an appropriate way to differentiate the human-machine interactions for the various LAWS.

Another way to delineate between the three types of LAWS focuses on the functions of the weapon system being automated. Therefore, autonomous weapon systems could be considered ‘self-targeted weapons’ where it is clear

---

<sup>35</sup> Air Force Colonel John Boyd developed the OODA Loop strategy which is a decision-making process that pilots go through when fighting an enemy aircraft. The aim is to understand the environment (observe), assess the environment and the situation (orient), detect the target, deciding to the course of action to take (decide) and act faster than the enemy “to get inside” the enemy’s OODA loop’: see Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 23-25, 43. See also John R Boyd, *A Discourse on Winning and Losing* (Air University Press 2018); Luft, Alastair, ‘The OODA Loop and the Half-Beat’, *The Strategy Bridge* <<https://thestrategybridge.org/the-bridge/2020/3/17/the-ooda-loop-and-the-half-beat>>;

<sup>36</sup> See United States Department of Defense, *Autonomy in Weapon Systems* (Directive No 3000.09, 21 November 2012); International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014) 14. Emphasis on *Fully*.

<sup>37</sup> See Paul Scharre and Michael C. Horowitz, ‘An Introduction to Autonomy in Weapon Systems’ (Working Paper, Centre for a New American Security, February 2015) 5-6.

that the weapon system is the one choosing the target.<sup>38</sup> Meanwhile, semi-autonomous and supervised weapon systems could be considered ‘human-targeted weapons’ where it is clear that the human operator is still selecting the individual target.<sup>39</sup>

Either of the two options for conceptualising autonomy in weapon systems can assist the description of effective human control to be as clear and accurate as possible, taking into consideration the various levels of autonomy that exist. However, for the purpose of consistency and convenience, the thesis will use the description of autonomy from the perspective of human operators; thus, using the terms semi-autonomous, supervised and fully autonomous in the following sections and chapters.

Selected examples of LAWS from each category will be examined in the following sections. This is to briefly demonstrate the interaction between the weapon systems and human operators in each category and how they may or may not be able to comply with the rules and principles of international humanitarian law. Many of the examples have been referred to in the existing literature on autonomy in weapon systems.<sup>40</sup>

### 3.3.1 SEMI-AUTONOMOUS WEAPON SYSTEMS

What classifies a weapon as a ‘semi-autonomous weapon system’ is the fact that the human operator chooses a specific target before they release the payload. Therefore, humans are still in the OODA loop.<sup>41</sup> Figure 3.1 depicts how the OODA loop operates for semi-autonomous weapon systems.

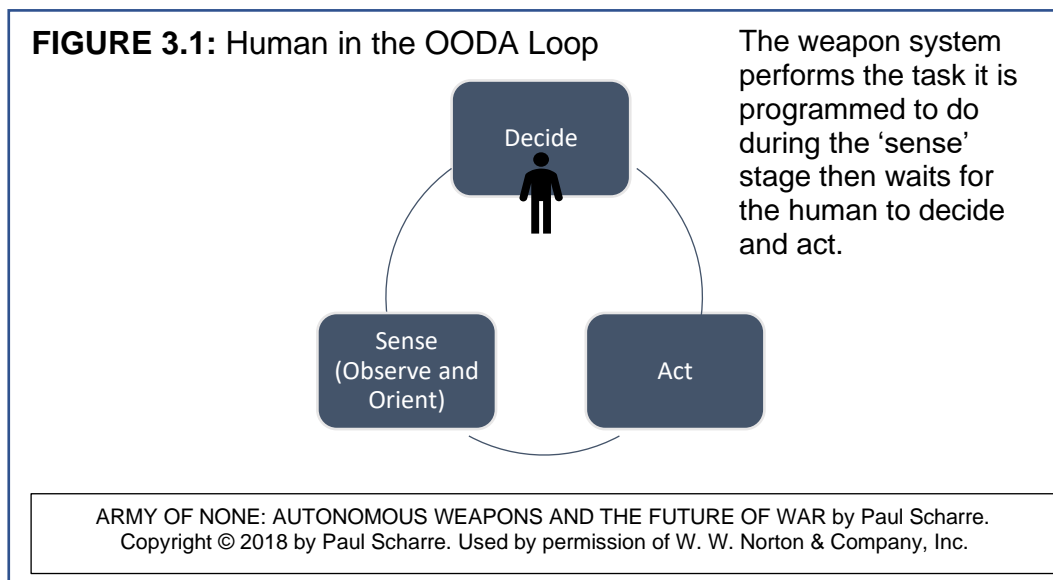
---

<sup>38</sup> Ibid 17.

<sup>39</sup> Ibid.

<sup>40</sup> Ibid 21-23 (See Appendix B).

<sup>41</sup> Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 48.



One of the earliest examples of semi-autonomous weapon systems, still used today, are guided munitions. They are bombs, torpedos, missiles or other weapon systems that can hone in on their targets and can correct their position when necessary after being released.<sup>42</sup> For example, the Tomahawk (Block IV) possesses communication links which allow an operator to re-target the munition while it is still in flight. Thus, operators still can control, re-target or abort the guided munitions like the Tomahawk (Block IV) after they have been activated and released.

However, there are also guided munitions that cannot be re-targeted after they have already been launched.<sup>43</sup> Thus, an operator that has launched this type of guided munition has less control over it compared to the Tomahawk despite having a human in-the-loop selecting and engaging targets.<sup>44</sup> Scharre and Horowitz note that these types of guided munitions are considered 'fire and forget weapons' because operators may not have real-time awareness of the target before the guided munition reaches it.<sup>45</sup> Furthermore, the time it takes for these fire-and-forget guided munitions to reach the target after they are launched may be up to several hours (i.e. cruise missiles).<sup>46</sup> Despite the variation, what these

<sup>42</sup> Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015) 8.

<sup>43</sup> Ibid 9.

<sup>44</sup> Ibid 8-9.

<sup>45</sup> Ibid 9-10.

<sup>46</sup> Ibid.

weapons have in common is the automated function that enables the weapon to track, identify and strike a target or group of targets that an operator has decided on.<sup>47</sup> It is critical to highlight that even though guided munitions possess some automated functions for tracking, identifying and engaging, the specific target to be engaged would still be determined by a human operator. This is the same for other semi-autonomous weapon systems.

An uncrewed aerial vehicle (UAV) is another example of a category of semi-autonomous weapon system. It should be noted, however, that UAVs can also have varying levels of autonomous capability ranging from semi-autonomous to fully autonomous. Nevertheless, for the purposes of this section, the focus will be on drones that are remotely controlled by a pilot in a location far from the target.<sup>48</sup> Most States now possess drones which are widely used for surveillance and intelligence gathering.<sup>49</sup> However, some drones are being used as lethal weapons. The MQ-1B Predator drone (which has officially been retired since 2018) and the MQ-9 Reaper (the Reaper) drone have been commonly used by the US Defense Force and are both around thirty-six feet long. They are used for 'persistent intelligence reconnaissance and surveillance', have 'target acquisition and "destroy and disable" capabilities', and are armed with hellfire missiles as well as other munitions.<sup>50</sup>

Since the Reaper is still in service and the MQ-1B Predator has been retired, this section will focus on the features of the Reaper. It is generally larger and more powerful than the MQ-1B Predator and is said to have surpassed one million hours of total development, testing, training, and combat'.<sup>51</sup> This is noted to be a

---

<sup>47</sup> Ibid.

<sup>48</sup> See Air Combat Command, Public Affairs Office, 'MQ-9 Reaper', *U.S. Air Force* (Website, 23 September 2015) <<https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104470/mq-9-reaper/>>; Air Combat Command, Public Affairs Office, 'MQ-1B Predator', *U.S. Air Force* (Website, 23 September 2015) <<https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104469/mq-1b-predator/>>.

<sup>49</sup> Rain Liivoja, Kobi Leins and Tim McCormack, 'Emerging technologies of warfare' in Rain Liivoja and Tim McCormack (eds), *Routledge Handbook of the Law of Armed Conflict* (Routledge, 2016) 612.

<sup>50</sup> Laurie R. Blank and Gregory P. Noone, *International Law and Armed Conflicts: Fundamental Principles and Contemporary Challenges in the Law of War* (Wolters Kluwer, 2016) 242.

<sup>51</sup> Air Combat Command, Public Affairs Office, 'MQ-1B Predator', *U.S. Air Force* (Website 23 September 2015) <<https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104469/mq-1b-predator/>>.



'significant accomplishment for the US Air Force'.<sup>52</sup> The features of the Reaper's baseline system involve a 'Multi-Spectral Targeting System' that is comprised of a suite of visual sensors.<sup>53</sup> These visual sensors include an 'infrared sensor, colour/monochrome daylight TV camera, image-intensified TV camera, laser designator and laser illuminator'.<sup>54</sup> This provides the Reaper with ample visual capabilities for precision targeting, but only when a military commander or operator can confirm that the object identified by the Reaper's visual sensors is the correct target.<sup>55</sup>

In the United Kingdom, the UAV demonstrator Taranis is an example of a semi-autonomous weapon system under development. It is designed to undertake 'sustained surveillance, marking targets, gathering intelligence, deterring adversaries and carrying out strikes in hostile territory'.<sup>56</sup> This is all possible under the control of a human operator who is in the OODA loop at all times.<sup>57</sup> Furthermore, according to the Taranis – Looking to the Future diagram (Taranis Diagram), there will be a Mission Commander who will verify targets and authorise the release of Taranis' payload.<sup>58</sup> As a result, this classifies the demonstrator UAV as a semi-autonomous weapon system. There are three key steps the drone is programmed to take during field tests:

- 1) Taking a pre-programmed flight path to the designated 'search area' and gathering intelligence which would then be relayed to mission command;
- 2) Identifying targets which would then be verified by mission command;
- 3) Carrying out a simulated firing under the authority of mission command then returning to the base using a pre-programmed flight path.<sup>59</sup>

---

<sup>52</sup> Ibid.

<sup>53</sup> Ibid.

<sup>54</sup> Ibid.

<sup>55</sup> Ibid.

<sup>56</sup> See 'Taranis', *BAE Systems (Website)* <<https://www.baesystems.com/en/product/taranis#>>. See also the Taranis - Looking to the Future Diagram that can be downloaded from the 'Taranis' web page on the *BAE Systems* website.

<sup>57</sup> Ibid.

<sup>58</sup> See the Taranis - Looking to the Future Diagram that can be downloaded from: 'Taranis', *BAE Systems (Website)* <<https://www.baesystems.com/en/product/taranis#>>.

<sup>59</sup> Ibid.

Although there is limited public information regarding the features of the Taranis, it is noted to be a 'combat air vehicle' and has helped the United Kingdom in understanding how to develop UAVs that 'can strike with precision over a long range'.<sup>60</sup> Therefore, by developing and testing the Taranis, the United Kingdom Ministry of Defence is attempting to develop Taranis and other similar UAVs in a manner that will enable the military to comply with the principle of distinction and the principle of proportionality. Furthermore, this UAV demonstrator will allow the Royal Air Force to consider combining both '[crewed] and [uncrewed] fast-jet aircraft' on missions and how the two types of aircraft will operate together.<sup>61</sup>

This strategy of combining both crewed and uncrewed aircraft could ensure that humans are always in the OODA loop and can make decisions relating to what the target is and when to release the payload. Or at the very least, this strategy should be able to keep human operators on the OODA loop where they can supervise the Taranis, should its targeting features become more autonomous and it can identify, select and attack the target on its own based on its programming.

### 3.3.2 SUPERVISED AUTONOMOUS WEAPON SYSTEMS

A weapon system that is 'supervised' usually has a human operator on the OODA Loop who can supervise the deployment as well as intervene when necessary. Figure 3.2 depicts how the OODA loop operates for supervised weapon systems. Examples of weapon systems in this category are close-in weapon systems (CIWS) used in naval vessels as well as counter rocket, artillery and mortar systems (C-RAMS) which are the land-based counterparts to CIWS.<sup>62</sup> Both CIWS and C-RAMS are anti-missile weapon systems that are rapid-fire guns controlled by computers, guided by radars and are engaged automatically to destroy and disable incoming missiles.<sup>63</sup> The Phalanx, manufactured by Raytheon in the United States, is one example of a CIWS and 'the most widely

---

<sup>60</sup> See 'Taranis', *BAE Systems (Website)* <<https://www.baesystems.com/en/product/taranis#>>; 'Taranis Unmanned Combat Air Vehicle (UCAV) Demonstrator', *Air Force Technology, (Website)* <<https://www.airforce-technology.com/projects/taranis/>>.

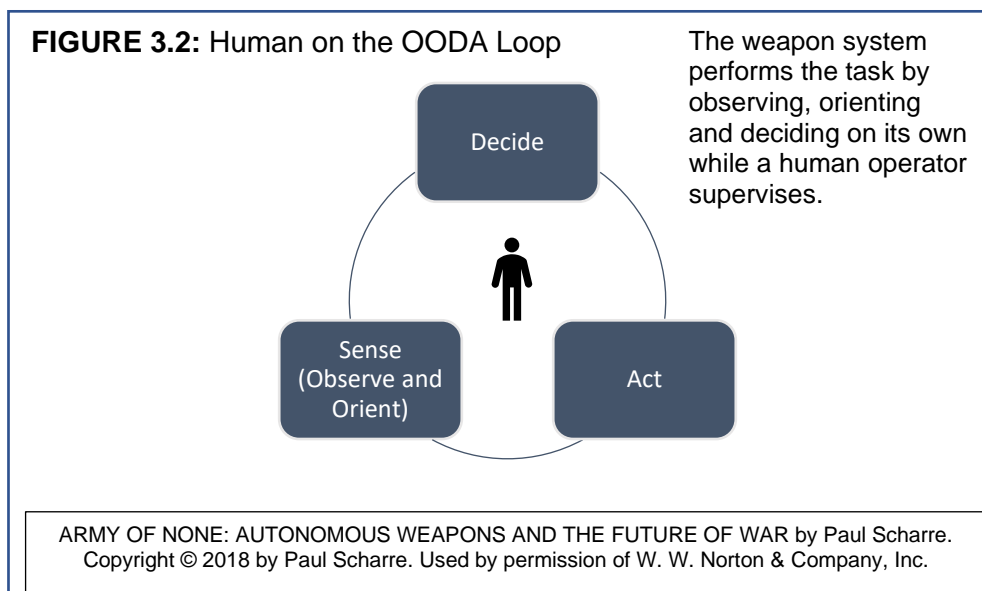
<sup>61</sup> 'Taranis', *BAE Systems (Website)* <<https://www.baesystems.com/en/product/taranis#>>.

<sup>62</sup> Rain Liivoja, Kobi Leins and Tim McCormack, 'Emerging technologies of warfare' in Rain Liivoja and Tim McCormack (eds), *Routledge Handbook of the Law of Armed Conflict* (Routledge, 2016) 612.

<sup>63</sup> *Ibid.*

deployed'.<sup>64</sup> The Phalanx CIWS is programmed to autonomously detect, track, engage and undertake a 'kill assessment' against an anti-ship missile as well as high-speed aircraft threats.<sup>65</sup> The current Block 1B version of the Phalanx CIWS incorporates a 'control station' including an 'electro-optic sensor' that enables an operator to 'visually track and identify targets before engagement'. Therefore, there is a human operator on-the-loop who can supervise while the weapon system (e.g. the Phalanx CIWS) is performing its task(s).

The Goalkeeper CIWS manufactured by Thales in the Netherlands is an 'autonomous and fully integrated weapon system' used for short defence against missiles and aircraft.<sup>66</sup> It automatically performs the process of surveillance, detection and destruction of targets as well as selecting the next priority target.<sup>67</sup>



Based upon the description by Fong and the Thales corporation, Goalkeeper needs very little human intervention when performing its tasks and can complete the OODA Loop on its own when activated. The operator is merely supervising the weapon system as it performs its tasks.<sup>68</sup>

<sup>64</sup> Kelvin Fong, 'CIWS: The Last-ditch Defence' [2008] (July/August) *Asian Defence Journal* 18, 18.

<sup>65</sup> 'MK 15 – Phalanx Close-In Weapon System (CIWS)', *US Department of the Navy* (Website, 15 January 2019) <[https://www.navy.mil/navydata/fact\\_display.asp?cid=2100&tid=487&ct=2](https://www.navy.mil/navydata/fact_display.asp?cid=2100&tid=487&ct=2)>.

<sup>66</sup> Kelvin Fong, 'CIWS: The Last-ditch Defence' [2008] (July/August) *Asian Defence Journal* 18, 19.

<sup>67</sup> See Kelvin Fong, 'CIWS: The Last-ditch Defence' [2008] (July/August) *Asian Defence Journal* 18, 19; 'Goalkeeper - close-in weapon system', Thales (Website) <<https://www.thalesgroup.com/en/goalkeeper-close-weapon-system>>.

<sup>68</sup> *Ibid.*

There are other types of CIWS including the Millennium Gun manufactured by Rheinmetall in Germany, the Kashtan CIWS manufactured by KBP Instrument Design Bureau in Russia, Type 730 manufactured in China and the SeaRAM Anti-Ship Missile Defense System manufactured by Raytheon in the United States.<sup>69</sup> The Millennium Gun that entered into service in 2007 is an '[uncrewed], remotely controlled gun mount'. It has been used by the Denmark Royal Navy and was also the subject of a program funded by the United States Navy.<sup>70</sup>

The modular system of the Kashtan CIWS, used by India and China, is comprised of command modules and combat modules.<sup>71</sup> The command module automatically detects threats, distributes the data then designates the threats as targets to the combat modules. This then ensures the initiation of the identification friend or foe procedure.<sup>72</sup> The combat modules then automatically track the target using radar and television, calculate the firing data and engage the target using guns and missiles.<sup>73</sup>

Type 730 is designed to provide terminal defences against anti-ship missiles and other airborne threats such as aircraft.<sup>74</sup> This weapon system is incorporated with a fire-control radar and an electro-optic director mounted on the turret roof.<sup>75</sup> Moreover, the electro-optic director includes a 'TV tracking camera, [an] infrared tracking camera and [a] laser rangefinder which provides a maximum tracking range of 5-6km'.<sup>76</sup> The SeaRam Anti-Ship Missile Defense System is the evolved version of the MK15 Phalanx. It possesses the same 'above-deck system and mechanical hardware' as the Phalanx.

The similarity between these CIWS is that they possess automated functions that enable them to defend naval ships against missile attacks autonomously with

---

<sup>69</sup> See Kelvin Fong, 'CIWS: The Last-ditch Defence' [2008] (July/August) *Asian Defence Journal* 18; Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015) 21.

<sup>70</sup> Kelvin Fong, 'CIWS: The Last-ditch Defence' [2008] (July/August) *Asian Defence Journal* 18.

<sup>71</sup> See Kelvin Fong, 'CIWS: The Last-ditch Defence' [2008] (July/August) *Asian Defence Journal* 18, 20; Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015) 21.

<sup>72</sup> *Ibid.*

<sup>73</sup> *Ibid.*

<sup>74</sup> Kelvin Fong, 'CIWS: The Last-ditch Defence' [2008] (July/August) *Asian Defence Journal* 18, 20.

<sup>75</sup> *Ibid.*

<sup>76</sup> *Ibid.*

operators supervising the performance of the CIWS. They are used to help defend against threats that would require speedy engagement but would overwhelm operators. Thus, automated defences provided by CIWS are essential to surviving attacks from precision-guided missiles.<sup>77</sup> Nevertheless, it is still human operators who determine the parameters of the weapon system and the threats it should target or ignore.<sup>78</sup> Therefore, human operators may not necessarily be in the OODA loop but are still 'on' it.

It can be concluded that these CIWS are currently able to comply with the principle of distinction as operators still determine what the weapon system should look for and target; thus, ensuring that the target(s) are appropriate military objectives. The majority of these CIWS are equipped with features such as TV and infrared tracking cameras, electro-optic sensors, radars, global positioning systems and other guidance systems to enable the weapon system to be more accurate and precise in tracking, identifying and engaging targets. This enables these CIWS to also abide by the principle of proportionality as their features assist in the targeting accuracy of the weapon system which in turn assists in avoiding extensive collateral damage.

The Modular Advanced Armed Robotic System (MAARS) is another example of a supervised, potentially lethal, weapon system. It is an uncrewed ground vehicle (UGV) used for 'reconnaissance, surveillance and target acquisition (RSTA) missions' to increase security for military and other personnel.<sup>79</sup> The MAARS receives programmed instructions from the operator and has 'multiple options for the escalation of force when required by the Rules of Engagement'.<sup>80</sup> The MAARS comes with payloads that include non-lethal options (e.g. audio deterrent, pre-recorded messages, siren and eye-safe lasers to disorient and confuse), 'less-lethal' options (e.g. a 40mm grenade launcher with a sponge, buckshot, tear gas, smoke, star clusters and illumination) and lethal options (e.g. 40mm grenade launcher with high explosive (HE), high explosive dual purpose, airburst HE and

---

<sup>77</sup> Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 46.

<sup>78</sup> Ibid 47.

<sup>79</sup> 'Modular Advanced Armed Robotic System', *QinetiQ North America* (Web Page) <<https://www.qinetiq.com/en-us/what-we-do/services-and-products/maars-weaponized-robot>>.

<sup>80</sup> Ibid.

an M240B medium machine gun with 45 rounds, 7.62mm ball). It can execute security missions including hostage rescue, ambushes, forced entry and navigating dangerous terrains.<sup>81</sup>

QinetiQ emphasises that 'MAARS is operational only when receiving coded instructions from its operator'.<sup>82</sup> Therefore, a human is on the OODA Loop. Nevertheless, there have been issues with the MAARS in terms of engaging a target and releasing its payload. The 'major issue' noted by military commanders with the MAARS deployment is regarding collateral damage as the machine gun bullets can travel farther than the sensors.<sup>83</sup> This may hinder the ability of the MAARS, and the operator, to comply with the principle of proportionality due to the possible excessive collateral damage, or even the principle of distinction due to the possible harm to civilians instead of combatants. Nevertheless, militaries are interested in weapon systems such as this since their main purpose is to ensure the security of military personnel during RSTA missions.

The Aegis Weapon System, also known as the Aegis Combat System, is also classified as a supervised weapon system.<sup>84</sup> This automated and centralised system includes a radar that can automatically search, detect, track and guide missiles simultaneously against multiple threats.<sup>85</sup> Part of the combat system also includes the Phalanx CIWS Block 1B mentioned earlier. At the core of the Aegis Combat System is the 'computer-based command and decision element'. This element is what allows the Aegis to run simultaneous offensive and defensive operations against 'multi-mission' threats that include 'anti-air, anti-surface and anti-submarine warfare'.<sup>86</sup> Concerning the operator's role and the human-machine interface, operators can control certain elements such as the AN/SP-1 Radar, the Command and Decision System as well as the weapon system

---

<sup>81</sup> Ibid.

<sup>82</sup> Ibid.

<sup>83</sup> British Forces Broadcasting Service (BFBS), 'MAARS Mission: The Military Patrol Robot', *Forces.Net* (Online News Article, 5 July 2016) <<https://www.forces.net/services/tri-service/maars-mission-military-patrol-robot>>.

<sup>84</sup> See Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 89; 'Aegis The Shield of the Fleet', *Lockheed Martin* (Webpage) <<https://www.lockheedmartin.com/en-us/products/aegis-combat-system.html>>.

<sup>85</sup> Command, Office of Corporate Communication Navy Sea Systems, 'Aegis Weapon System', United States Navy Fact File, 10 January 2019) <[https://www.navy.mil/navydata/fact\\_display.asp?cid=2100&tid=200&ct=2](https://www.navy.mil/navydata/fact_display.asp?cid=2100&tid=200&ct=2)>.

<sup>86</sup> Ibid.

through doctrine statements that define the parameters for taking action against targets that meet specific conditions.<sup>87</sup>

The final supervised LAWS that will be discussed in this section is the MQ-8C Fire Scout. It is an uncrewed air vehicle developed by Northrop Grumman, in collaboration with Bell, and has evolved from the MQ-8B Fire Scout.<sup>88</sup> The weapon system can 'autonomously take off and land from any aviation-capable ship'.<sup>89</sup> Its capabilities have been expanded to have increased payload capacity (modified 70mm Hydra rockets equipped with a guidance system), endurance and speed compared to the MQ-8B Fire Scout.<sup>90</sup>

### 3.3.3 FULLY AUTONOMOUS WEAPON SYSTEMS

Weapon systems that are considered fully autonomous, theoretically, would not require any human supervision or intervention. These weapon systems would be able to observe, orient, decide and act all on their own; thus, humans are out of the OODA loop altogether. Figure 3.3 depicts how the OODA Loop operates for fully autonomous weapon systems. However, there are very few examples of fully autonomous weapon systems currently deployed.<sup>91</sup> Loitering munitions are one of the few examples of fully autonomous weapon systems, and the Harpy is the only example of a currently operational loitering munition.<sup>92</sup> Loitering munitions such as the Harpy are different from guided munitions in that they can be launched into a general location and fly a search pattern over a wide area seeking

---

<sup>87</sup> 'AEGIS Weapon System Mk 7', *Global Security* (Website, 7 July 2011) <<https://www.globalsecurity.org/military/systems/ship/systems/aegis-core.htm>>.

<sup>88</sup> See 'Fire Scout Unmanned Aircraft System', *Northrop Grumman* (Web Page) <<https://www.northropgrumman.com/what-we-do/air/fire-scout/>>; Northrop Grumman, 'Northrop Grumman-Built MQ-8C Fire Scout Makes Operational Deployment with US Navy' (News 24 January 2022) <[https://news.northropgrumman.com/news/releases/northrop-grumman-built-mq-8c-fire-scout-makes-operational-deployment-with-the-us-navy?\\_gl=1\\*1oi15qs\\*\\_ga\\*MjA2ODg3MDA1Ni4xNjY2ODMwNDA1\\*\\_ga\\_7YV3CDX0R2\\*MTY2NjgzMDQwNC4xLjEuMTY2NjgzMDU2NS4wLjAuMA..>](https://news.northropgrumman.com/news/releases/northrop-grumman-built-mq-8c-fire-scout-makes-operational-deployment-with-the-us-navy?_gl=1*1oi15qs*_ga*MjA2ODg3MDA1Ni4xNjY2ODMwNDA1*_ga_7YV3CDX0R2*MTY2NjgzMDQwNC4xLjEuMTY2NjgzMDU2NS4wLjAuMA..>)>;

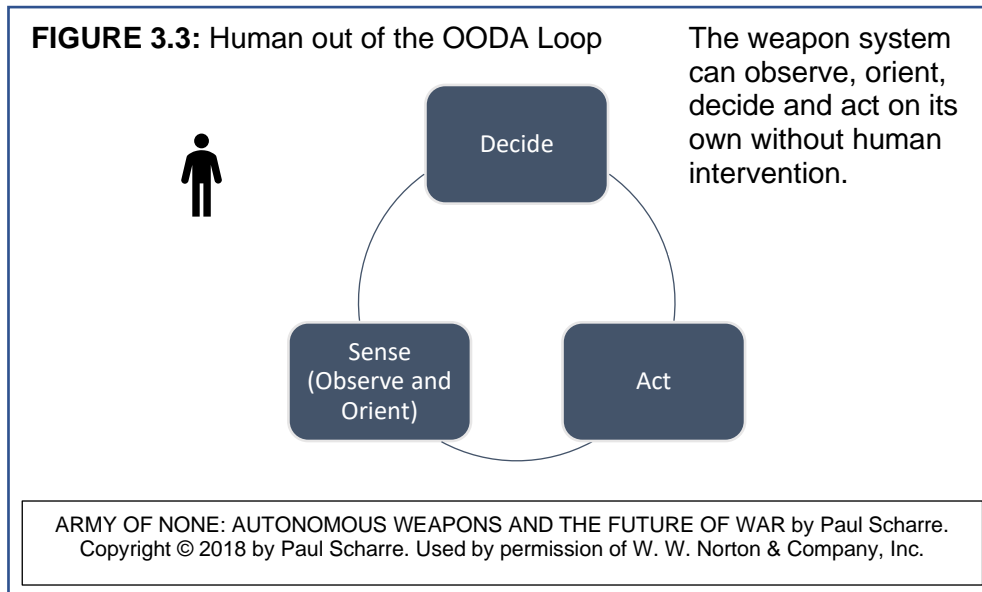
<sup>89</sup> 'Fire Scout Unmanned Aircraft System', *Northrop Grumman* (Web Page) <<https://www.northropgrumman.com/what-we-do/air/fire-scout/>>

<sup>90</sup> See See 'Fire Scout Unmanned Aircraft System', *Northrop Grumman* (Web Page) <<https://www.northropgrumman.com/what-we-do/air/fire-scout/>>; Werner, Ben, 'Navy Declares Unmanned MQ-8C Fire Scout Helicopter Mission Capable', *US Naval Institute News* (online, 9 July 2019) <<https://news.usni.org/2019/07/09/navy-declares-unmanned-mq-8c-fire-scout-helicopter-mission-capable>>.

<sup>91</sup> Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015) 4.

<sup>92</sup> *Ibid.*

targets. In contrast, the guided munitions are given a specific target to engage by an operator.<sup>93</sup>



Using the example of the Harpy, it would be activated and launched having a pre-programmed search pattern to look for 'enemy radars'. The Harpy can then search a wide area for radars, and once a radar fitting the pre-programmed pattern is detected and located the Harpy locks in and engages the target.<sup>94</sup> The Harpy can go through this process on its own without an operator deciding the specific target or interfering. The United States has also developed loitering munitions such as the Low-cost Autonomous Attack System (LOCAAS) and the Tacit Rainbow; however, none of them have been deployed by the United States defence force.<sup>95</sup>

Another example of a potentially fully autonomous weapon system is the encapsulated torpedo mine as it blurs the line between semi-autonomous and fully autonomous weapon systems. It is a type of sea mine that can be set up deeper than two thousand metres underwater.<sup>96</sup> While mines do have automatic functions, they do not necessarily have the freedom to navigate and search for targets themselves.<sup>97</sup> However, encapsulated torpedo mines are seen to function

<sup>93</sup> Ibid 13-14.

<sup>94</sup> Ibid.

<sup>95</sup> Ibid 13.

<sup>96</sup> Scott C. Truver, 'Taking Mines Seriously: Mine Warfare in China's Near Seas' (2012) 65(2) *U.S. Naval War College Review* 30, 41.

<sup>97</sup> Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 51.



more like autonomous weapons compared to other mines. Unlike other mines, they have greater freedom to release a torpedo which will then track onto the target.<sup>98</sup>

Encapsulated torpedo mines also can engage targets over a much wider area than traditional mines; therefore, it is more similar to a loitering munition.<sup>99</sup> When the mine is activated by a ship passing by, the capsule opens and releases a torpedo that homes in on and engages the target, which is the passing ship.<sup>100</sup> Therefore, this type of torpedo does not home in on a target selected by an operator nor will it blow up in place like other mines.<sup>101</sup> In summary, the encapsulated torpedo mine can select and engage its target without the need for input or interference from an operator. The PMK-2 encapsulated torpedo mine is currently used by Russia and China today. The United States did have these mines in the inventory for several years, but they have now been retired.<sup>102</sup>

#### 3.3.4 A GLIMPSE INTO THE FUTURE: MORE EXAMPLES OF WEAPON SYSTEMS IN THE DEVELOPMENT STAGE

Earlier on, the discussion about the Taranis UAV provided an example of a semi-autonomous weapon system under development in the United Kingdom by BAE Systems. This section will address more examples of weapon systems under development with various degrees of autonomy to provide a glimpse into the future of autonomous weapon systems.

The Guardium, an uncrewed ground vehicle (UGV), is another example of a weapon system that has the potential to be fully autonomous. It was developed by Nius-G, a joint venture between Israel Aerospace Industries Limited and Elbit Systems Limited in Israel.<sup>103</sup> The weapon system is equipped with 'a counter-improvised explosive device (CIED) jammer, ground penetrating radar, counter-

---

<sup>98</sup> Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015) 15.

<sup>99</sup> Ibid. See also Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 51.

<sup>100</sup> See Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015) 15; Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 51.

<sup>101</sup> Ibid.

<sup>102</sup> Ibid.

<sup>103</sup> Yuval Azulai, 'Israel's Defense Ministry scraps robot vehicle venture', *Globes* (Online, 4 May 2016) <<https://en.globes.co.il/en/article-idf-scraps-robot-vehicle-development-1001122079>>.

human and vehicle detection radar and a mini-pop cooled thermal surveillance camera' which enables operators to receive real-time footage from the system.<sup>104</sup> The Guardium will be driven by operators sitting in a command centre far away from the location of the Guardium, and it will also be possible for the Guardium to patrol pre-programmed routes.<sup>105</sup> It is also said that the Guardium could respond to emergencies and evolving situations during its patrol.<sup>106</sup> Performing tasks such as navigating pre-programmed routes and responding to emergencies and evolving situations while patrolling is what gives the Guardian its potential to be a fully autonomous weapon system.

The Guardium has gone through the development and testing phase having been used in operations along the Gaza Strip and Israel's northern border.<sup>107</sup> However, the joint venture Nius-G has been terminated due to a lack of interest from potential buyers; indicating, a lack of profitability and economic viability.<sup>108</sup> This can be considered an example of the hesitancy of some militaries deploying such weapon systems.

Another weapon system that is in the development stage is the Sea Hunter currently being developed and tested in the United States. Sea Hunter is 'a prototype of an [uncrewed] submarine tracking vessel' that is capable of tracking and possibly engaging 'enemy submarines'.<sup>109</sup> It is designed to travel months at a time, operating autonomously with little to no onboard crew for a fraction of the current costs.<sup>110</sup> It is worthwhile to note that the reduction in operation costs

---

<sup>104</sup> 'AvantGuard Unmanned Ground Combat Vehicle', *Army Technology* (Website) <<https://www.army-technology.com/projects/avantguardunmannedgr/>>.

<sup>105</sup> John Reed, 'Israel's killer robot cars', *Foreign Policy* (Online, 20 November 2012) <<https://foreignpolicy.com/2012/11/20/israels-killer-robot-cars/>>.

<sup>106</sup> *Ibid.*

<sup>107</sup> See 'AvantGuard Unmanned Ground Combat Vehicle', *Army Technology* (Website) <<https://www.army-technology.com/projects/avantguardunmannedgr/>>; David Shamah, 'As Google Dreams of Driverless Cars, IDF Deploys Them', *The Times of Israel* (online, 3 June 2014) <<https://www.timesofisrael.com/as-google-dreams-of-driverless-cars-idf-deploys-them/>>.

<sup>108</sup> Yuval Azulai, 'Israel's Defense Ministry scraps robot vehicle venture', *Globes* (Online, 4 May 2016) <<https://en.globes.co.il/en/article-idf-scraps-robot-vehicle-development-1001122079>>.

<sup>109</sup> Julian Turner, 'Sea Hunter: inside the US Navy's autonomous submarine tracking vessel', *Naval Technology* (Web Page, 3 May 2018) <<https://www.naval-technology.com/features/sea-hunter-inside-us-navys-autonomous-submarine-tracking-vessel/>>.

<sup>110</sup> See Michael T. Klare, 'Autonomous Weapon Systems and the Laws of War' 49 (March 2019) *Arms Control Today*; Julian Turner, 'Sea Hunter: inside the US Navy's autonomous submarine tracking vessel', *Naval Technology* (Web Page, 3 May 2018) <<https://www.naval->

would have contributed to the motivation of high-ranking officials in the United States Navy and the Pentagon to develop Sea Hunter. Although there is limited public information as to whether Sea Hunter would be equipped with lethal payloads, there are plans underway to equip Sea Hunter with anti-submarine weapons.<sup>111</sup>

There is no doubt that there is interest in developing LAWS with more autonomous features leading to more weapon systems that would be very close to becoming a fully autonomous weapon system. However, it is still uncertain what the future of LAWS would look like. Despite this, current weapon systems in use and the ones under development do paint a picture as to how autonomy in weapon systems is currently used and its potential uses in future operations.

### **3.4 CAN LAWS COMPLY WITH IHL?**

Whether LAWS can comply with IHL depends on how they operate, how human supervision is exercised over them, what they are used for and the conditions they are used in.<sup>112</sup> At this time, the majority of the weapon systems discussed earlier have some form of human control or supervision. Therefore, tasks such as determining proportionality and applying the principle of distinction are still likely to be completed by the operators. Although there are LAWS that can apply the principle of distinction by identifying, selecting and queuing up military targets on their own, the parameters of the targets are pre-programmed into the system by developers and or operators.<sup>113</sup>

If the weapon system itself is not indiscriminate by nature and is not deemed to cause superfluous injury and unnecessary suffering, it should be able to comply with the laws of targeting under IHL. This raises the question of whether the weapon system would be able to take the relevant precautions when carrying out an attack as IHL requires since whoever, or whatever, decides to attack also must

---

technology.com/features/sea-hunter-inside-us-navys-autonomous-submarine-tracking-vessel/>.

<sup>111</sup> Julian Turner, 'Sea Hunter: inside the US Navy's autonomous submarine tracking vessel', *Naval Technology* (Web Page, 3 May 2018) <<https://www.naval-technology.com/features/sea-hunter-inside-us-navys-autonomous-submarine-tracking-vessel/>>.

<sup>112</sup> Kenneth Anderson, Daniel Reisner and Matthew Waxman, 'Adapting the Law of Armed Conflict to Autonomous Weapon Systems' (2014) 90 *International Law Studies* 386, 397.

<sup>113</sup> See Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 33-35.

make a judgment as to whether the target is a legally appropriate target or whether the attack would lead to excessive collateral damage.

This may prove to be one of the major challenges for compliance.<sup>114</sup> There may be ways to program precautionary measures into weapon systems such as ensuring that there are sufficient sensors, radars, other equipment and algorithms that would enable the weapon system to be more precise in identifying and attacking military targets. Nevertheless, precautionary measures are usually determined before initiating an attack by commanders who make plans for the overall attack and decide upon the rules of engagement.<sup>115</sup> Therefore, the responsibility for taking precautions in attacks, deciding the weapon to be used and the overall operation still rests with the commander.<sup>116</sup>

There is nothing to indicate that LAWS cannot comply with IHL, and they are not considered to be inherently illegal.<sup>117</sup> This will be the case providing that human control is being exercised over LAWS to ensure that LAWS are developed so that the weapon system can be lawfully used. Therefore, human control and judgment are still important to ensure that the relevant assessments of IHL principles are made and the necessary precautions are taken before initiating an attack. Overall, if there is effective human control and oversight, there should be no inherent difficulties in complying with IHL when developing and using LAWS.

### **3.5 CONCLUSION**

Several factors contribute to the increased military interest and investment in LAWS which include economic, operational, security and humanitarian factors. Developing and deploying LAWS have the potential to reduce the cost of personnel, increase the speed of the decision-making process, keep military

---

<sup>114</sup> Jeffrey S. Thurnher, 'The Law That Applies to Autonomous Weapon Systems' (2013) 17(4) *American Society for International Law Insights* 4.

<sup>115</sup> Kenneth Anderson, Daniel Reisner and Matthew Waxman, 'Adapting the Law of Armed Conflict to Autonomous Weapon Systems' (2014) 90 *International Law Studies* 386, 404.

<sup>116</sup> Kenneth Anderson, Daniel Reisner and Matthew Waxman, 'Adapting the Law of Armed Conflict to Autonomous Weapon Systems' (2014) 90 *International Law Studies* 386, 404.

<sup>117</sup> See Michael N. Schmitt and Jeffrey S. Thurnher, "'Out of the Loop": Autonomous Weapon Systems and the Law of Armed Conflict' (2013) 4 *Harvard National Security Journal* 231, 279; Kenneth Anderson, Daniel Reisner and Matthew Waxman, 'Adapting the Law of Armed Conflict to Autonomous Weapon Systems' (2014) 90 *International Law Studies* 386, 406.

personnel safe and increase the targeting accuracy of the weapon which may lead to a decrease in collateral damage.

However, there are also disadvantages to the development and use of LAWS that need to be considered. These include the fact that 1) discretion is involved in analysing the situations on the battlefield and in making judgments based on a changing environment; 2) the act of analysing and making judgments on the battlefield requires an assessment of large amounts of qualitative data; and 3) there is currently no software capability that allows a computer to process large amounts of qualitative data. Nevertheless, the advantages of developing and using weapon systems with autonomous capabilities have captured the interest of several State militaries.

It would be impractical to describe autonomy in a categorical manner where a weapon system is either autonomous or not. It is best to describe it and view it as a scale which will be further discussed in Chapter Six. A scale of autonomy can encompass the range of autonomy-enabling technology being used in various weapon systems. This is demonstrated by the existing LAWS discussed in this chapter, and that certain LAWS possess more autonomous capabilities than others. That has led the US Department of Defense and other experts to create classifications like semi-autonomous, supervised and fully autonomous weapon systems.

Regarding the capability for LAWS to comply with IHL, there is nothing to indicate that they are inherently illegal and cannot comply with IHL. If the weapon system in question is not by nature indiscriminate and does not cause superfluous or unnecessary suffering, then the weapon system should be able to comply with IHL. However, defining effective human control and ensuring effective human control is exercised over LAWS would be beneficial in guaranteeing that the development and use of LAWS comply with IHL.

Having discussed why there is military interest in developing and using LAWS the LAWS currently being used and whether they can, in their nature, comply with IHL, it is necessary to analyse the discussions on LAWS that have occurred in meetings with experts and State Parties to the CCCW. This is to gain further insight into what the experts have said about the practicalities of autonomous

weapon systems and how the State Parties have framed and viewed the issues discussed in the meetings.

---

## CHAPTER 4: DELIBERATIONS ON LAWS

---

## 4.1 INTRODUCTION

In 2013 the State Parties to the Convention on Certain Conventional Weapons (CCCW) decided that the Chairperson would organise and convene an informal meeting of experts in 2014 to discuss questions regarding emerging technologies, particularly LAWS.<sup>1</sup> After the first meeting in November 2014, two more informal meetings occurred in 2015 and 2016 which will be discussed further in the subsequent sections. The GGE on LAWS was established at the Convention on Certain Conventional Weapons (CCCW) Fifth Review Conference in 2016 and first met in 2017. They have continued to meet in the subsequent years; however, the latest meeting in 2020 was delayed due to the COVID-19 pandemic. The first session of the 2020 meeting was eventually held between the 21<sup>st</sup> and 25<sup>th</sup> of September.<sup>2</sup>

This chapter will explore and reflect upon the discussions that have occurred so far during the three informal meetings of experts on LAWS and the three meetings of the GGE on LAWS. This is to better understand what should be considered in the working definition of effective human control. Analysing the content of the meetings will provide insight into how the discussion on LAWS has developed, in particular, the discussion on the concepts regarding human control over LAWS and how experts and delegates of the meetings are approaching the concept.

From the discussions, this chapter aims to highlight certain elements from the technical concept of autonomy, the term 'meaningful' human control, which is the common term used during these meetings, and the suggested descriptions of LAWS. The chapter will then examine which aspects of these concepts and terms would be most appropriate to take into consideration when developing a working definition of effective human control. This is to ensure that the working definition

---

<sup>1</sup> Fourth Review Conference 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, *Final Report*, 2013 sess, Agenda Item 13, UN Doc CCW/MSP/2013/10 (16 December 2013) 7, [32].

<sup>2</sup> 'Convention on Certain Conventional Weapons Group of Governmental Experts on Lethal Autonomous Weapons Systems', *United Nations Office for Disarmament Affairs* (Web Page, 2020) <<https://meetings.unoda.org/meeting/62100>>.



of effective human control is built on realistic and practical elements that make the working definition implementable.

## **4.2 KEY ISSUES FROM THE 2014 INFORMAL MEETING OF EXPERTS<sup>3</sup>**

### **4.2.1 THE GENERAL DEBATE AND BACKGROUND OF THE 2014 MEETING**

The first informal meeting of experts on LAWS occurred between 13 and 16 May 2014. The main purpose of this meeting was to begin building the framework for the discussions on LAWS using the CCCW as a platform. Thus, the general debate and specific topic discussions that transpired were preliminary. Germany noted that this session should be about asking the right questions.<sup>4</sup> Meanwhile, Ecuador mentioned several key questions that needed to be considered such as:<sup>5</sup>

- How can weapon systems distinguish between a combatant and a civilian?
- How can weapon systems better identify soldiers compared to military objectives?
- How can weapon systems identify active combatants compared to hors de combat?
- How can weapon systems identify between civilians taking part in hostilities and those civilians that are part of domestic security such as the police?

Delegates noted that it was premature to determine the course the discussions would take.<sup>6</sup> During the general debate, where delegations were able to deliver their initial statement, a range of possible solutions were suggested. This included exchanging information regarding the development and use of LAWS between

---

<sup>3</sup> See Appendix 1: Table 4.1 for a summary of the key issues and points from the 2014 meeting.

<sup>4</sup> Federal Republic of Germany Foreign Office, 'CCW Expert Meeting on Lethal Autonomous Weapon Systems: General Statement by Germany' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014) 2.

<sup>5</sup> Misión Permanente del Ecuador ante las Naciones Unidas y Organismos Internacionales en Ginebra, 'Reunión Informal de Expertos Sober Armas Letales Autónomas en el Marco de la CCAC [Informal Meeting of Experts on Lethal Autonomous Weapon Systems of the CCCW]' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems, 13 March 2014) 2.

<sup>6</sup> *Report of the 2014 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2013 sess, Agenda Item 8, UN Doc CCW/MSP/2014/3 (14 November 2014) 3, [16]

States and experts, developing best practices and a moratorium on research into LAWS.<sup>7</sup>

#### 4.2.2 KEY ISSUE ONE: CLARIFYING TERMINOLOGY

The first key issue to highlight is the need to clarify the terms such as 'autonomous weapon system', 'autonomy' and 'human control'. For example, in their initial statements, Australia and Austria expressed their desire to have a clear, substantive definition of LAWS to enable further discussion.<sup>8</sup> While Australia said that they 'would like to eventually see a definition',<sup>9</sup> Austria stated that 'a more substantive, agreed [on] definition...would be a desirable outcome of this meeting'.<sup>10</sup> Unlike Australia, Austria seemed to believe that a definition of LAWS should be agreed upon sooner rather than later.

Regarding clarification of the term autonomy, Germany mentioned that it would be beneficial to investigate the definition of 'automatic', compared to 'automated' and 'autonomous'.<sup>11</sup> It is important to clarify the difference between those three terms. However, conceptualising autonomy on a scale instead of focusing on the details of the definition of each of those terms would be more practical. Section 6.2 of this chapter discusses the reasons why a scale of autonomy would be a suitable approach compared to a strict delineation between the terms automatic, automated and autonomous.

In addition, Ireland stated that they would like to clarify the term 'control' because it is an important concept in the discussions and suggested that it should be ensured that control is effective and not merely nominal.<sup>12</sup> Ireland's comments

---

<sup>7</sup> Ibid.

<sup>8</sup> Peter Woolcott, 'Australian Statement for the General Debate' (Speech, CCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems (LAWS), 13 May 2014); Thomas Hajnoczi, 'Statement by Austria: General Debate' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapons Systems, 13 May 2014).

<sup>9</sup> Peter Woolcott, 'Australian Statement for the General Debate' (Speech, CCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems (LAWS), 13 May 2014).

<sup>10</sup> Thomas Hajnoczi, 'Statement by Austria: General Debate' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapons Systems, 13 May 2014).

<sup>11</sup> Federal Republic of Germany Foreign Office, 'CCW Expert Meeting on Lethal Autonomous Weapon Systems: General Statement by Germany' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014) 3.

<sup>12</sup> Ireland, 'Irish General Statement at the CCW Informal Consultations on Lethal Autonomous Weapons' (Statement, CCCW Informal Meeting of Experts on LAWS, 13 May 2014).

that control should be effective is one of the reasons why this thesis uses the term 'effective' and proposes a working definition of effective human control.

Other delegates such as India and Japan believed it may be too early to engage in an in-depth discussion on definitions.<sup>13</sup> Understandably, delegations would have slightly different viewpoints on whether it is appropriate to clarify definitions and other terms at the very first meeting. However, deliberations would be more effective if, as some delegations suggested, terms and definitions are clarified early on so that the discussions on LAWS can progress. No clarification or direction on the understanding of key terms such as 'lethal autonomous weapon systems' and 'human control', makes it difficult to address other issues as the discussion will be sure to circle back to how certain terms should be defined. However, as this is just the first meeting, it is reasonable to expect no clear outcome regarding key terms and definitions.

#### 4.2.3 KEY ISSUE TWO: THE TECHNICAL CONCEPT OF AUTONOMY

The second key issue focused on understanding the technical aspects of LAWS.<sup>11</sup> The discussion on this key issue provides insight into the technical description of autonomy and how autonomy in weapon systems works. Dr Raja Chatila and Dr Paul Scharre emphasised that there are elements crucial to describing the concept of autonomy.<sup>12</sup> This includes the description that autonomous weapon systems have the 'capacity to select and engage a target without human intervention'.<sup>13</sup>

According to Dr Chatila, 'a machine is endowed with...basic capabilities' which include 1) data acquisition through sensors; 2) data interpretation to extract information and build representations from acquired data and pre-existing knowledge a machine possesses; 3) decision-making by using information and knowledge to determine and plan a course of action, to achieve an objective or to react to events; 4) the execution of a physical action by the machine through actuators or other devices; 5) communication with operators or other machines; and 6) machine learning 'to improve world representations or performance from

---

<sup>13</sup> See D.B Venkatesh Varma, 'Statement at the CCW Experts Meeting on Lethal Autonomous Weapon Systems' (Speech, CCCW Informal Meeting of Experts, 13 May 2014); Toshio Sano, 'Statement by H.E. Ambassador Toshio Sano' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 May 2014).

experience'.<sup>14</sup> The fifth capability considers the human-machine interface and how the operators and machine communicate with one another as well as how much interaction there is between the human and machine. Meanwhile, the sixth capability considers a machine's programmed ability to learn from previous experiences to improve its decision-making process and response which may not require as much intervention from human operators. Along with these six capabilities, autonomy can be considered as the capacity of a system to decide and act with little to no assistance from another agent.<sup>15</sup>

Professor Noel Sharkey provided an insight into the general, decision-making process of computers when they are programmed to perform tasks. Sharkey notes that there are three general steps in the process:

1. Information is gathered through the sensors, whether that is radar, infrared cameras or radiation detection systems.
2. The information is then received and processed by the computer.
3. Once the information input is processed, the computer output sends a signal to the motor (or actuator) which will then move the robot or machine, whether that is to release a payload or to navigate through terrain.<sup>16</sup>

Professor Sharkey was only interested in implementing a ban or moratorium on the 'kill function' of the autonomous weapon system.<sup>17</sup> That would be the output from the computer that controls the weapon directly without a human involved.<sup>18</sup> In terms of the steps described earlier, for example, the kill function would be in step three where the computer output sends a signal to the weapon to release its lethal payload. Although implementing a ban or moratorium is still debated among academics and practitioners, a key point is that focusing on the critical functions related to target identification, selection and the kill function of the weapon system provides a starting point in accurately describing autonomy.

---

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> Noel Sharkey, 'The pros and cons of LAWS' (Presentation, CCCW Informal Meeting of Experts, 13 May 2014)

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

Regarding autonomy, Dr Scharre presented a way to view autonomy that emphasises the importance of the human-machine interface in conceptualising the term. He suggests that autonomy refers to a) the level of human control over a machine, b) the complexity of the machine and c) the kind of task the machine is to perform.<sup>19</sup> These three points build a good foundation on how to understand the practicalities of machine autonomy.

Focusing on critical functions is another technical element of autonomy that should be considered when creating the working definition of effective human control. For example, a human operator should exercise *effective control* over the *critical functions* of an AWS. Thus, this preliminary description that this thesis will continue to build upon acknowledges both the importance of considering the human-machine interface and ensuring effective control over the critical functions related to target identification, selection and the release of the weapon system's payload.

Understanding and considering the information that Dr Chatila, Dr Scharre and Professor Sharkey presented regarding machine processes and autonomy is important since the information paints a picture of the technical aspect of machine autonomy from an engineering and robotics perspective, and that autonomy is also about how the human and machine interacts. This helps in building a practical understanding of autonomy and human control over autonomous machines which in turn will help build a practical understanding of effective human control.

#### 4.2.4 KEY ISSUE THREE: UNDERSTANDING THE OPERATIONAL AND MILITARY ASPECTS OF LAWS

Although there was not much in-depth discussion on the operational and military aspects of LAWS during the 2014 meeting, there are still important points that form the building blocks to a more comprehensive discussion. The first point to note is that the delegates and experts acknowledged that there are risks when deploying LAWS which have life-and-death consequences.<sup>20</sup> The second point is

---

<sup>19</sup> Paul Scharre, 'Where does the Human Belong in the Loop ' (Presentation CCCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014)

<sup>20</sup> *Report of the 2014 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2014 sess, Agenda Item 8, UN Doc CCW/MSP/2014/3 (14 November 2014) 5, [36].

that delegates and experts acknowledged that in an operational context, states are not interested in replacing humans completely by deploying LAWS. The reason is the need for commanders to keep control over military operations.<sup>21</sup> The necessity of commanders to retain control over military operations they supervise indicates that human control is essential to the smooth running of military operations.

If soldiers are to work alongside autonomous machines, there needs to be a practical understanding of how the soldiers are to exercise human control over the autonomous machines that would enable them to comply with IHL effectively. Because of the operational risks in deploying LAWS, the lack of interest in completely replacing humans with LAWS and the necessity for commanders to retain control, there needs to be a common and practical understanding of the term effective human control.

#### 4.2.5 KEY ISSUE FOUR: PROHIBITION, MORATORIUM OR NONE?: THE ONGOING DEBATE

The debate on whether to prohibit or implement a moratorium versus not implementing either one on the development and use of LAWS does not assist in answering the question of how to define LAWS or to define effective human control. Nevertheless, it is an aspect of the larger debate on LAWS that cannot be ignored as it is relevant to determine if there is a need for additional regulations specific to the development and use of LAWS. It is worth noting some of the comments made by participants of the 2014 informal meeting of experts since what has been suggested by the participants is relevant, whether directly or indirectly, to forming a consensus on the meaning of LAWS and the effectiveness of human control.

During the general debate, the Ambassador of Egypt, Dr Walid M Abdelnasser, expressly stated that the Egyptian delegation supports a moratorium on the development and use of LAWS, including research on LAWS. This is to give time and opportunity for 'serious and meaningful international engagement' with the

---

<sup>21</sup> Ibid 5, [35]. See also Wolfgang Richter, 'Utility and limitations of the use of LAWS in military operations' (Presentation, CCCW Informal Meeting of Experts on LAWS 15 May 2014).

challenges of LAWS.<sup>22</sup> Furthermore, Ambassador Abdelnasser stated that past experiences have shown that it is safest to ban weapons deemed to cause superfluous injury or are indiscriminate by nature before they are deployed like the CCCW protocol prohibiting the use of blinding lasers and non-detectable fragments.<sup>23</sup>

Mexico emphasised that they support the prohibition of weapons that are by nature indiscriminate and those that cause superfluous injury.<sup>24</sup> However, the Mexican delegation did not express their position on whether they would like to implement a prohibition, moratorium or neither of them, unlike the Egyptian delegation. In contrast, Pakistan voiced their opinion and has expressed the need to pre-emptively ban the development and use of LAWS through a protocol of the CCCW.<sup>25</sup>

Professor Ronald Arkin indicated that he would prefer to place a moratorium on the development and use of autonomous weapon systems until there is a consensus as to how to define what they are trying to regulate.<sup>26</sup> Arkin also suggested that rather than implementing a blanket prohibition on autonomous weapon systems, one should '[c]onsider restrictions in well-defined circumstances'. As mentioned earlier, Professor Sharkey provided his viewpoint on whether there should be a ban or moratorium. He suggested placing a ban or a moratorium on the aspect of the LAWS where the computer output controls the weapon directly with no human intervention. Meanwhile, Professor Peter Asaro, co-founder and vice-chair of the International Committee for Robot Arms Control (ICRAC), argued that a pre-emptive, comprehensive ban would be beneficial because:

---

<sup>22</sup> Walid M Abdelnasser, 'Statement of the Arab Republic of Egypt' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 May 2014) 3.

<sup>23</sup> Ibid 2.

<sup>24</sup> Mariana Salazar-Albornoz, 'Intervención de México Durante el Debate General [Statement from Mexico during the General Debate]' (Speech, CCCW Informal Meeting of Experts, 13 May 2014)

<sup>25</sup> Zamir Akram, 'Statement by [Pakistani] Ambassador Zamir Akram Permanent Representative' (Speech CCCW Informal Meeting of Experts on LAWS, 13 May 2014) 4.

<sup>26</sup> Ronald C Arkin, 'Lethal Autonomous Weapon Systems and the Plight of the Noncombatant' (Presentation CCW Informal Meeting of Experts, 13 May 2014).

- 1) international law currently does not explicitly prohibit fully autonomous lethal weapon systems; and
- 2) there is a need to establish a norm to ensure the appropriate use of LAWS.<sup>27</sup>

Some delegations such as India and Spain expressed concerns that a preemptive ban or moratorium would be premature. India noted in their general debate statement that they see current approaches to discussions on LAWS falling into two categories. One of the two categories Ambassador Varma describes is that 'there is a spectrum of autonomy inbuilt into existing weapon systems and that a prohibition on LAWS is either premature, unnecessary or unenforceable'.<sup>28</sup> Despite this note, India did not explicitly state whether they support a moratorium, ban or neither. Meanwhile, Spain said that they would view proposals for a moratorium without first defining the scope of the application as premature.<sup>29</sup>

While there was no resolution during the 2014 informal meeting regarding the debate on implementing a prohibition, a moratorium or neither of them, the point of compromise would be to implement a moratorium which would at least help slow down the development and use of LAWS.<sup>30</sup> A moratorium would provide more time for States to consider the challenges LAWS brings more thoroughly and avoid having any issues occur from continuing the research, development and use of LAWS. However, the terms of a moratorium would still need to be negotiated which would take time as well. Nevertheless, should a moratorium on the development and use of LAWS be implemented, it should be focused on 'well-defined circumstances', as suggested by Arkin, as well as on the aspect of the weapon system where it is the computer that directly controls the weapon and release of the payload, as suggested by Sharkey. To achieve this, a consensus

---

<sup>27</sup> Peter Asaro, 'Ethical questions raised by military applications of robotics' (Presentation CCCW Informal Meeting of Experts, 13-16 May 2014).

<sup>28</sup> D.B Venkatesh Varma, 'Statement by [Indian] Ambassador D.B. Venkatesh Varma' (Speech, CCCW Informal Meeting of Experts, 13 May 2014) [5].

<sup>29</sup> Spain, 'Intervención de la Delegación Española [Statement of the Spanish Delegation]' (Speech, CCCW Informal Meeting of Experts, 13 May 2014).

<sup>30</sup> See e.g., Mark Hargerott, 'Lethal Autonomous Weapons Systems from a Military Officer's Perspective...this time is different: Offering a Framework and Suggestions' (Presentation CCCW Informal Meeting of Experts, 13-16 May 2014).



on terminology such as 'autonomy', 'human control', 'effective human control' and what would be considered a lethal autonomous weapon system still needs to be reached.

### **4.3 KEY ISSUES FROM THE 2015 INFORMAL MEETING<sup>31</sup>**

#### **4.3.1 THE GENERAL DEBATE AND BACKGROUND OF THE 2015 MEETING**

The second meeting, held from 13-17 April 2015 and chaired by Ambassador Michael Biontino from Germany, resulted in a few 'areas of common understanding' arising from the general debate. The second meeting also resulted in certain notions being re-emphasised and further explored. Thus, continuing to build upon the discussions from the first meeting in 2014. These areas of common understanding and notions will be elaborated on below.

The first area of common understanding is the 'rejection of fully autonomous weapon systems deciding over the use of force against humans without any human intervention'.<sup>32</sup> The second area of common understanding is that fully autonomous weapon systems do not currently exist.<sup>33</sup> This notion was also discussed in the 2014 meeting and seems to have been solidified in the 2015 meeting. Notwithstanding that fully autonomous weapons do not currently exist and are not yet deployed, States such as Pakistan and Sri Lanka contended that fully autonomous weapon systems possessing the ability to make life and death decisions without any human intervention would be a violation of IHL.<sup>34</sup> The third area of common understanding is the universal appreciation of the 'imperative for unconditional respect of international law', including IHL and international human

---

<sup>31</sup> See Appendix 2: Table 4.2 for a summary of the key issues and points from the 2015 meeting.

<sup>32</sup> *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 4, [12]. See also Susanne Rumohr Hækkerup, 'General statement by Susanne Rumohr Hækkerup, [Danish] Ambassador for Disarmament, Non-Proliferation and Arms Control' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015).

<sup>33</sup> See, eg, South Africa, 'CCW Statement by South Africa' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015); Susanne Rumohr Hækkerup, 'General statement by Susanne Rumohr Hækkerup, [Danish] Ambassador for Disarmament, Non-Proliferation and Arms Control' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015).

<sup>34</sup> *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 4, [13]. See, eg, Irfan Mahmood Bokhari, 'Statement by Irfan Mahmood Bokhari, Second Secretary' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015); Sri Lanka, 'Statement by Sri Lanka' (Speech, CCCW Informal Meeting of Experts on LAWS 13 April 2015).

rights law (IHRL).<sup>35</sup> This notion was emphasised in the first meeting in 2014 and has been reiterated in this meeting.

The debate on implementing a prohibition, moratorium or neither on LAWS continued during the general debate of this meeting. Some states continued to advocate for a legally binding instrument to ban the development, acquisition, deployment and trade of LAWS, while others did not see the necessity of such an instrument.<sup>36</sup> However, no definitive conclusion was reached as to whether to implement a prohibition, moratorium or neither.

#### 4.3.2 KEY ISSUE ONE: WHETHER OR NOT TO CONSIDER EXISTING WEAPON SYSTEMS

There was a brief discussion on whether existing weapon systems should or should not be considered when discussing LAWS and the challenges they pose to IHL. This may not have been a discussion at the forefront of the current debate on LAWS; however, for the purposes of this thesis, it is important to address it. The reason to address this discussion is because of the impact it can have in the creation and implementation of future regulations on the development and use of LAWS.

Some delegations suggested that 'existing weapons were not the subject of the LAWS debate'.<sup>37</sup> However, this seems like a miscalculated approach. As proposed by the International Committee of the Red Cross (ICRC), considering existing weapon systems that have autonomous functions would provide 'useful insights regarding the acceptable levels of autonomy and human control, and under what circumstances'.<sup>38</sup> Technical insights into existing weapons can also prove useful for developing an accurate, practical working definition of effective human control. Considering existing weapons would provide a more accurate picture of how autonomy works and how it could work in future weapon systems.

---

<sup>35</sup> *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 4, [16].

<sup>36</sup> *Ibid* 4, [17].

<sup>37</sup> *Ibid* 5, [20].

<sup>38</sup> *Ibid* 5, [23]. See also Kathleen Lawand, 'Statement of the International Committee of the Red Cross' (Speech, CCCW Informal Meeting of Experts on Laws, 13 April 2015) 2.

Dismissing existing weapon systems from the LAWS debate would not solve the issues that are currently being explored. It would disregard many weapons systems possessing autonomous capabilities in their critical functions that would still need to be regulated. It would also not be beneficial to just focus on future, hypothetical, weapon systems. Should regulations be developed for LAWS in the future, considering existing weapon systems while also considering future LAWS would be a better approach to ensuring the effectiveness of the regulation and its implementation.<sup>39</sup>

#### 4.3.3 KEY ISSUE TWO: THE CONCEPT OF DISTRIBUTED AUTONOMY

Another concept that was raised in the first panel discussion was distributed autonomy. This concept consists of two points. One, autonomous systems consist of software systems and various components.<sup>40</sup> Two, autonomous systems are modelled as 'multi-agent systems', and each agent, whether human software or hardware, has its own tasks to accomplish.<sup>41</sup> To summarise, a multi-agent system is defined as a network of 'a number of loosely coupled dynamic units' called agents. These agents can be, for example, software, hardware, robots, vehicles, or sensors.<sup>42</sup> Furthermore, multi-agent systems are useful when there are goals that are difficult to achieve with one agent (a monolithic system) as the agents in a multi-agent system work collectively to achieve goals that have been programmed into the system.<sup>43</sup>

This means that the definition of autonomy and multi-agent systems must take into consideration this concept of distributed autonomy to reflect a more realistic and appropriate description of autonomy in weapon systems. This is because most of the 'complex computational systems of interest can be thought, modelled

---

<sup>39</sup> See Kathleen Lawand, 'Statement of the International Committee of the Red Cross' (Speech, CCCW Informal Meeting of Experts on Laws, 13 April 2015)

<sup>40</sup> *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 6, [25(b)(i)]. See also Andrea Omicini, 'The Distributed Autonomy' (Presentation, CCCW Informal Meeting of Experts on LAWS, 13 April 2015).

<sup>41</sup> *Ibid.*

<sup>42</sup> Magdi S Mahmoud, *Multiagent Systems: Introduction and Coordination Control* (CRC Press Taylor & Francis Group, 2020) 17.

<sup>43</sup> *Ibid.*

and built as multi-agent systems'.<sup>44</sup> However, a key point to consider with multi-agent systems is that humans can be part of that system and be considered agents as well. Professor Omicini states that 'most of the relevant systems [today] are socio-technical systems' where there are both human and software (and or hardware) agents involved which is typical of an LAWS.<sup>45</sup> This model that includes both software, hardware and humans is known as the distributed property of socio-technical systems.<sup>46</sup> Therefore, if the relevant systems today are based on this model, the definition of autonomy should consider the fact that there are still human agents involved within the autonomous, multi-agent system and that humans have not been completely removed from the operation of weapon systems.

Consequently, when defining effective human control, the roles of the agents within the weapon system and what their tasks are must also be considered. This includes both human and software agents. This would include but is not limited to, looking at whether the human agent's role is supervisory and does not require them to take physical action, or whether the weapon system requires the human agent to review the data the system provides and then decide the course of action the system should take followed by a physical action. Regarding software agents, examples of what would need to be determined are the tasks the software agents are assigned to perform, whether those tasks are performing critical functions of the weapon systems (e.g. identifying, selecting and or attacking a target) and whether there is any form of human control (e.g. a human has to authorise the weapon system to attack, supervise the performance or be able to intervene while the weapon system is operating). Defining these tasks can build an understanding of how the agents of the weapon systems interact with one another and assist in determining whether there is effective human control being exercised over LAWS.

---

<sup>44</sup> Andrea Omicini, 'The Distributed Autonomy' (Presentation, CCCW Informal Meeting of Experts on LAWS, 13 April 2015). See also Pekka Appelqvist, 'Systems approach to LAWS: characteristics, considerations and implications' (Presentation, CCCW Informal Meeting of Experts on LAWS, 15 April 2015).

<sup>45</sup> See *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 6, [25(b)(ii)]; Andrea Omicini, 'The Distributed Autonomy' (Presentation, CCCW Informal Meeting of Experts on LAWS, 13 April 2015).

<sup>46</sup> *Ibid.*

#### 4.3.4 KEY ISSUE THREE: THE CHARACTERISTICS OF LAWS

This section will explore and analyse the debate that occurred during the panel discussion on the characteristics of LAWS. This exploration and analysis will assist in understanding how participating experts and delegations characterise LAWS and how they define terminology such as ‘meaningful human control’ and ‘critical functions’. Furthermore, this section will highlight any progress in the discussions regarding the characteristics of LAWS.

The two key notions mentioned during the first part of the panel discussions are ‘meaningful human control’ and ‘critical functions’. Both terms had been touched upon in the first informal meeting of experts on LAWS in 2014; however, in this meeting, the delegations discussed these terms in more detail. Ambassador Biontino summarised the notion of meaningful human control as describing ‘the interaction between a human being and weapon technologies that can function independently’.<sup>47</sup> Ambassador Biontino also observed that there seems to be an understanding that for LAWS to be legally and ethically acceptable, there would need to be some form of human control.<sup>48</sup> The next step would be to consider what would be ‘meaningful’ human control. Maya Brehm, in her presentation, suggested that meaningful human control would depend on what the human operator exercises control over.<sup>49</sup> This could include but is not limited to, control over deciding what the target is, why the target was chosen, when the force should be applied and where the force should be applied.<sup>50</sup> Overall, a human operator should maintain control over some aspects of the use of force.

The second key notion, ‘critical functions’, is described as the functions that enable a LAWS to independently identify, select and attack targets.<sup>51</sup> Dr Neil Davison suggested that it would be beneficial to focus on the critical functions of

---

<sup>47</sup> See *Report of the 2015 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 10, [37(a)(i)]; Maya Brehm, ‘Meaningful Human Control’ (Presentation, CCCW Informal Meeting of Experts on LAWS, 15 April 2015).

<sup>48</sup> *Report of the 2015 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 10, [37(a)(ii)].

<sup>49</sup> Maya Brehm, ‘Meaningful Human Control’ (Presentation, CCCW Informal Meeting of Experts on LAWS, 15 April 2015).

<sup>50</sup> *Ibid.*

<sup>51</sup> Neil Davison, ‘Characteristics of Autonomous Weapon Systems’ (Speech, CCCW Informal Meeting of Experts on LAWS, 14 April 2015).

a LAWS as well as autonomy use of force rather than autonomy in terms of technical sophistication.<sup>52</sup> Dr Davison explained that if there are two LAWS with different levels of technical sophistication but both LAWS can identify, select and attack targets without human intervention once activated, then the common characteristic is that both LAWS can independently identify, select and attack a target.

Therefore, the common characteristics are what should be the focus when describing autonomy, so the technical sophistication of either LAWS or other autonomous functions that are not 'critical functions' are irrelevant.<sup>53</sup> This is because, at a rudimentary level, autonomy in the critical functions mentioned earlier is what differentiates autonomous weapon systems from other weapon systems, such as non-lethal autonomous weapon systems.<sup>54</sup> Furthermore, these critical functions are the most relevant factors in the use of force. A weapon system's capability to use force with little to no human intervention is what instigated the ethical question raised in these meetings which is: should weapon systems be allowed to select and attack targets without human intervention? Thus, focusing on the critical functions of a LAWS helps highlight what autonomous functions are most important when determining whether there is effective human control over a weapon system and for complying with IHL. The importance of focusing on autonomy in the critical functions of weapon systems is further discussed in section 5.1 of this chapter.

Based upon the discussions of these two key notions, it is necessary to ensure that they are incorporated in some form into the working definition of effective human control. Doing this would ensure the working definition is a realistic and practical one in which States and organisations can accept it and later implement it. Therefore, a rough draft of a potential working definition of effective human control should include the following components:

1. consideration of the type of interaction between a human operator and the weapon system (i.e. the human-machine interface); and

---

<sup>52</sup> Ibid 2.

<sup>53</sup> Ibid.

<sup>54</sup> Ibid.

2. the critical functions of LAWS and the tasks the weapon systems are designed to perform.

These considerations provide support for using the term ‘effective’ rather than meaningful, referring back to the discussion in 4.2.2 and 4.2.3 of this chapter. Thus, humans should be exercising *effective* control over the *critical functions* of a weapon system throughout its lifecycle. Furthermore, the working definition would incorporate Dr Davison’s suggestion to focus on the critical functions of the weapon system and highlight where it is necessary to exercise effective human control over LAWS so they can be compliant with IHL.

#### **4.4 KEY ISSUE FROM THE 2016 MEETING<sup>55</sup>**

##### 4.4.1 THE GENERAL DEBATE AND BACKGROUND OF THE 2016 MEETING

The third informal meeting of experts on LAWS was held from 11-15 April 2016 and was chaired again by Ambassador Michael Biontino of Germany. The general debate involved reiterations of the importance of discussing the issue of LAWS, developing a better understanding of LAWS and that lethal, fully autonomous weapon systems are not currently in use. Furthermore, it was proposed that the concept of meaningful human control, or in this case effective human control, could be used as a framework to evaluate the legal aspects of LAWS. This idea had been suggested in the 2015 meeting.<sup>56</sup> Nevertheless, there was no clear consensus on the approach the State parties to the CCCW would take regarding the proposal. The recommendations for the 2016 Fifth Review Conference only stated, under paragraph 2(b), that there was a general understanding that:

[V]iews on appropriate human involvement with regard to lethal force and the issue of delegation of its use are of critical importance to the further consideration of LAWS amongst the High Contracting Parties and should be the subject of further consideration.<sup>57</sup>

---

<sup>55</sup> See Appendix 3: Table 4.3 for a summary of the key issue and the key points from the 2016 meeting.

<sup>56</sup> See *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016) 3, [15]; *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 10, [37(a)(v)].

<sup>57</sup> *Ibid* 14, [2(b)].

Another recurring notion is the proposition to increase transparency and confidence-building measures among States regarding the research, development and deployment of LAWS, particularly sharing information about the legal weapons review processes of States. Some delegations see it as a way forward. Increasing transparency and confidence-building measures concerning LAWS would be a step in the right direction; however, whether States will implement such measures is a separate question entirely.

The 2016 informal meeting of experts on LAWS has made progress in terms of creating a list of recommendations to be submitted to the Fifth Review Conference of the CCCW. However, the recommendations are only preliminary and do not provide any substantial consensus as to the terms autonomy, LAWS, meaningful human control and critical functions. Nevertheless, it was a promising step in the right direction as it provided an opportunity for the participants of the informal meeting of experts on LAWS to share what has already been discussed with a broader audience, namely State parties and observers of the CCCW. Below is the continuation of the discussion on LAWS during some of the panel discussions that occurred in this meeting.

#### 4.4.2 SO WHAT IS AUTONOMY?

The presenters during this panel discussion highlighted the fact that current existing systems still rely on some form of human supervision; therefore, a clear distinction needs to be made between automated and autonomous.<sup>58</sup> Creating a delineation between automated and autonomous is certainly helpful; however, to encompass both existing and possible future LAWS in some form of regulation, it is best to view autonomy in weapon systems on a scale. Looking at autonomy on a scale will ensure that the criteria for what is automated compared to autonomous is not rigid, but flexible, and regulations regarding weapon systems

---

<sup>58</sup> *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016) 5, [28]. For more information on the presentations see Vincent Boulanin, 'Mapping autonomy: current developments in the military sphere' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016); Mark Hoepflinger, 'CCW Expert Meeting' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016); David Shim, 'UNOG Laws' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016); Leon Kester, 'Mapping Autonomy' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016); Didier Danet, 'Progrès technique, utilité militaire et autonomie des systèmes d'armes' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016).



would be able to include existing weapon systems and adapt to future weapon systems and evolving autonomous technologies. This is further discussed in Chapter 6 in section 6.2 regarding the importance of flexibility.

Moreover, viewing autonomy in weapon systems on a scale reflects the reality of autonomy in machines since determining whether a machine, as a whole, is automatic, automated or autonomous is not always straightforward as demonstrated by the experts who presented the concept of autonomy in this meeting and earlier meeting.

Regarding defining the term autonomy, the Chair's report of the 2016 meeting indicates the complexity of defining autonomy due to the various perspectives and interpretations of the term. For example, in the discussions, autonomy was described as 'increased capacities in the field of target selection'.<sup>59</sup> A second suggestion for describing autonomy was that it could 'refer to the lack of predictability of a system'.<sup>60</sup> A third suggestion was that autonomy could be 'in terms of their reliability or capacity, rather than their level of autonomy'.<sup>61</sup> A fourth perspective proposed to 'consider autonomy as a necessary response to the increasing complexity of a weapon system, and a form of support to the human operator'.<sup>62</sup>

This panel discussion and the expert presentations provided further details into what autonomy is in a technical sense, how it is used in existing weapon systems and the advantages and limitations of using autonomous technologies in weapon systems. However, it still did not result in a coherent description of autonomy. As mentioned earlier, the delegates did not agree as to how they would define autonomy from this point forward in the context of LAWS and IHL regulation.

This thesis argues that the most appropriate definition of autonomy to build a working definition of effective human control would be to return to the most basic, technical understanding of autonomy and that is the ability of a weapon system

---

<sup>59</sup> *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016) 6, [34].

<sup>60</sup> *Ibid.*

<sup>61</sup> *Ibid.* See also Canada, 'Mapping Autonomy' (Working Paper, CCCW Informal Meeting of Experts on LAWS, 11-15 April 2016).

<sup>62</sup> *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016) 6, [34].

to 'manage its own operation in some significant way'.<sup>63</sup> Furthermore, it is important to keep the concept of distributed autonomy in mind as not all functions of a weapon system are autonomous, and that autonomy is distributed to various agents that carry out a particular function within the weapon system.

#### **4.5 KEY THEMES FROM THE 2017 MEETING**

The topics discussed during the first Group of Governmental Expert Meeting in 2017 addressed many of the same topics discussed in the informal meetings of experts in previous years. Therefore, this section aims to highlight aspects of those discussions that had not been addressed in earlier meetings or are important additional information from previous discussions that would help contribute to a practical and implementable working definition of effective human control. On that note, two important themes from this meeting are necessary to address. The first one is the need to focus on autonomy in the critical functions of weapon systems, and the second one is the importance of clarity in the regulation of weapon systems.

##### **4.5.1 THEME 1: EMPHASISING THE NEED TO FOCUS ON AUTONOMY IN THE CRITICAL FUNCTIONS OF WEAPON SYSTEMS<sup>64</sup>**

Arguments regarding the suggestion to focus on autonomy in the critical functions of a weapon system have been addressed earlier in this chapter under section 4.3.4. However, this section builds upon those arguments and concentrates on why it is important to focus on autonomy in the critical functions of LAWS when drafting regulations for LAWS. The ICRC emphasised during the 2017 meeting of governmental experts that their view on the working definition focusing on autonomy in the critical functions of LAWS would be 'without prejudice to an eventual regulation'.<sup>65</sup> This is an important point in the debate as the ICRC is now attempting to progress the debate on LAWS towards setting actionable goals. This includes providing an opportunity for States to come as close as possible to

---

<sup>63</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 29.

<sup>64</sup> See Appendix 4: Table 4.4 for a summary of the key themes and points from the 2017 meeting.

<sup>65</sup> *Report of the 2017 Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 7, UN Doc CCW/GGE.1/2017/3 (22 December 2017) 11, [46].

a consensus on key terms such as LAWS. Moreover, this thesis agrees with the ICRC's statement.

It is interesting to note that the delegation from the United States of America made a similar statement to the ICRC. The US delegation suggested not to focus on 'specific technological assumptions' and 'defining the sophistication of the machine intelligence'.<sup>66</sup> The US delegation reasons that it is irrelevant to focus on specific technological assumptions and sophistication of machine intelligence since such characteristics may become irrelevant later due to the rapid development of technology.<sup>67</sup> Moreover, focusing on the technical sophistication of machine intelligence 'would incorrectly focus on the machine, rather than understanding what is important for the law — how human beings are using the weapon and what they expect it to do'.<sup>68</sup> Therefore, the suggestion made by the US delegation does provide further support for the importance of focusing on autonomy in the critical functions of LAWS and human-machine interactions rather than on assumptions about machine intelligence and its technical sophistication.

Furthermore, the US delegation's suggestion also highlights the need for transparency. What is meant by transparency in this context is the ability of military personnel to know and understand how the weapon works, what it is programmed to do and what the effects of using the weapon system would be. With that knowledge and understanding, military personnel would make a reasonable assessment of the principles of IHL to determine whether an attack using a weapon system would violate IHL or not. Therefore, transparency, as an element of human control, ensures that there is effective human control when planning and or preparing an attack using a weapon system.

Considering the arguments made in section 4.3.4 as well as the statements made by the ICRC and the US delegation, there are two reasons why this thesis argues

---

<sup>66</sup> United States of America, 'Characteristics of Lethal Autonomous Weapons Systems ' (Working Paper No 7, 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, 10 November 2017) 2, [7]

<sup>67</sup> Ibid.

<sup>68</sup> Ibid 2, [8].

that it is important to focus on autonomy in the critical functions of LAWS when drafting regulations for LAWS. The first reason is that it would ensure that the regulation addresses what differentiates LAWS from other commonly used weapons which is the ability to independently identify, select and attack targets. The second reason is that it would allow drafters to address where it is important to exercise effective human control. Moreover, it would allow drafters to avoid drafting ambiguous clauses that would lead to various interpretations of where and how human control should be exercised, which would not address the actual issues related to LAWS and exercising human control.

#### 4.5.2 THEME 2: THE IMPORTANCE OF CLARITY IN THE REGULATION OF WEAPON SYSTEMS: THE ETHICAL AND LEGAL LENSES

It is important to note that there is an ethical basis for the legality of LAWS. The report of the 2017 meeting of the GGE on LAWS frames this point by stating that '[e]thics is the ceiling to the legal floor'.<sup>69</sup> In other words, ethical considerations such as whether LAWS should be given the capability to use lethal force without human supervision, and whether life and death decisions should be delegated to weapon systems underpin the concerns surrounding the legality of LAWS under IHL. In this regard, there needs to be 'legal clarity' as to what would be considered ethically unacceptable, and therefore unlawful concerning the development and use of LAWS.<sup>70</sup> This will ensure that future regulations on LAWS have 'universal application over time'.<sup>71</sup>

#### 4.6 THE 2018 AND 2019 MEETINGS: FORMATION OF THE GUIDING PRINCIPLES

There were further discussions on the characterisation of weapon systems under consideration by the GGE on LAWS as well as on human-machine interaction and important points for human control. However, there has not been much consensus on the approach to take for both topics of discussion. Nevertheless, the 2018 and 2019 meetings of the GGE on LAWS did make progress by

---

<sup>69</sup> Ibid 12, [51]. It has also been noted in the report that 'the Martens Clause denotes an ethical horizon'.

<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

developing guiding principles for the development and use of LAWS.<sup>72</sup> In the 2019 GGE on LAWS meeting, the majority of the draft guiding principles from the 2018 meeting were reaffirmed and became part of the list of guiding principles for LAWS.<sup>73</sup> Therefore, this will be the focus of the exploration of the issues discussed in the 2018 and 2019 meetings of the GGE on LAWS.

#### 4.6.1 GUIDING PRINCIPLES ON LAWS

The guiding principles formulated during the 2018 and 2019 meetings are a good start in building towards a common understanding of certain aspects of LAWS, as well as the general approach to take to create a sense of certainty and boundary regarding the development and use of LAWS. However, they are still quite general and do not address important details such as a consensus on the description of LAWS, a consensus on the description of autonomy and what would be considered adequate human control over LAWS. There is still much work to be done. Nevertheless, to see years of discussion, starting from 2014, culminating in the creation of guiding principles is a positive step in the right direction. Therefore, this section will examine aspects of the discussions that occurred during the 2018 and 2019 meetings, as well as allude to discussions from earlier meetings, that led to the formation of the guiding principles.

#### GUIDING PRINCIPLE ONE

Guiding principle one states:

*International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapon systems.*

It was noted early on in the deliberations on LAWS that adherence to international law, particularly IHL, was important.<sup>74</sup> It was in the 2017 meeting that it was made

---

<sup>72</sup> Report of the 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, Agenda Item 7, UN Doc CCW/GGE.1/2018/3 (23 October 2018) 4.

<sup>73</sup> For the list of affirmed list of guiding principles for LAWS see *Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 9, UN Doc CCW/GGE.1/2019/3) 13 (Annex IV).

<sup>74</sup> See *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 4, [16]; *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016) 3, [16].

clear that IHL applies to all weapon systems, which implies existing weapon systems, and the development and use of lethal autonomous weapon systems.<sup>75</sup>

#### GUIDING PRINCIPLES TWO AND FOUR

Guiding principle two states:

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

Meanwhile, guiding principle four states:

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

The discussion surrounding who would be accountable for a violation of IHL or war crime as a result of the use of LAWS was a lengthy debate. Early on in the debate, several participants questioned whether the use of LAWS created an accountability gap.<sup>76</sup> This debate continued in the subsequent meetings.<sup>77</sup> It has not been discussed much in this chapter as the discussion on this topic is not directly relevant to the construction of a working definition for effective human control. However, it is certainly linked to the discussion around effective human control.

Over the years the discussion on accountability led to a growing consensus that accountability cannot be transferred to weapon systems and humans are to remain responsible. There was also a growing consensus that States are to 'ensure accountability for lethal action by any weapon system used by State's

---

<sup>75</sup> *Report of the 2017 Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 7, UN Doc CCW/GGE.1/2017/3 (22 December 2017) 4. [16(b)].

<sup>76</sup> *Report of the 2014 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2014 sess, Agenda Item 8, UN Doc CCW/MSP/2014/3 (14 November 2014) 5, [30].

<sup>77</sup> See *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 4, 11, 14, 16, 17, 21; *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016) 3, 8-10, 13.

forces in armed conflict in accordance with applicable international law'.<sup>78</sup> Therefore, should a State's armed force use a weapon system that leads to a violation of IHL or a war crime, States should also take responsibility to ensure the relevant people are disciplined. This is a confirmation that human control over weapon systems, including LAWS, is and will continue to be important in ensuring that current and future weapon systems are compliant with IHL.

### GUIDING PRINCIPLE THREE

Guiding principle three states:

*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.*

This statement is an affirmation that human-machine interaction is a key feature to focus on when attempting to resolve the ethical and moral challenges to the development and use of LAWS as well as ensuring that responsibility for violations of IHL and or war crimes resulting from the deployment of a LAWS remains with humans and States.

The relevance of this guiding principle to the creation of a working definition of effective human control is that it acknowledges that human control can take various forms and be implemented at different stages of a weapon system's lifecycle. This means that a strict and rigid description or criteria of human control will not be the most appropriate approach to take when trying to construct a working definition of effective human control. Consequently, a more flexible and broad approach is needed to encompass all possible forms of human control at any stage of a weapon system's lifecycle.

---

<sup>78</sup> Report of the 2017 Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS), Agenda Item 7, UN Doc CCW/GGE.1/2017/3 (22 December 2017) 4, [16(c)].

## GUIDING PRINCIPLE FIVE

Guiding principle five states:

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

This guiding principle affirms the obligation of States under article 36 of *Additional Protocol I* to undertake a weapons review of any weapon system that is newly developed, acquired or has been modified to the extent that its function is different to the original design. Therefore, this guiding principle emphasises the importance of States fulfilling their obligation under article 36.

## GUIDING PRINCIPLES SIX AND SEVEN

Guiding principle 6 states:

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

Meanwhile, guiding principle seven states:

*Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems.*

Guiding principles six and seven confirm that human control is to remain during the development phase of a weapon system's lifecycle. Therefore, when considering the concept of human control over weapon systems, one must also consider the form of human control exercised over weapon systems early on in the lifecycle.

It also affirms the need to take as many precautions as possible before the deployment of a weapon system to ensure that it complies with IHL and cannot be used in a way that would violate IHL, including being hacked.



## GUIDING PRINCIPLE EIGHT

Guiding principle eight states:

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

This guiding principle affirms that IHL and other international obligations States have accepted should always be considered when deciding to use emerging technologies in the context of LAWS.

## GUIDING PRINCIPLES NINE AND TEN

Guiding principle nine states:

*In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized.*

Meanwhile guiding principle ten states:

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

Guiding principles nine and ten help provide some direction as to what to include in potential policies. Regarding guiding principle nine, the participants of these meetings have discussed the need to avoid anthropomorphising LAWS. The main reason noted by the participants for this because attributing human characteristics to a weapon system could lead to the misconstruing of the actual issues, which in turn could lead to potential policies that do not effectively address the challenges brought by LAWS.<sup>79</sup>

Regarding guiding principle ten, early in the deliberations, there were concerns expressed by State participants about the importance of not discouraging the

---

<sup>79</sup> Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 17-18, [59(c)].

development and use of autonomous technologies for peaceful purposes.<sup>80</sup> This discussion also addressed the point that autonomous technologies have a dual-use character since there are civilian applications for such technologies as well.<sup>81</sup>

These guiding principles are not as relevant to the creation of a working definition of effective human control because they address approaches to take when drafting policy and regulations about LAWS and not about the exercise of human control. However, they are necessary to ensure that potential policies on LAWS do not result in misinterpretations of the actual issues regarding LAWS and a misleading framework in the development and use of LAWS.

#### GUIDING PRINCIPLE ELEVEN

Guiding principle eleven states:

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

This last guiding principle is simply an affirmation that future discussion on LAWS is to remain within the framework of the CCCW (or CCW as mentioned in the guiding principle).

#### **4.7 THE 2020 GGE ON LAWS MEETING: POTENTIAL ELEMENTS FOR CONSENSUS RECOMMENDATIONS**

The GGE on LAWS meeting in 2020, chaired by Ljupčo Gjorgjinski, focused on consolidating what has been discussed earlier about the challenges posed by LAWS, 'potential elements for consensus recommendations' and reviewing the

---

<sup>80</sup> Toshio Sano, 'Statement by H.E. Ambassador Toshio Sano' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 May 2014); *Report of the 2014 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2013 sess, Agenda Item 8, UN Doc CCW/MSP/2014/3 (14 November 2014) 4, [22]; *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 13, [46(d)].

<sup>81</sup> *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016) 4, [22]; Japan, 'Japan's views on issues relating to LAWS' (Working Paper, CCCW Informal Meeting of Experts on LAWS, 11-15 April 2016).

guiding principles that were agreed on in the GGE on LAWS meeting in 2019 by gathering statements from State delegations on the guiding principles.<sup>82</sup> The topics discussed in this meeting and the points that were made by the participants are a continuation of the discussions that occurred in earlier meetings. Therefore, it is not necessary to go through all the discussion points of this meeting. What this section will focus on is the consolidation of the discussion points into what is called the 'possible elements for consensus recommendations'.<sup>83</sup>

The possible elements for consensus recommendations are a consolidation of what State parties participating in the GGE on LAWS have, in some way, concluded and agreed upon based on the discussion that occurred during the 2020 meeting and earlier meetings. They provide a reference point for what to consider and what to incorporate when building the working definition of effective human control. These possible elements of consensus address issues regarding human judgement and the exercise of control throughout a weapon system's lifecycle, the lawfulness of LAWS and accountability.

Regarding the human judgement and the exercise of control during a weapon system's lifecycle, possible elements for consensus include the point that during the research and development stage, human judgement and control should be exercised to account for risks of excessive civilian casualties from the use of the weapon system and any precautions that could be taken to minimize the risks.<sup>84</sup> Examples of risk mitigation such as rigorous testing, legal reviews of weapons and promoting transparency were noted as possible elements of consensus.<sup>85</sup>

Another possible element for consensus is that human judgement is necessary to ensure that the use of LAWS complies with IHL and that the operators and or commanders exercise 'judgement over the operational context'.<sup>86</sup> Furthermore, human control can be exercised in many ways throughout a weapon system's lifecycle.<sup>87</sup> These elements emphasise the importance and necessity of human

---

<sup>82</sup> 'Chairperson's Summary', (Working Paper No CCW/GGE.1/2020/WP.7, Group of Governmental Experts on Lethal Autonomous Weapon Systems, 19 April 2021).

<sup>83</sup> Ibid 5-10.

<sup>84</sup> Ibid 10, [37(a)].

<sup>85</sup> Ibid 10, [37(b)].

<sup>86</sup> Ibid 5-6 [15(d)], [15(i)].

<sup>87</sup> Ibid 9, [31(a)].

judgement to ensure that the use of LAWS complies with IHL and that determining the ability of LAWS to comply with IHL starts at the research and development stage. Therefore, these elements are necessary to incorporate in the working definition of effective human control.

Regarding the lawfulness of LAWS, a possible element for consensus is that it is unlawful to use weapon systems 'with effects that cannot be limited in accordance with IHL'.<sup>88</sup> More specifically, if a LAWS cannot 'reliably or predictably perform their functions' as intended, it is inherently unlawful.<sup>89</sup> Therefore, the parameters and operational restrictions of the weapon systems must enable the weapon system to be reliable and predictable, and therefore compliant with IHL. Consequently, the reliability and predictability of a LAWS are important elements of human control to incorporate into the working definition of effective human control.

Regarding accountability, the possible elements of consensus include the point that IHL places obligations upon States and people, not machines. Therefore, States, non-state actors and individuals that are party to an armed conflict must adhere to their obligations under international law, including IHL.<sup>90</sup> Furthermore, IHL rules and principles 'must be applied through a chain of responsible command and control' by military personnel.<sup>91</sup> Another possible element of consensus on accountability is that States have an obligation to review weapons and determine whether they are compliant with IHL or not.<sup>92</sup> Therefore, States are obligated to ensure that effective human control is exercised by people who are involved in the review process.

These possible elements for consensus recommendations speak to the concept of State responsibility, due diligence and individual criminal responsibility. They emphasise the point that States, non-state actors and individuals will still be accountable for any violations of IHL that arise from the use of LAWS. It would be beneficial to include these points on accountability in the working definition of

---

<sup>88</sup> Ibid 6, [15(h)].

<sup>89</sup> Ibid 6, [15(f)].

<sup>90</sup> Ibid 5-6, [15(a), (b), (h)].

<sup>91</sup> Ibid 5, [15(c)].

<sup>92</sup> Ibid 6 [15(k)].

effective human control to clarify the point that exercising effective control over LAWS means that parties to, and individual participants of, an armed conflict are responsible for the consequences that follow from the employing LAWS in an attack.

The possible elements for consensus recommendations help narrow down the important things to consider for the working definition of effective human control. They highlight what State parties and experts that participated in the deliberations have agreed on. Incorporating the elements into the working definition would help convince the States that the working definition is universally implementable.

## **4.8 2021 GGE ON LAWS AND BEYOND**

### **4.8.1 2021 GGE ON LAWS**

The terminology used within the GGE on LAWS has moved away from meaningful human control, and the terms human judgement, responsibility and accountability have become the common terms used within the GGE on LAWS.<sup>93</sup> Despite the change in terminology, the 2021 GGE on LAWS and the following meetings have re-emphasised the guiding principles established in the 2019 GGE on LAWS, and there are still States that see the term 'effective human control' as relevant and important.<sup>94</sup>

The delegates of the 2021 GGE on LAWS have agreed that 'human judgement is essential to ensure that the potential use of weapon systems [complies] with international law, particularly international humanitarian law'.<sup>95</sup> Furthermore, the participants affirmed that 'human responsibility for the decision on the use of

---

<sup>93</sup> *Report of the 2021 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, 3rd sess, Agenda Item 7, UN Doc CCW/GGE.1/2021/3 (22 February 2022).

<sup>94</sup> See *Report of the 2021 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, 3rd sess, Agenda Item 7, UN Doc CCW/GGE.1/2021/3 (22 February 2022); Australia et al, 'Building on Chile's Proposed Four Elements of Further Work for the Convention on Certain Conventional Weapons (CCW) Group of Governmental Experts (GGE) on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems (LAWS)' (Working Paper No CCW/GGE.1/2021/WP.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon System, 27 September 2021). See also, Bolivarian Republic of Venezuela et al, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 December 2021)

<sup>95</sup> *Report of the 2021 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, 3rd sess, Agenda Item 7, UN Doc CCW/GGE.1/2021/3 (22 February 2022) 10, [17].

weapon systems must be retained since accountability cannot be transferred to machines',<sup>96</sup> and that States remain 'responsible for the conduct of its organs such as its armed forces' and the agents that are a part of it.<sup>97</sup> Regarding human accountability, the participants agreed that '[h]umans must at all times remain accountable in accordance with applicable international law for decisions on the use of force'.<sup>98</sup> This involves '[a]ccountability for developing, deploying and using any weapon systems'.<sup>99</sup>

Some delegates submitted working papers that proposed ideas of what the normative and operational framework for the governance of LAWS should include or look like.<sup>100</sup> These proposals were based on the four focus areas of the 2021 GGE on LAWS.<sup>101</sup> There is some consensus on certain aspects of the proposals for the normative and operational framework. For example, there is a consensus that parameters should be set to ensure that LAWS cannot be used indiscriminately.<sup>102</sup> Delegates of the 2021 GGE on LAWS have also reached a

---

<sup>96</sup> Ibid 11, [21].

<sup>97</sup> Ibid 11, [20].

<sup>98</sup> Ibid 11, [22].

<sup>99</sup> Ibid 11, [23].

<sup>100</sup> See United States of America, 'U.S. Proposals on Aspects of the Normative and Operational Framework' (Working Paper No CCW/GGE.1/2021/WP.3, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon System, 27 September 2021); France, 'Possible consensus recommendations in relation to the clarification, consideration and development of aspects on the normative and operational framework on emerging technologies in the area of LAWS' (Working Paper No CCW/GGE.1/2021/WP.4, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021); France and Germany, 'Outline for a normative and operational framework on emerging technologies in the area of LAWS' (Working Paper No CCW/GGE.1/2021/WP.5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021); International Committee of the Red Cross, 'Proposal for consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework' (Working Paper No CCW/GGE.1/2021/WP.6, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021).

<sup>101</sup> See *Report of the 2021 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, 3rd sess, Agenda Item 7, UN Doc CCW/GGE.1/2021/3 (22 February 2022) for more information on the four focus areas of the 2021 GGE on LAWS. The four focus areas are a) application of international law, b) human and state responsibility, c) human-machine interaction, and d) legal weapon reviews.

<sup>102</sup> United States of America, 'U.S. Proposals on Aspects of the Normative and Operational Framework' (Working Paper No CCW/GGE.1/2021/WP.3, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon System, 27 September 2021) 1-3; The Argentine Republic et al, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.7, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021) 2, [9(a)-d)]; International Committee of the Red Cross, 'Proposal for consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational

consensus on the notion that using a weapon system in a manner that does not enable an operator to distinguish between combatants and civilians or assess the proportionality of an attack is contrary to IHL.<sup>103</sup> The fact that the delegates have agreed on the notions of human judgement, responsibility and accountability mentioned earlier and have reached a consensus on some aspects of the normative and operational framework for LAWS is a positive sign. However, as to be expected, there were aspects of the normative and operational framework for LAWS that did not have consensus among the delegates.

The Russian Federation stated that 'existing military and dual-use systems with a high degree of autonomy should not be included in a "special" category that requires immediate restrictions and prohibitions' since a high degree of autonomy would 'help reduce the negative impact of the use of such weapon system'.<sup>104</sup> On the contrary, the Argentine Republic and other delegates, in a joint working paper, stated that 'real or hypothetical weapon systems or configurations within the scope of our discussion that are fully autonomous are unacceptable and must be prohibited under international law' because 'such systems target, engage and apply force...in deciding on life or death of human beings'.<sup>105</sup> Furthermore, the States of the Non-Aligned Movement and other states who were part of the Joint

---

framework' (Working Paper No CCW/GGE.1/2021/WP.6, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021) 2, [5(c)].

<sup>103</sup> See eg, United Kingdom, 'Written contributions on possible consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2021/WP.11, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 11 January 2022); Australia et al, 'Building on Chile's Proposed Four Elements of Further Work for the Convention on Certain Conventional Weapons (CCW) Group of Governmental Experts (GGE) on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems (LAWS)' (Working Paper No CCW/GGE.1/2021/WP.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon System, 27 September 2021); The Argentine Republic et al, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.7, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021); al, Bolivarian Republic of Venezuela et, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 December 2021).

<sup>104</sup> Russian Federation, 'Considerations for the report of the Group of Governmental Experts of the High Contracting Parties to the Convention on Certain Conventional Weapons on emerging technologies in the area of Lethal Autonomous Weapons Systems on the outcomes of the work undertaken in 2017-2021' (Working Paper, CCW/GGE.1/2021/WP.1, 27 September 2021) 2, [8].

<sup>105</sup> The Argentine Republic et al, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.7, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021) 2, [9(a)].

Working Paper submitted by Venezuela noted that ‘it is essential first to identify the key attributes that would characterize a given weapon system as LAWS’.<sup>106</sup>

Therefore, there is still some form of disagreement as to what type of LAWS should be regulated, and it is still unclear whether there is a consensus regarding what characteristics of a weapon system make it a LAWS. Although the discussions of the GGE on LAWS have progressed to proposing potential normative and operational frameworks for the regulation of LAWS, and the terminology is changing towards a more specific idea of human control, there are still key aspects of the framework where the delegates still need to reach consensus.

#### 4.8.2 2022 GGE ON LAWS

In the 2022 GGE on LAWS, several proposals sought to outline what a new protocol (binding agreement) and a non-binding agreement concerning LAWS would look like and include. It was noted in the Report of the 2022 GGE on LAWS that when developing and presenting the proposals for a new protocol on LAWS, delegates considered existing CCCW protocols as examples.<sup>107</sup> These existing protocols to the CCCW would make a decent guide as to how to structure a legally binding agreement. Nevertheless, there have also been proposals for a non-legally binding agreement and other options regarding the normative and operational frameworks were considered as well.<sup>108</sup>

A group of delegates,<sup>109</sup> in a working paper titled ‘Roadmap Towards a New Protocol on Autonomous Weapon Systems’ submitted to the 2022 GGE on LAWS, outlined what they believe should be considered when creating a new protocol on LAWS.<sup>110</sup> Key considerations include an understanding of meaningful human

---

<sup>106</sup> Bolivarian Republic of Venezuela et al, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 December 2021) 2, [8].

<sup>107</sup> *Report of the 2022 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, Agenda Item 7, UN Doc CCW/GGE.1/2022/2 (31 August 2022) 3, [16]

<sup>108</sup> *Ibid.*

<sup>109</sup> The group of delegates who submitted this working paper consisted of delegates from Argentina, Costa Rica, Guatemala, Kazakhstan, Nigeria, Panama, the Philippines, Sierra Leone, the State of Palestine and Uruguay.

<sup>110</sup> Argentina et al, 'Roadmap Towards a New Protocol on Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2022/WP.3, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022).



control, ethical considerations, general commitments that can then be translated into articles that outline the prohibitions and regulations for the development and use of LAWS, a reaffirmation of the State's obligation to conduct reviews of weapons and risk mitigation.<sup>111</sup> The same group of delegates who submitted the working paper mentioned earlier also submitted another working paper titled 'Draft Protocol VI' that outlined what they believe a legally binding agreement should include.<sup>112</sup>

The delegation from Chile and Mexico also submitted a working paper that outlined what they believe should be included in a legally binding agreement on LAWS.<sup>113</sup> Several elements that Chile and Mexico proposed embody the same views and values as what the group of delegates mentioned earlier had proposed. For example, both proposals noted that the development and use of LAWS that cannot be controlled by humans or incapable of complying with IHL should be prohibited.<sup>114</sup> There were positive obligations proposed as well that related to the review of weapons, risk mitigation and compliance with IHL.<sup>115</sup> However, one key difference between the two proposals is that Chile and Mexico did not provide an express definition of human control but alluded to the necessity of human control; meanwhile, the group of delegates who submitted 'Draft Protocol VI' included an

---

<sup>111</sup> Ibid.

<sup>112</sup> See Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022).

<sup>113</sup> See Chile and Mexico, 'Elements for a Legally Binding Instrument to Address the Challenges Posed by Autonomy in Weapon Systems' (Working Paper No CCW/GGE.1/2022/WP.5 Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System 8 August 2022).

<sup>114</sup> Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022) 2; Chile and Mexico, 'Elements for a Legally Binding Instrument to Address the Challenges Posed by Autonomy in Weapon Systems' (Working Paper No CCW/GGE.1/2022/WP.5 Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System 8 August 2022) 4, [18(a)]. Australia, Canada, Japan, the Republic of Korea, the United Kingdom and the United States also expressed similar views. See, Australia et al, 'Principles and Good Practices on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2022/WP.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System 8 August 2022) 3-4.

<sup>115</sup> Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022) 2-3; Chile and Mexico, 'Elements for a Legally Binding Instrument to Address the Challenges Posed by Autonomy in Weapon Systems' (Working Paper No CCW/GGE.1/2022/WP.5 Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System 8 August 2022) 4, [18(b)].

express definition of 'meaningful human control' in their working paper.<sup>116</sup> This indicates that there is still room to build a working definition of effective human control that delegates of the GGE on LAWS could agree upon.

Some delegations seem hesitant to provide a clear stance on whether there should be a legally binding agreement or a non-binding agreement to regulate the development and use of LAWS. For example, Australia, Canada, Japan, the Republic of Korea, the United Kingdom and the United States did not make a clear stance as to whether they supported the idea of a legally binding agreement or a non-binding agreement in their working paper.<sup>117</sup> Nevertheless, the principles of good practices proposed by Australia and the other delegates are similar to the draft sections proposed in Draft Protocol VI, and the elements for a legally binding instrument proposed by Chile and Mexico. For example, concerning the review of weapons, all three working papers note the importance of rigorous testing and certification procedures to ensure that the use of the weapon system can comply with IHL.<sup>118</sup>

#### 4.8.3 2023 GGE ON LAWS

The discussion on various principles of best practice that could be incorporated into some agreement that regulates LAWS continued in the 2023 GGE on LAWS meeting. More States have submitted working papers that specify potential

---

<sup>116</sup> See Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022) 1 (see Article 2 Section2). Cf Chile and Mexico, 'Elements for a Legally Binding Instrument to Address the Challenges Posed by Autonomy in Weapon Systems' (Working Paper No CCW/GGE.1/2022/WP.5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022).

<sup>117</sup> See Australia et al, 'Principles and Good Practices on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2022/WP.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022).

<sup>118</sup> See Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022) 1 (see Article 2 Section2) 2 (see article four); Australia et al, 'Principles and Good Practices on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2022/WP.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022) 6; Chile and Mexico, 'Elements for a Legally Binding Instrument to Address the Challenges Posed by Autonomy in Weapon Systems' (Working Paper No CCW/GGE.1/2022/WP.5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022) 5.

principles and norms for the regulation of LAWS.<sup>119</sup> It is reassuring to observe that the States that have submitted working papers for both the 2022 and 2023 GGE on LAWS meetings LAWS have similar ideas as to what should be included in draft articles, or what should be the principles and norms of the development and use of LAWS. This indicates that the delegates at the GGE on LAWS are coming closer to a consensus. Nevertheless, how these articles or principles and norms will eventually take shape is still yet to be seen.

#### **4.9 CONCLUSION: KEY POINTS TO INFORM THE WORKING DEFINITION AND THE FUTURE OF THE GGE ON LAWS**

Over the years of deliberation on LAWS, some progress has been made that has culminated in the creation and agreement of the guiding principles. However, there is still uncertainty as to what approach the participants of the CCCW meetings will take on regulating the development and use of LAWS. There are insights from the guiding principles into what would be included and or considered in potential policies and regulations. However, the form the potential policies and regulations will take is still not clear.

Nevertheless, it is clear from the deliberations that effective human control must be retained over LAWS, particularly focusing on their critical functions including identifying, selecting, and targeting military objectives. Thus, the human-machine interface of a weapon system, and the point that the human-machine interface may vary between different weapon systems, are important considerations. This is because it is the human-machine interface that is the point of connection between the humans who operate the weapon system and the weapon system

---

<sup>119</sup> See Austria, 'Revised Working Paper' (Working Paper No CCW/GGE.1/2023/WP.1/Rev.1, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 3 March 2023); State of Palestine, 'State of Palestine's Proposal for the Normative and Operational Framework on Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2023/WP.2/Rev.1, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 3 March 2023); Pakistan, 'Proposal for an international legal instrument on Lethal Autonomous Weapons Systems (LAWS)' (Working Paper No CCW/GGE.1/2023/WP.3/Rev.1, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 March 2023); Australia et al, 'Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law ("IHL")' (Working Paper No CCW/GGE.1/2023/WP.4/Rev.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 15 May 2023)

itself. It is also important to ensure that existing LAWS should be part of the category of weapons being considered in these deliberations on LAWS.

Furthermore, when describing autonomy in weapon systems, it is important to describe autonomy in a technical sense since this will enable treaty and policy drafters to understand how autonomy works in a weapon system and thereby draft regulations and policies to accurately reflect the use of autonomous technology in weapon systems. To have a realistic picture of autonomy in weapon systems, a key concept to consider is distributed autonomy. This is because autonomy in existing weapon systems is often distributed amongst various agents that perform specific functions within the weapon system.

Overall, it is important to ensure that some form of human control, whether it would be human operators taking physical action or simply supervising the weapon system, should be retained over LAWS to ensure that the weapon system as a whole is performing according to how it was programmed, and to ensure that its use does not violate IHL. Therefore, the important points from the deliberations to consider when developing a working definition of effective human control include 1) the affirmation that human control must be retained; 2) the human-machine interface; 3) existing weapon systems with autonomous technologies should be considered; and 4) a technical understanding of autonomy.

Regarding the future of the GGE on LAWS, it is clear that the work of the GGE on LAWS has not finished and more progress needs to be made. There have been participants of the CCCW Review conferences and meetings have expressed frustration. For example, Nobel Peace Laureate Jody Williams, a representative of the Nobel Women's Initiative, advised that it is time to get serious and implored the participants to continue to prove that the CCCW is a credible platform to discuss the challenges of LAWS to IHL, international law in general as well as global peace and security.<sup>120</sup> She contended that the State parties to the CCCW have to do more than just 'come together every year for a

---

<sup>120</sup> *Third UN Meeting on Killer Robots: Convention on Conventional Weapons (CCW)* (Campaign to Stop Killer Robots 2016). To watch the audio-visual clip see <[https://www.youtube.com/watch?v=zIO\\_wY68TTs](https://www.youtube.com/watch?v=zIO_wY68TTs)>.

week-long series of expert discussions and panels where states say nothing about their own positions and what they are doing...and come back a year later and do the same [thing]'.<sup>121</sup> Furthermore, Stephen D Goose, a representative of Human Rights Watch, recommended that States should agree to a mandate to establish an open-ended group of governmental experts whose task would be to begin formal negotiations of a new CCCW protocol on LAWS.<sup>122</sup>

Although there have been proposals of legally binding and non-binding agreements, there still needs to be clear and tangible outcomes regarding the direction States will take concerning the governance of the development and use of weapons. As indicated in the recent GGE on LAWS meetings, clear and tangible outcomes could take the form of an additional protocol to the CCCW where the guiding principles, and other relevant regulations on the development and use of LAWS including a definition of effective human control, can be codified. As a result, the additional protocol can become a clear and reliable guide on the development and use of weapon systems. However, consensus on whether to have a legally binding agreement or a non-binding agreement still needs to be reached.<sup>123</sup> Therefore, it would be ideal to see a consensus reached on this point soon so the work of the GGE on LAWS can progress and reach a tangible outcome.

---

<sup>121</sup> Ibid.

<sup>122</sup> Ibid.

<sup>123</sup> See, eg, Russian Federation, 'Considerations for the report of the Group of Governmental Experts of the High Contracting Parties to the Convention on Certain Conventional Weapons on emerging technologies in the area of Lethal Autonomous Weapons Systems on the outcomes of the work undertaken in 2017-2021' (Working Paper, CCW/GGE.1/2021/WP.1, 27 September 2021). Cf Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022); Chile and Mexico, 'Elements for a Legally Binding Instrument to Address the Challenges Posed by Autonomy in Weapon Systems' (Working Paper No CCW/GGE.1/2022/WP.5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022).

---

CHAPTER 5: FROM DEVELOPMENT TO AFTERMATH:  
ACCOUNTABILITY AND THE ROLE OF HUMAN CONTROL

---

## 5.1 INTRODUCTION

This chapter will explore the concept of State responsibility, due diligence and individual criminal responsibility in governing the development and use of LAWS. It is necessary to discuss these concepts as it is necessary to have clarity regarding the chain of accountability as it has been agreed upon by the participants of the GGE on LAWS that accountability cannot be transferred to machines (e.g. weapon systems).<sup>1</sup> Therefore, the roles of operators cannot be ignored if humans are still to be accountable for violations of IHL and war crimes involving the use of LAWS.<sup>2</sup> Exploring existing principles and rules within these concepts can also aid in creating rules, standards and best practices for the development and use of autonomous weapon systems.<sup>3</sup> This way, the working definition can be realistic and practical.

The first part of this chapter explores the concept of State responsibility and the due diligence States are obliged to undertake in international humanitarian law (IHL). This part will then discuss these concepts in the context of autonomous weapon systems. This includes observations on what States could do to best implement their responsibilities and their due diligence concerning the development and use of autonomous weapon systems.

The second part of this chapter provides a brief overview of the rules and principles of individual criminal responsibility. Furthermore, this part will discuss issues that may arise regarding individual criminal responsibility concerning autonomous weapon systems. The first issue that will be discussed concerns the threshold requirement that violations of IHL and or crimes need to occur within the context of an armed conflict. The second issue concerns knowledge and intent being key elements of individual criminal responsibility and how these may impede the ability to assign accountability. The third issue concerns the concept of command responsibility and how that may help or hinder assigning accountability.

---

<sup>1</sup> *Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 9, UN Doc CCW/GGE.1/2019/3) 13 (see Annex IV guiding principle (b)).

<sup>2</sup> See Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 61; *Report of the 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 7, UN Doc CCW/GGE.1/2018/3 (23 October 2018) 4, [21(b)]; *Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 9, UN Doc CCW/GGE.1/2019/3) 13.

<sup>3</sup> Vincent Boulanin et al, 'Limits on Autonomy in Weapon Systems' (Report, June 2020) x, 38.

The third part will examine the role of human control through the scope of the three main stages of an autonomous weapon systems lifecycle (research and development, deployment and operation). This part will also discuss issues that may arise regarding accountability and the development and use of autonomous weapon systems. It is important to note that this thesis discusses the role of human control over autonomous weapon systems from a technical perspective considering concepts from engineering and cybernetics. Furthermore, it is important to note that this thesis is primarily focused on autonomy in the critical functions of a weapon system which involves functions that assist in selecting and engaging targets.

In addition to discussing the role of human control in a technical sense, a case study regarding Australia's system of control will also be discussed to provide a practical example that can help build an understanding of how some States exercise human control over weapon systems. This in turn will aid in constructing a realistic, practical working definition of effective human control. It is also to provide a practical perspective on how some States ensure that human control is exercised over weapon systems. This case study could also serve as a guide when developing regulations for the use and development of LAWS.

The final part of this chapter summarises the various issues that have been addressed in the previous parts of this chapter regarding accountability in the context of the use and development of LAWS. It reiterates what the major obstacles are in holding individuals and weapon system developers accountable for violations of IHL and or crimes under the *Rome Statute*. This chapter concludes by highlighting what effects the concepts of State responsibility, due diligence and individual criminal responsibility have on constructing a realistic and practical working definition of effective human control.



## 5.2 STATE RESPONSIBILITY AND DUE DILIGENCE

The use of LAWS brings into play principles and rules from the broader field of international law given the lethal consequences of using LAWS. This includes laws on state responsibility and due diligence. Identifying the appropriate amount of human control to retain over an autonomous weapon system can have an impact on the responsibility of a State or the accountability of a military official for violations of IHL, which can also amount to war crimes, as a result of the misuse of that weapon system.

This section will examine the relevant aspects of State responsibility and due diligence concerning the development and use of autonomous weapon systems. This section will also discuss how the concept of effective human control would affect these rules and principles. A deeper, more detailed examination of State responsibility and due diligence is not within the scope of this thesis but would certainly be appropriate to return later for further research. As McFarland and McCormack conclude, '[t]oo little analysis has been undertaken on questions of State responsibility for the deployment of autonomous weapons systems that result in serious violations of the law of armed conflict'.<sup>4</sup>

### 5.2.1 STATE RESPONSIBILITY: PRINCIPLES AND APPLICATION TO LAWS

The concept of State responsibility arises from the notion that States are legal personalities under international law and are the 'principle bearers of international obligations'.<sup>5</sup> James Crawford acknowledges that State responsibility is the starting point that enables the consideration of other forms of international responsibility, especially for international organisations.<sup>6</sup> Furthermore, State responsibility is part of customary IHL under rule 149 of the ICRC study on customary IHL,<sup>7</sup> and has been codified in article three of *Hague Convention IV* and in article 91 of *Additional Protocol I*.<sup>8</sup>

---

<sup>4</sup> Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 385.

<sup>5</sup> James R Crawford, 'State Responsibility', Max Planck Encyclopedias of Public International Law (Web Page, September 2006) [1] <<https://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1093#law-9780199231690-e1093-p-3>>.

<sup>6</sup> *Ibid.*

<sup>7</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 149.

<sup>8</sup> See *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910); *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978); Jean-Marie Henckaerts and Louise

Early in the development of the concept of State responsibility, the ICJ in the *Corfu Channel* case rejected the prima facie responsibility of Albania to carry the burden of proving that they did not breach their international obligations.<sup>9</sup> Instead, the ICJ placed the burden of proof on the United Kingdom to demonstrate whether Albania had breached its international obligation.<sup>10</sup> Mohammed Bedjaoui commented that ‘the international responsibility of a State [could not] be presumed’ when preventing an event that may be contrary to the rights of other States, or citizens of other States, because there is no ‘prima facie responsibility’ for States in international law.<sup>11</sup> However, Bedjaoui also observed that ‘[e]ven if a State does not have a specific and express obligation to act, it cannot escape its responsibilities from the international community from the moment that the required action carries a “social good” for all’.<sup>12</sup>

It was later in the *Barcelona Traction Case*, that the obligation and responsibility towards the international community was affirmed by the ICJ. The Court’s remark, which has since often been quoted and generally accepted, was that States have an obligation and a ‘legal interest’ in the protection of the basic rights and principles of foreign nationals and foreign investments.<sup>13</sup> This was despite the Court finding that Belgium did not have legal standing to exercise diplomatic protection over Belgian shareholders of a Canadian company in Spain. The Court expressed that the obligations of a State towards another State related to the

---

Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) 530.

<sup>9</sup> *The Corfu Channel Case (United Kingdom of Great Britain and Northern Ireland v Albania) (Judgment)* [1949] ICJ Rep 4, 18. See also Mohammed Bedjaoui, ‘An international contentious case on the threshold of the Cold War’ in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 3, 13.

<sup>10</sup> Ibid.

<sup>11</sup> Mohammed Bedjaoui, ‘An international contentious case on the threshold of the Cold War’ in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 3, 9, 13. See also Sarah Heathcote, ‘State omissions and due diligence’ in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 295, 299.

<sup>12</sup> Mohammed Bedjaoui, ‘An international contentious case on the threshold of the Cold War’ in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 3, 14.

<sup>13</sup> See *Case Concerning the Barcelona Traction, Light and Power Company, Limited (Belgium v Spain) (Judgment)* [1970] ICJ Rep 3, 32, [33] (*Barcelona Traction Case*); James R Crawford, ‘State Responsibility’, *Max Planck Encyclopedias of Public International Law* (Web Page September 2006) [13]. <<https://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1093#law-9780199231690-e1093-p-3>>

area of diplomatic protection are distinct from the obligations of a State to the international community in general.<sup>14</sup>

Today, the International Law Commission's (ILC) 2001 Draft Articles on State Responsibility (DASR) are the key reference point for the law on State responsibility. They have also been adopted by the UN General Assembly as Resolution 56/83 *Responsibility of States for Internationally Wrongful Acts*. Article one of the UN resolution provides that '[e]very internationally wrongful act of a State entails the international responsibility of that State'.<sup>15</sup> Article two goes on to define the elements of an 'internationally wrongful act' and thereby identifies the 'constituent elements' needed 'to establish the existence of an internationally wrongful act of the state'.<sup>16</sup> It provides that:

There is an internationally wrongful act of a State when conduct consisting of an action or omission:

(a) Is attributable to the State under international law; and

(b) Constitutes a breach of an international obligation of the State.<sup>17</sup>

There are hurdles when attempting to fulfil the elements outlined in article two. With the first element, the conduct in question has to be attributable to the State under the relevant international law. If the first element cannot be fulfilled, then there is no responsibility to be attributed to the State, and there is no breach of an international obligation. If the conduct in question can be attributed to a State, then that conduct must constitute a breach of an existing international legal obligation that is in force by that State at the time.<sup>18</sup> It has been mentioned that despite certain principles being part of customary international law, States would naturally have different interests depending on their geographical location, resources,

---

<sup>14</sup> *Case Concerning the Barcelona Traction, Light and Power Company, Limited (Belgium v Spain) (Judgment)* [1970] ICJ Rep 3, 32, [33]-[35].

<sup>15</sup> See *Responsibility of States for Internationally Wrongful Acts*, GA Res 56/83, UNGAOR, 6th Comm, 56th sess, Agenda Item 162, UN Doc A/RES/56/83 (28 January 2001) art 1. See also James Crawford, *The International Law Commission's Articles on State Responsibility* (Cambridge University Press, 2002) 81, [1].

<sup>16</sup> James Crawford, *The International Law Commission's Articles on State Responsibility* (Cambridge University Press, 2002) 81, [1].

<sup>17</sup> *Responsibility of States for Internationally Wrongful Acts*, GA Res 56/83, UNGAOR, 6th Comm, 56th sess, Agenda Item 162, UN Doc A/RES/56/83 (28 January 2001) art 2.

<sup>18</sup> James Crawford, *The International Law Commission's Articles on State Responsibility: Introduction, Text and Comments* (Cambridge University Press, 2002) 81, [1].

exports and imports<sup>19</sup>. This results in States having various responsibilities deriving from treaty obligations and commitments which may not be the same as another State.<sup>20</sup> Thus, determining what constitutes a breach of a State's international responsibility depends on that particular State's international obligations considering its geographic location, interests as well as its existing treaty obligations and commitments.

The Permanent Court of International Justice, in the *Phosphates in Morocco* case, provides an insight into how the principle of attributing an act or omission to a State has been interpreted even though the case occurred before the ILC drafted the articles on State responsibility. The PCIJ held that when 'an act being attributable to [a] State [is] described as [being] contrary to the treaty right(s) of another State', international responsibility is established.<sup>21</sup> Therefore, a State has to possess an existing right that the alleged perpetrating State contravened to establish international responsibility.

Chapter two of the *Responsibility of States for Internationally Wrongful Acts* Resolution outlines the various ways conduct can be attributed to a State.<sup>22</sup> This can be summarised into several categories. The first category is the conduct of State organs. The conduct of any State organ is considered an act of the State; therefore, attributable to the State. Articles four, six and seven of the DASR provide for this category of attributable conduct. The second category is the conduct of persons or entities empowered to exercise forms of governmental authority. Articles five and seven provide for this category of attributable conduct.

The third category is the conduct of an individual or group that would be attributable to a State. Article eight provides for the conduct of an individual or group acting on the instructions of the State, or under the control of the State when 'carrying out the conduct'.<sup>23</sup> Meanwhile, article nine provides for the conduct of an individual or group exercising forms of governmental authority but 'in the absence or default of the official authorities', and 'in the

---

<sup>19</sup> James R Crawford, 'State Responsibility', Max Planck Encyclopedias of Public International Law (Web Page, September 2006) <<https://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1093#law-9780199231690-e1093-p-3>> [2].

<sup>20</sup> Ibid.

<sup>21</sup> *Phosphates in Morocco (Italy v France) (Preliminary Objections)* [1938] PCIJ (ser A/B No. 74) 10, 28. See also Crawford, James, *The International Law Commission's Articles on State Responsibility: Introduction, Text and Comments* (Cambridge University Press, 2002) 77, 81.

<sup>22</sup> See *Responsibility of States for Internationally Wrongful Acts*, GA Res 56/83, UNGAOR, 6th Comm, 56th sess, Agenda Item 162, UN Doc A/RES/56/83 (28 January 2001) arts 4-11. See also James Crawford, *The International Law Commission's Articles on State Responsibility: Introduction, Text and Comments* (Cambridge University Press, 2002) 61-63, 91-123.

<sup>23</sup> *Responsibility of States for Internationally Wrongful Acts*, GA Res 56/83, UNGAOR, 6th Comm, 56th sess, Agenda Item 162, UN Doc A/RES/56/83 (28 January 2001) art 8.

circumstances such as to call for the exercise of those elements of authority'.<sup>24</sup> The fourth category is the conduct of 'an insurrectional movement' that eventually becomes the new government.<sup>25</sup> Article 10 provides for this category of attributable conduct. The fifth category is conduct that is not attributable to a State but is later 'acknowledged and adopted by a State as their own'.<sup>26</sup> This category of attributable conduct is provided for in article 11.

The concept of State responsibility has been codified in *Additional Protocol I* of the Geneva Conventions and in *Hague Convention (IV)*. However, there is a slight difference between the definition of attributable conduct outlined in article 91 of *Additional Protocol I* and article 3 of *Hague Convention (IV)*. Article 91 of *Additional Protocol I* provides that '[a] party to the conflict...shall be responsible for all acts committed by persons forming part of its armed forces'.<sup>27</sup> This article provides that States are to be responsible for all conduct of the members of its armed forces. Article 3 of *Hague Convention (IV)* provides that '[a] belligerent party....shall be responsible for all acts committed by persons forming part of its armed forces'.<sup>28</sup> This article imposes the same obligations States have on non-state armed forces.

These articles would be considered the more general rules as the more specific rules are outlined in the *Responsibility of States for Internationally Wrongful Acts* Resolution and in DASR. Longobardo notes that *lex specialis* applies to rules on attribution.<sup>29</sup> Therefore, the more specific rules outlined in the *Responsibility of States for Internationally Wrongful Acts* Resolution and in the DASR will prevail over the general rules in *Additional Protocol I* and *Hague Convention (IV)*.

Regarding the application of the law of State responsibility to the development and use of LAWS, there are several things to consider. First, are LAWS just like any other conventional weapon such as guns? One could argue that LAWS are different from conventional weapons as autonomy in weapon systems brings a new element to the art of targeting and warfare. Weapon systems with autonomous targeting functions would lead one to conclude that

---

<sup>24</sup> Ibid art 9.

<sup>25</sup> Ibid art 10.

<sup>26</sup> Ibid art 11.

<sup>27</sup> *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 91.

<sup>28</sup> *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910) art 3.

<sup>29</sup> Marco Longobardo, 'The Relevance of the Concept of Due Diligence for International Humanitarian Law' (2019) 37(1) *Wisconsin International Law Journal* 44

operators are not the ones who are ‘doing’ the targeting. So how could a violation of IHL and or crime involving a weapon system be linked to a State?

As explored in Chapter Three, there are LAWS employed today that still have operators controlling what the weapon system targets in some way or form. Therefore, a violation and or crime involving a weapon system can still be linked to an operator or commander who would be considered an agent of the State. The subsequent question becomes: is the element of *mens rea* required to successfully attribute the conduct in question to a State? The drafters of the ICL’s articles on State responsibility indicate that if there is no mention of ‘any specific requirement of a mental element’ concerning a State’s primary obligations ‘it is only the act of the State that matters, independently of any intention’.<sup>30</sup> This implies that the element of *mens rea* is not a necessary consideration when attributing the conduct in question to a State.

Should the use of a LAWS lead to a violation of IHL, a way to delineate State responsibility should be as simple as making the connection from the autonomous weapon system deployed, the operator (or an agent of the State) who activated the weapon system and the State who the operator (or agent) is acting for.<sup>31</sup> Since there is no specific requirement of a mental element concerning the obligations of members of the armed forces.<sup>32</sup> It is the action taken by armed force members of deploying a LAWS that should matter when attempting to connect a violation and or crime to a State and finding that State responsible.<sup>33</sup>

When attributing a violation and or crime to a State, the various attributable conducts outlined in Chapter Two of the *Responsibility of States for Internationally Wrongful Acts* Resolution can be relevant to the development and use of weapon systems. For instance, the conduct of State organs (i.e. armed forces and government departments) when contributing to the development or deployment of these weapon systems would be attributable to a State.<sup>34</sup> The conduct of people empowered to exercise forms of government

---

<sup>30</sup> *The International Law Commission’s Articles on State Responsibility: Introduction, Text and Comments* (Cambridge University Press, 2002) 84, [10].

<sup>31</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 130-134.

<sup>32</sup> *The International Law Commission’s Articles on State Responsibility: Introduction, Text and Comments* (Cambridge University Press, 2002) 84, [10].

<sup>33</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 135-136.

<sup>34</sup> *Responsibility of States for Internationally Wrongful Acts*, GA Res 56/83, UNGAOR, 6th Comm, 56th sess, Agenda Item 162, UN Doc A/RES/56/83 (28 January 2001)) art 4.

authority (i.e. members of armed forces or government departments) concerning the development and or use of weapon systems would be attributable to a State.<sup>35</sup> The conduct of a person or group who is under the instruction or control of a State when developing and or using weapon systems would also be attributable to the controlling State.<sup>36</sup> Therefore, it should be relatively straightforward to attribute the action of a State organ, person or group that involves the use of LAWS to the relevant State.

Once the conduct resulting in a violation and or crime is attributed to the relevant State, that State should take responsibility for its actions. This can be done in various ways including, but not limited to the State initiating an investigation into why a violation or crime involving the weapon systems occurred. This may result in the prosecution of the State's agents who were involved, restitution, reparations or compensation to the injured party.

### 5.2.2 DUE DILIGENCE: PRINCIPLES AND APPLICATION TO LAWS

The principle of due diligence is often discussed within the context of State responsibility; however, it is not an aspect of State responsibility.<sup>37</sup> The principle in international law evolved from 'arbitral decisions, mixed claims commissions and state practice' around the late 19<sup>th</sup> century and early 20<sup>th</sup> century.<sup>38</sup> Since then, it has become a common principle of international law.<sup>39</sup> Furthermore, due diligence is considered to be a type of obligation and can be categorised in several ways including the obligation to act and the obligation to prevent.<sup>40</sup>

The ICJ has reaffirmed that the due diligence obligation to act is 'an obligation on States to deploy their best efforts to achieve a desired outcome...even if that outcome need not be ensured'.<sup>41</sup> In other words, a State does not need to succeed in achieving the desired outcome according to international norms, as long as they gave it their best effort to achieve

---

<sup>35</sup> Ibid art 5.

<sup>36</sup> Ibid art 6.

<sup>37</sup> Marco Longobardo, 'The Relevance of the Concept of Due Diligence for International Humanitarian Law' (2019) 37(1) *Wisconsin International Law Journal* 44, 47.

<sup>38</sup> Ibid.

<sup>39</sup> Ibid.

<sup>40</sup> Sarah Heathcote, 'State omissions and due diligence' in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 295, 307-309.

<sup>41</sup> See Sarah Heathcote, 'State omissions and due diligence' in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 295, 308; *Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v Serbia and Montenegro) (Judgment)* [2007] ICJ Rep 43, 221, [430]; *Case Concerning Pulp Mills on the River Uruguay (Argentina v Uruguay)* [2010] ICJ Rep 14, 77, [186]-[187].

that desired outcome. The desired outcome would be in accordance with international norms. However, when a State fails to employ their best efforts to achieve the desired outcome that responsibility is incurred by that State.

The due diligence obligation to prevent a wrongful act from occurring is considered to be a sub-category of the obligation to act.<sup>42</sup> It can be argued that a State can employ their best efforts to prevent a wrongful act from occurring.<sup>43</sup> For example, a State can employ their best efforts to prevent its armed forces from deploying an autonomous weapon system that will likely violate a principle of IHL such as the prohibition on indiscriminate attacks. A State's best effort in this scenario could include implementing a sufficient and efficient weapons review mechanism, implementing regulations restricting the development and use of autonomous weapon systems and ensuring weapon system developers that are contracted understand the applicable regulations.

Regarding the obligation to prevent, a State can also violate an international obligation by omission. There are two ways this can occur. First, a State may not take any action required; thus, omission by inaction. Second, a State may take the wrong action required; thus, breaching by omitting to do the right action in accordance with international law and norms.<sup>44</sup> Therefore, not only would a State be liable if it did not actively attempt to prevent a wrongful act from occurring, but a State would also be liable if it omitted to prevent a wrongful act from occurring.

Not all IHL obligations require States to apply due diligence. Marco Longobardo asserts that negative obligations (i.e. prohibitions of certain conduct) do not require the application of due diligence because 'due diligence plays no role since a [S]tate may implement that obligation only reaching the specific negative result demanded by that obligation'.<sup>45</sup> However, some positive obligations in IHL would require States to apply due diligence. These positive obligations are categorised into five parts by Longobardo. They are:

1. Due diligence obligations concerning the implementation of IHL;

---

<sup>42</sup> Sarah Heathcote, 'State omissions and due diligence' in Karine Bannelier, Theodore Christakis and Sarah Heathcote (eds), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 295, 309.

<sup>43</sup> Ibid.

<sup>44</sup> Ibid.

<sup>45</sup> Marco Longobardo, 'The Relevance of the Concept of Due Diligence for International Humanitarian Law' (2019) 37(1) *Wisconsin International Law Journal* 44, 55.



2. Due diligence obligations concerning the conduct of hostilities;
3. Due diligence obligations concerning the protection of civilians and *hors de combat*;
4. Due diligence obligations on an occupying power; and
5. Due diligence obligations during non-international armed conflicts.<sup>46</sup>

These positive due diligence obligations are all applicable in the context of the development and use of autonomous weapon systems as IHL is still applicable to govern the development and use of such weapon systems.

In the context of the development and use of autonomous weapon systems, a State is obliged to do its due diligence to prevent an autonomous weapon system it is planning to develop and deploy from violating IHL. A State should implement their best effort to conduct a thorough review of autonomous weapon systems they are developing, acquiring or modifying. In addition, a State should also implement their best efforts to ensure that the autonomous weapon system is deployed in accordance with IHL by informing their military personnel of their obligations.

### **5.3 INDIVIDUAL CRIMINAL RESPONSIBILITY**

The question of whether human control should be maintained over autonomous weapon systems also leads to the issue of individual criminal responsibility. In accordance with IHL and ICL, individuals directly participating in hostilities, whether they are combatants or belligerents, are accountable for any war crimes they commit.<sup>47</sup> Thus, combatants and belligerents have individual criminal responsibility for war crimes and other crimes under international law.<sup>48</sup> Some States and commentators have argued that defining effective human control, or meaningful human control as used in the literature, would help resolve the 'accountability problem' created by the use of autonomous weapon systems.<sup>49</sup> However,

---

<sup>46</sup> Ibid 55-56.

<sup>47</sup> Vivek Sehrawat, 'Autonomous weapon systems: Law of armed conflict (LOAC) and other legal challenges' (2017) 33(1) *Computer Law & Security Review: The International Journal of Technology Law and Practice* 38, 49.

<sup>48</sup> See Vivek Sehrawat, 'Autonomous weapon systems: Law of armed conflict (LOAC) and other legal challenges' (2017) 33(1) *Computer Law & Security Review: The International Journal of Technology Law and Practice* 38, 49; *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002); Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 151.

<sup>49</sup> Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 63.

there may need to be other measures in place to address this issue as later discussion on individual criminal responsibility will reveal.

### 5.3.1 THE RULES AND PRINCIPLES

Individual criminal responsibility is part of customary international law. Rule 102 of the ICRC study on customary IHL states that '[n]o one may be convicted of an offence except on the basis of individual criminal responsibility'.<sup>50</sup> This customary norm can be seen in the Hague Regulations (in *Hague Convention IV*), *Geneva Convention IV* and the *Rome Statute*.<sup>51</sup> Furthermore, 151 provides that '[i]ndividuals are criminally responsible for war crimes they commit'.<sup>52</sup>

Article 25(1) of the *Rome Statute* enables the International Criminal Court (ICC) to have jurisdiction over 'natural persons' and the war crimes they committed.<sup>53</sup> Individual criminal responsibility is also incorporated in several supranational conventions such as the *American Convention on Human Rights*, the *African Charter on Human and Peoples' Rights* and the *Cairo Declaration on Human Rights in Islam*.<sup>54</sup> Although it is not expressly provided in the *European Convention on Human Rights*, the principle of individual criminal liability was acknowledged by the European Court of Human Rights in the case of *A.P., M.P and T.P v Switzerland*.<sup>55</sup> The European Court of Human Rights in that case held that '[i]t is the fundamental rule of criminal law that criminal liability does not survive the person who has committed the criminal act'.

---

<sup>50</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 102.

<sup>51</sup> See *Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910) art 50; *Geneva Convention (IV) relative to the Protection of Civilian Persons in Time of War*, opened for signature 12 August 1949, 75 UNTS 287 (entered into force 21 October 1950) art 33(1); *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 25.

<sup>52</sup> *Ibid* r 151.

<sup>53</sup> *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 25(1).

<sup>54</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 102 (see pg 373); *American Convention on Human Rights*, opened for signature 22 November 1969 (entered into force 18 July 1978) art 5(3); *African Charter on Human's and People's Rights*, opened for signature 27 June 1981, CAB/LEG/67/3 rev. 5, 21 I.L.M. 58 (1982), (entered into force 21 October 1986) 7(2); Ministers, Islamic Conference of Foreign, *Cairo Declaration on Human Rights in Islam*, UN GAOR, 4th sess, Agenda Item 5, UN Doc A/CONF.157/PC/62/Add.18 (5 August 1990) art 19(c).

<sup>55</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 102 (see pg 373); *A.P., M.P, T.P. v Switzerland* (Eur Court HR, Chamber, Application No 71/1996/690/882, 29 August 1997) 11, [48].

Individual criminal responsibility as a norm in customary international law acknowledges that States are not the only actors that commit breaches of IHL. Not only does it address individuals who were directly involved in committing the breach, but it also addresses those who facilitate as well as aid and abet.<sup>56</sup> However, it is novel to place individual criminal responsibility on anything other than a person. When considering the mental elements needed to prove a person responsible for committing a breach such as knowledge and intent, it is difficult to determine whether a LAWS those mental elements are present in such a weapon system. This will be explored further in section 5.3.2 below.

McDougall also points out that there are scenarios where relevant military personnel (i.e. operators and or commanders) can still be found responsible for violations as a result of the deployment of a LAWS.<sup>57</sup> This occurs when the intention to harm civilian and or civilian objects, as well as the knowledge that the LAWS will cause harm and damage, can easily be traced back to a developer, an operator or a commander. Therefore, there is no need to determine if a LAWS has individual criminal responsibility. However, there are situations where it would be difficult to find an operator or commander criminally liable for a war crime as the requisite elements of knowledge and intent may not be present.<sup>58</sup> For example, a situation where a LAWS targets and kills civilians due to an error in the weapon system's programming and the relevant military personnel did not intend for the weapon system to behave that way or know it would behave that way.<sup>59</sup>

### 5.3.2 KNOWLEDGE AND INTENT AS KEY ELEMENTS OF INDIVIDUAL CRIMINAL RESPONSIBILITY

The *Rome Statute* criminalises violations of the principle of proportionality as well as wilful killing, in the context of international armed conflicts, and murder, in the context of non-international armed conflict.<sup>60</sup> Therefore, if a military official commits any violation mentioned above using LAWS, there may be a way to hold them liable for war crimes under the *Rome*

---

<sup>56</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 102 (see page 373-374).

<sup>57</sup> Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 68-70.

<sup>58</sup> *Ibid.*

<sup>59</sup> *Ibid.* 69.

<sup>60</sup> See *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) arts 8(2)(b)(iv), 8(2)(a)(i), 8(2)(c)(i); Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 65-66.

*Statute*. That is if the LAWS still allows for humans to be in-the-loop or on-the-loop and, as experts suggested, military officials and operators are to remain accountable for the misuse of LAWS. It would be more complicated to hold a fully lethal autonomous weapon system, with humans completely out-of-the-loop, accountable for war crimes listed in the *Rome Statute*.

The controversial issue with LAWS and accountability lies in the mental elements of war crimes.<sup>61</sup> For example, article 8(2)(b)(iv) concerning the violation of the principle of proportionality states that:

Intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians or damage to civilian objects or widespread, long-term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated;<sup>62</sup>

Based upon the language used in article 8(2)(b)(iv), the drafters of the *Rome Statute* have explicitly stated that the intention to launch an attack with the knowledge that it will cause a disproportionate loss of life or injury to civilians are key elements of the crime. Furthermore, to prove that article 8(2)(b)(iv) has been violated, the alleged perpetrator would need to have known that 'the attack would cause incidental death or injury to civilians or damage to civilian objects' and would need to have been 'aware of the factual circumstances that established the existence of an armed conflict'.<sup>63</sup>

There is no precedent about proving that a LAWS can know it would violate the principle of proportionality and can be aware that it is participating in an armed conflict. This is the case for several of the war crimes in the *Rome Statute* that require the mental elements of knowledge and intent.<sup>64</sup> However, the human operator and or commander can still be held accountable for a violation of IHL that amounts to a war crime resulting from the use of a LAWS. One reason is that if a LAWS cannot be lawfully used according to article 57 of

---

<sup>61</sup> Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 66.

<sup>62</sup> *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) arts 8(2)(b)(iv)

<sup>63</sup> International Criminal Court, *Elements of Crime*, Doc No RC/11 (adopted 11 June 2010) art 8(2)(b)(iv) elements 3 and 5.

<sup>64</sup> See the rest of the war crimes listed under article 8 of the *Rome Statute* and the elements of the crime under article 8 in the *Elements of Crime*.

*Additional Protocol I*, then its use would be illegal.<sup>65</sup> Accordingly, whether the LAWS has the knowledge and intention to commit a war crime is unnecessary to consider.<sup>66</sup> Furthermore, it is still humans that set the parameters of the LAWS; therefore, there is still a chance for prosecutors to prove the existence of the mental elements of knowledge and intention in the weapon system developers, operators or commanders.<sup>67</sup> However, there may still be issues with proving the existence of the mental elements in weapon system developers which is discussed further in section 5.4.1.2.

### 5.3.3 COMMAND RESPONSIBILITY

It is a well-established rule of customary international law that a commander may be criminally liable for war crimes committed by their subordinates.<sup>68</sup> Command responsibility where war crimes are committed according to the orders of commanders and other superiors is addressed in rule 152 of the ICRC study on customary IHL. Meanwhile, situations where commanders and other superiors knew, or should have known, that their subordinates were going to commit, or have committed war crimes and did not prevent or punish the commission of such crimes, are addressed in rule 153 of the ICRC study.

The principle of command responsibility under customary international law in r 152 is stated as follows:

Commanders and other superiors are criminally responsible for war crimes committed pursuant to their orders.<sup>69</sup>

In addition, command responsibility under r 153 is stated as follows:

Commanders and other superiors are criminally responsible for war crimes committed by their subordinates if they knew, or had reason to know, that the subordinates were about to commit or were committing such crimes and did not take all necessary and reasonable

---

<sup>65</sup> See Ian S Henderson, Patrick Keane and Josh Liddy, 'Remote and autonomous warfare systems: precautions in attack and individual accountability' in Jens David Ohlin (ed), *Research Handbook on Remote Warfare* (Edward Elgar Online 2017) 335, 357.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid 359.

<sup>68</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) rr 152, 153.

<sup>69</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 152.

measures in their power to prevent their commission, or if such crimes had been committed, to punish the persons responsible.<sup>70</sup>

The customary IHL rules on command responsibility are not as detailed or specific compared to how it is codified in *Additional Protocol I* or the *Rome Statute*. However, this customary IHL rules on command responsibility makes a good reference point as this is binding on all States, even those who are not parties to *Additional Protocol I* or the *Rome Statute*. The one concern with such a broad statement is that it allows States, especially those who are not parties to the relevant treaties, to interpret the rule in various ways that may not align with the more specific provisions in *Additional Protocol I* and the *Rome Statute*.

In *Additional Protocol I*, art 86(2) explicitly provides that a superior officer should not be excused from disciplinary action and responsibility just because his or her subordinate committed a breach of the Geneva Conventions and its Additional Protocols.<sup>71</sup> In article 87 of *Additional Protocol I* the duties of the commander are outlined which include the following:

- (1) Requiring commanders to prevent his or her subordinates from committing breaches of the Geneva Conventions and its Additional Protocols, as well as report it to the relevant authorities if there was any breach committed;
- (2) Requiring commanders to inform his or her subordinates of their obligations under the Geneva Conventions and its Additional Protocols; and
- (3) Requiring commanders to take measures to prevent the commission of a breach should he or she be aware that his or her subordinates will commit one. Also, when necessary, to take steps to discipline or punish those who committed a breach.<sup>72</sup>

In the *Rome Statute*, article 28(a) provides that along with other grounds of criminal responsibility outlined in the *Rome Statute*:

- (a) A military commander or person effectively acting as a military commander shall be criminally responsible for crimes within the jurisdiction of the Court committed by forces under his or her effective command and control, or effective authority and control as the case may be, as a result of his or her

---

<sup>70</sup> Ibid r 153.

<sup>71</sup> *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 86(2).

<sup>72</sup> Ibid art 87.

failure to exercise control properly over such forces, where:

(i) That military commander or person either knew or, owing to the circumstances at the time, should have known that the forces were committing or about to commit such crimes; and

(ii) That military commander or person failed to take all necessary and reasonable measures within his or her power to prevent or repress their commission or to submit the matter to the competent authorities for investigation and prosecution.<sup>73</sup>

Therefore, a commander or the highest-ranking member of a military unit or militia is deemed to be responsible for any crimes, within the *Rome Statute*, that her or his subordinates committed.<sup>74</sup> The articles in *Additional Protocol I* and the *Rome Statute* ensure that senior officials are held accountable for their failure to properly supervise and control their subordinates.<sup>75</sup>

The importance of imposing an express international legal obligation on commanders through customary IHL and treaty provisions is evident in the commentary of the Additional Protocols to the Geneva Conventions. The drafters expressed their concern regarding the enforcement of treaty rules on the battlefield. They argued that it is military commanders who have the power to enforce the rules, ensure that their subordinates obey the rules and that the 'fatal gap between the undertakings entered into by the Parties to the conflict and the conduct of individuals is avoided'.<sup>76</sup>

In practice, several State armed forces have expressed provisions in their military manuals regarding command responsibility.<sup>77</sup> Some States also have provisions for command

---

<sup>73</sup> *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 28(a). See also article 28(b) with respect to superior and subordinate relationship not described in 28(a).

<sup>74</sup> Case Matrix Network, *International Criminal Law Guidelines: Command Responsibility* (Report, January 2016) 17.

<sup>75</sup> *Ibid.*

<sup>76</sup> Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers 1987) 1018, [3550].

<sup>77</sup> For rule 152 see Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 152, 556: at 29; Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 3716-3718. For rule 153 see generally *Customary International Humanitarian Law Volume I*

responsibility in domestic legislation.<sup>78</sup> However, these provisions regarding command responsibility vary in how specific they are written and in the interpretation of the commander's duties. For example, in Belgium's Disciplinary Regulations, it is stated that '[s]uperiors...are liable for the orders they give'.<sup>79</sup> By contrast, Australia's Defence Force Manual provides that 'specifically, a commander will be held accountable if an order is given to a subordinate to commit a breach of LOAC or knows that a breach is occurring and fails to intervene'.<sup>80</sup> The statement in Belgium's Disciplinary Regulations is broad and can encompass rules 152 and 153 under customary IHL<sup>81</sup> in comparison to Australia's Defence Force Manual which specifies how and when a commander is liable by distinguishing between giving orders to commit a crime and having knowledge that a violation is occurring but fails to intervene. These examples provide an insight into how different interpretations of command responsibility could be.

There are also differing perspectives as to whether LAWS can be assigned individual criminal responsibility and have command responsibility apply to LAWS.<sup>82</sup> Robert Sparrow argued that a LAWS can never be held liable for its actions.<sup>83</sup> On the other hand, Markus Schulzke argues that it is possible to still assign responsibility to the commanders or the relevant high-ranking military official through command responsibility.<sup>84</sup> Both scholars have relevant points. It is no doubt novel to hold LAWS liable, but in practice holding LAWS liable will likely never happen. Nevertheless, this problem can be solved by assigning responsibility to the operator or relevant high-ranking military official. Therefore, there is still

---

*Rules* r 153, 558; *Customary International Humanitarian Law Volume II: Practice* pages 3738-3745 for more details on State practices regarding r 153.

<sup>78</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) r 152, 556: at 30 and r 153, 559: at 45; Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 3718-3722, 3745-3751.

<sup>79</sup> Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005) 3716.

<sup>80</sup> *Ibid.*

<sup>81</sup> See Jean-Marie Henckaerts and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005) rr 152-153.

<sup>82</sup> See Barry de Vries, *Individual Criminal Responsibility for Autonomous Weapons Systems in International Criminal Law* (Brill, 1 ed, 2023) vol 65 for an in-depth analysis on how individual criminal responsibility can be approached when it comes to the development and use of LAWS.

<sup>83</sup> See Robert Sparrow, 'Killer Robots' (2007) 24(1) *Journal of Applied Philosophy* 62-67; Jack McDonald, 'Autonomous Agents and Command Responsibility' in James Gow et al (ed), *Routledge Handbook of War, Law and Technology* (Routledge Taylor & Francis Group, 2019) 141, 142.

<sup>84</sup> See Marcus Schulzke, 'Autonomous Weapons and Distributed Responsibility' (2013) 26(2) *Philosophy & Technology* 203, 217.



someone held accountable for violations of IHL and war crimes involving autonomous weapon systems.

Carrie McDougall suggests that command responsibility is not the likely answer that will fill the accountability gap for LAWS. This is because there is still a requirement to provide evidence that there was a failure to exercise proper control, on the part of the commander, over the subordinate.<sup>85</sup> Therefore, there is still an accountability gap if there is no evidence of wrongdoing on the part of the commander, or even the operator if the weapon system is viewed as a subordinate.<sup>86</sup> This is especially the case in scenarios where the weapon system's performance results in an unexpected outcome even if it was launched in accordance with IHL.<sup>87</sup> This is when it becomes necessary to look at the responsibility of developers which will be discussed later in section 5.4.1.2.

#### 5.3.4 WAR CRIMES INVOLVING THE USE OF LAWS

An example of an article in the *Rome Statute* that could cover the commission of a war crime as a result of the use of LAWS is article 8(2)(b)(xx). The article provides that the following constitutes a war crime:

Employing weapons, projectiles and material and methods of warfare which are of a nature to cause superfluous injury or unnecessary suffering or which are inherently indiscriminate in violation of the international law of armed conflict, provided that such weapons, projectiles and material and methods of warfare are the subject of a comprehensive prohibition and are included in an annex to this Statute, by an amendment in accordance with the relevant provisions set forth in articles 121 and 123.<sup>88</sup>

However, the second part of the provision indicates that the weapon, projectile, material and methods of warfare employed need to be expressly prohibited and to be included in an annex of the *Rome Statute*. Thus, the issues that arise are: 1) there is no specific, comprehensive prohibition, or even restriction, on the use of LAWS, and 2) there is no annex that has been added to the *Rome Statute* that provides a list of weapons, projectiles, materials and methods of warfare that are subject to a comprehensive prohibition.

---

<sup>85</sup> *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 28(a)(ii).

<sup>86</sup> Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 77-78.

<sup>87</sup> *Ibid* 75-76. Note the examples provided by Carrie McDougall regarding autonomous weapon systems 'going rogue' due to the unpredictability of artificial intelligence.

<sup>88</sup> *Ibid* 8(2)(b)(xx).

Consequently, this article does not provide much guidance for the use of autonomous weapon systems, and to indicate how and when the use of such weapon systems would be considered a war crime. For article 8(2)(b)(xx) to be effective, there needs to be regulations on LAWS (i.e. restricting the development and use of autonomous weapon systems), and these regulations need to be included in the annex to the *Rome Statute*.

Therefore, it would be necessary to consider other war crimes listed under s 8(2) that have criminalised the violations against the fundamental principles of IHL encoded in the Geneva Convention and its Additional Protocols. For example, article 8(2)(a)(iii) provides that it is a war crime to wilfully cause great suffering, or serious injury to body or health.<sup>89</sup> There are other war crimes listed under article 8(2) that have criminalised attacks that are intentionally indiscriminate or intentionally direct attacks at civilians and or civilian objects.<sup>90</sup>

#### **5.4 THE ROLE OF HUMAN CONTROL**

Having considered the principles and rules regarding state responsibility and individual criminal responsibility, it would be appropriate to see how these principles and rules would be applied throughout the lifecycle of the LAWS discussed in chapter three (research and development, deployment and operation). Therefore, this section of the chapter will explore the role of human control over weapon systems throughout the lifecycle. The section will start from the earliest form of human control exercised over LAWS and finish at the point where the weapon is in operation. By going through the three stages of a weapon system's lifecycle, it would clarify who or what is exercising control when, and where the accountability would lie should there be a violation and or crime involving autonomous weapon systems.

It would be appropriate to first discuss the term autonomy and where this thesis stands regarding its definition. There are several definitions of autonomy in various disciplines. However, it is more appropriate to refer to the definitions used in the technical fields of robotics, cybernetics and engineering to return to the basic concept of autonomy.<sup>91</sup> A definition that paints an accurate picture of autonomy in a technical sense is:

---

<sup>89</sup> *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) 8(2)(b)(iii).

<sup>90</sup> See, eg, *Ibid* arts 8(2)(b)(i), (ii), (iii), (iv), (v) (for international armed conflicts), and arts 8(2)(e)(i), (ii), (iii), (iv) (for non-international armed conflicts).

<sup>91</sup> This thesis agrees with the statements made by Tim McFarland that to properly understand the concept of autonomy, it is necessary to understand the term in the context of the relevant technical fields, namely the field of robotics. This will allow future debates on LAWS to be based on rational discussions of how autonomy

...having the power for self government. Autonomous controllers have the power and ability for self governance in the performance of control functions. They are composed of a collection of hardware and software, which can perform the necessary control functions, without external intervention, over extended time periods.<sup>92</sup>

Another definition describes autonomy as:

...a capability (or set of capabilities) that enables a particular action of a system to be automatic or, within programmed boundaries, 'self-governing'.<sup>93</sup>

These two definitions highlight two aspects of autonomy in machines. The first aspect is regarding self-management. The machine, or system, can govern itself in the sense that it is capable of selecting and deciding its own behaviour. The second aspect is regarding programming limitations. The machine, or system, is self-governing 'within programmed boundaries'. The emphasis is on the fact that there are limits to a machine's self-governing capability which has been programmed by a person or group of people. Therefore, autonomy does not necessarily mean that the machine is completely without human control. There is still a person who defines the parameters of a machine's self-governing capability.<sup>94</sup>

#### 5.4.1 THE RESEARCH AND DEVELOPMENT STAGE

Human control over LAWS does not begin when an operator activates the weapon system. Software developers, engineers and all the others who contribute to the development of the weapon system exercise some form of human control before the weapon system is ready to be deployed. This group of people and organisations for the purposes of this thesis will be referred to generally as 'weapon system developers'.<sup>95</sup> For example, weapon system developers have the capability and the opportunity to determine how the weapon system works and to determine which aspects of the weapon system will have autonomous

---

realistically works and their 'legal significance'. See Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 29.

<sup>92</sup> Panos J Anstaklis, Kevin M Passino and S J Wang, 'An Introduction to Autonomous Control Systems' (1991) 11(4) IEEE Control Systems 5 cited in Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 30. See also

<sup>93</sup> United States Department of Defense, *Autonomy in Weapon Systems* (Directive No 3000.09, 21 November 2012) cited in Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 30.

<sup>94</sup> See Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 31.

<sup>95</sup> Throughout this part, the term developer(s), weapon developer(s) and weapon system developers will be used interchangeably.

functions. This all occurs in what is commonly referred to as the research and development stage of a weapon system's lifecycle.

Weapon system developers convey their knowledge of how to control the system through software which is then programmed into the weapon's control system. Thus, the control system then assumes the role of the human operator (in the context of a manual weapon system) to an extent.<sup>96</sup> Three theoretical concepts should be considered when discussing autonomy in general, whether in weapons or other machines. Although it is not within the scope of this thesis to go into depth regarding these concepts, it is appropriate to mention them briefly to help describe the forms of control in machines at a technical level.

The first concept is control theory which is the general concept regarding regulating machine behaviour over time.<sup>97</sup> It was because of the automation of industrial processes in several industries of the modern economy that there was a need to develop a 'formal, structured means of controlling complex machines'.<sup>98</sup> Therefore, control theory in the mathematical discipline and control systems engineering in the engineering field were developed.<sup>99</sup> The aim is to ensure that machines can express the desired behaviour and perform accordingly without the operator intervening.<sup>100</sup>

The second concept is adaptive control. Adaptive control is defined by Sragovich as:

...the part of control theory devoted to the study of the whole class of control process  $\kappa$ , instead of a particular process, due to the lack of complete information.<sup>101</sup>

Another definition provided by Landau et al states that:

---

<sup>96</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 33. There is also a more in-depth discussion as to how weapon system developers describe the weapon system as well as diagrams to demonstrate the human-weapon interaction for a manual weapon system and for an autonomous weapon system (see pages 32-33).

<sup>97</sup> Ibid 31. See also James R Leigh, *Control Theory: A Guided Tour* (Institution of Engineering and Technology, 2012) cited in Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 31.

<sup>98</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 31.

<sup>99</sup> Ibid.

<sup>100</sup> Ibid.

<sup>101</sup> Vladimir Grigor'evich Sragovich, *Mathematical Theory of Adaptive Control* (World Scientific Publishing Company, 2006) 20. Original emphasis

*Adaptive Control* covers a set of techniques which provide a systematic approach for automatic adjustment of controllers [or control systems] in *real time*.<sup>102</sup>

Overall, the concept addresses a control system's ability to modify its behaviour in response to changes in the machine (i.e. due to damage) or the environment.<sup>103</sup> It should be noted that the complexity of the environment and machine limits the 'usefulness' of adaptive control techniques.<sup>104</sup> This is because these techniques rely on the control system developers to be able to predict changes that might occur to the machine, disruptions the machine might have to confront and environmental changes that the machine will have to adapt to.<sup>105</sup> Therefore, in environments that have a high degree of complexity and uncertainty or with highly complex machines, it would be quite difficult to make the requisite predictions and construct algorithmic models in such detail.<sup>106</sup>

The third concept is intelligent control in which a range of techniques can be drawn upon to allow a machine to operate in highly complex and unpredictable environments.<sup>107</sup> Mathematical models used in traditional control techniques would not be considered appropriate to apply in these environments.<sup>108</sup> Therefore, machines that have this form of control would be considered to have a high degree of autonomy. Hangos, Lakner and Gerzson summarise the concept of intelligent control as 'computer-controlled systems where at least part of the control tasks performed require intelligent methods'.<sup>109</sup> What Hangos, Lakner and Gerzson meant by 'intelligent methods' is that aspects of heuristics and biological cognitive processes applied by humans are being emulated by intelligent control software.<sup>110</sup> With this concept, the developers of control systems do not need detailed knowledge of all the possible situations a machine could encounter.<sup>111</sup>

---

<sup>102</sup> Ioan Doré Landau et al *Adaptive Control: Algorithms, Analysis and Applications* (Springer, 2nd ed, 2011) 1.

<sup>103</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 38.

<sup>104</sup> *Ibid.*

<sup>105</sup> *Ibid.*

<sup>106</sup> *Ibid* 38-39.

<sup>107</sup> *Ibid* 39.

<sup>108</sup> *Ibid.*

<sup>109</sup> Katalin M Hangos, Rozália Lakner and Miklós Gerzson, *Intelligent Control Systems: An Introduction with Examples* (Kluwer Academic Publishers 2004) 3.

<sup>110</sup> See Katalin M Hangos, Rozália Lakner and Miklós Gerzson, *Intelligent Control Systems: An Introduction with Examples* (Kluwer Academic Publishers 2004) 2-3; Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 39.

<sup>111</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 39.

These three concepts illustrate that autonomy still includes human control despite it appearing like there is a lack of human control or intervention. Furthermore, this thesis agrees with the notion that a LAWS being able to operate for an extended period of time with no need to interact with an operator does not mean that it is completely independent of human control.<sup>112</sup> Developers still exercise human control over machines, or weapon systems, during the development stage by programming the necessary software to ensure that the machine or weapon system behaves in the desired manner. Even when using the intelligent control concept, developers or operators provide a set of instructions that guide the machine's behaviour even if those instructions allow a machine to perform complicated actions and respond to situations that were not predicted by developers or operators.<sup>113</sup> This can be considered the earliest form of human control exercised over weapon systems in which developers play a significant role. Therefore, this form of human control should be included in the description of effective human control to provide an inclusive and realistically accurate definition of this term.

Human control over weapon systems is still being exercised at the research and development stage since '[c]hoices made by hardware and software developers in the design stage will shape the behaviour of the [weapon] systems from then on'.<sup>114</sup> Moreover, the way human control is exercised during this stage such as the decisions made by developers regarding how the weapon system is to function will have an impact later during the deployment and operation stage of the weapon system's lifecycle.

#### 5.4.1.1 EXERCISING HUMAN CONTROL DURING A WEAPONS REVIEW

Arguably, there is also a form of human control being exercised over LAWS when an article 36 weapons review is conducted. This type of human control is more in the form of lawyers, engineers and software developers examining the weapon system for any potential issues that may deem the weapon system a violation of IHL in some way. It is all part of the research and development stage of LAWS. However, whether there is effective human control implemented at this part of the research and development stage, depends on how rigorous and extensive a State's weapons review process is. This is because article 36 does not provide any specifics about how States should implement article 36 as mentioned in chapter two. Consequently, the extent of a State's weapons review process may also affect the level

---

<sup>112</sup> Ibid 40.

<sup>113</sup> Ibid.

<sup>114</sup> Ibid 49.

of responsibility for the State.<sup>115</sup> Section 5.4.3 further discusses how States can ensure that effective human control is exercised throughout the lifecycle of a weapon system, including the weapons review, by using Australia as a case study on how States can develop comprehensive policies on the weapons review process and human control.

#### 5.4.1.2 ACCOUNTABILITY FOR WEAPON SYSTEM DEVELOPERS

Tim McFarland and Tim McCormack note that a weapon system's capability to cause harm and damage, just like any other weapons developed and used, is a result of efforts made by weapon developers.<sup>116</sup> However, there is a difference between highly autonomous weapon system developers and developers of other 'dumb' weapons.<sup>117</sup> The definition of a weapon system developer provides an insight into this difference between a developer of 'dumb', or more manual weapons, and weapon systems. A weapon system developer is broadly defined as 'people who play some significant role in defining the behaviour of an autonomous weapon system'.<sup>118</sup> This definition indicates that weapon system developers have a greater opportunity to define how the weapon system functions and how it will be used compared to a developer of manual weapons.

Weapon system developers play a role that is not anticipated by the current IHL framework.<sup>119</sup> The difference is that weapon system developers are responsible for the creation of the software programs that would be installed in the computer system which would then control certain functions of the weapon. It is weapon developers that can determine how the weapon system functions and ensure the weapon system can be deployed according to IHL. Moreover, the more autonomous a weapon system is, the more likely it will assume tasks that are usually executed by military personnel.<sup>120</sup> Thus, it is logical to conclude that the more autonomous a weapon system is, the less work an operator needs to do to control the weapon system.<sup>121</sup> Therefore, developers will exert greater control over

---

<sup>115</sup> Switzerland, 'A "compliance-based" approach to Autonomous Weapon Systems' (Working Paper No 9, 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, 10 November 2017) 4, [19].

<sup>116</sup> See Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 366, 368.

<sup>117</sup> *Ibid.*

<sup>118</sup> *Ibid* 363.

<sup>119</sup> *Ibid* 366.

<sup>120</sup> *Ibid.* See also Tony Gillespie, *Systems Engineering for Ethical Autonomous Systems* (Institution of Engineering & Technology, 2019) 15.

<sup>121</sup> Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 366.

the actions the weapon system can perform and the actions it does perform after deployment.<sup>122</sup>

This rationale provides a basis to argue that weapon system developers should be held accountable for violations of IHL that amount to war crimes if the requisite elements of the crime in question are satisfied. Realistically, it may not be that simple as there are a few obstacles when trying to hold weapon system developers accountable. This is discussed in detail by McFarland and McCormack, but the key points will be summarised in this thesis.<sup>123</sup> The first major obstacle is the fact that there is a threshold requirement for a violation or crime to have occurred during an armed conflict. The issue is that often the role of weapon system developers occurs before the existence of an armed conflict. There may be situations in which weapon systems are developed during an armed conflict and will be used in that armed conflict. However, this may not be the most common scenario. Thus, it would be difficult to satisfy this threshold when trying to hold a weapon system developer accountable for a violation and or crime involving their weapon system when it was developed before there was an armed conflict.

The second obstacle is determining the ground of individual criminal responsibility in article 25 of the *Rome Statute*. The issue lies with the fact that weapon development does not include the physical act of operating the weapon such as pulling the trigger, activating the weapon or controlling its movement. Therefore, it is doubtful that weapon system developers will be charged as physical perpetrators under article 25(3)(a) of the *Rome Statute*.<sup>124</sup> That is unless it was determined that the developer exercised enough control to commit the violation jointly with another person or through another person such as the operator under article 25(3)(a).<sup>125</sup> It should be kept in mind that the amount of control a developer exercises over a weapon system depends on the level of autonomy the weapon system has.<sup>126</sup> Consequently, the level of autonomy in the weapon system becomes a factor determining

---

<sup>122</sup> Ibid.

<sup>123</sup> Ibid 372-381.

<sup>124</sup> Ibid 375. See also *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 25(3)(a).

<sup>125</sup> *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 25(3)(a).

<sup>126</sup> Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 375-376.



whether developers are liable for violations and or crimes involving the weapon system if there is no direct control or intervention from the part of the operator.<sup>127</sup>

Following this logic, the most appropriate and likely ground of individual criminal liability for weapon system developers is stated in article 25(3)(c) of the *Rome Statute* as an accessory to a crime.<sup>128</sup> Article 25(3)(c) provides that an individual is criminally liable if the individual:

For the purpose of facilitating the commission of such a crime, aids, abets or otherwise assists in its commission or its attempted commission, including providing the means for its commission.<sup>129</sup>

However, there are still obstacles to accessorial liability. One obstacle is whether it is possible to have aided and abetted or otherwise assisted in the commission of a crime before an armed conflict existed.<sup>130</sup> This refers back to the major obstacle concerning the threshold requirement of the existence of an armed conflict. Another obstacle is the knowledge or *mens rea* requirement since developers must have aided and abetted, or otherwise assisted, a crime 'for the purpose of facilitating the commission of such a crime'.<sup>131</sup> Therefore, if the weapon system developer has no knowledge that the weapon system would be used in the commission of a crime, the weapon system developer does not have the requisite *mens rea* to be found liable as an accessory to the crime.

International tribunals have explored the possibility of holding companies liable for violations of IHL that amount to war crimes. For example, the US Military Tribunal (the Tribunal) explored the behaviour of companies as a whole to prosecute the managers of those companies. This was most notable in the cases of I.G. Farben 1948<sup>132</sup> (I.G. Farben Trial) in

---

<sup>127</sup> Ibid.

<sup>128</sup> See Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 376; Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 78.

<sup>129</sup> *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 25(3) I.

<sup>130</sup> For obiter regarding the possibility that aiding and abetting a crime can occur prior to, during or after the perpetration of the principle crime see *Prosecutor v Blaškić (Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Appeals Chamber, Case No IT-95-14-A, 9 July 2004) [48]; *Prosecutor v Taylor (Trial Judgment)* (Special Court for Sierra Leone, Trial Chamber II, Case No SCSL-03-01-T, 18 May 2012).

<sup>131</sup> See *Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) art 25(3)(c); Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 380.

<sup>132</sup> *Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 10 LRTWC 1. See also *Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 8 Trials of War Criminals before the Nuremberg Military Tribunals 1.

which twenty-three members of the German company that manufactured chemicals and pharmaceuticals were prosecuted, and the German corporation Krupp 1948<sup>133</sup> (The Krupp Trial) in which twelve high-ranking managers were prosecuted. The two companies as legal persons were not the subject of prosecution; however, the US Military Tribunal examined their behaviour to prove that the managers and members of those companies had committed war crimes, specifically the plunder of property in occupied territory and the use of forced labour in inhumane conditions.<sup>134</sup>

Concerning the I.G. Farben trial, the prosecution alleged that Carl Krauch and the twenty-two others who were accused acted 'through the instrumentality of Farben' to commit crimes against peace, war crimes and crimes against humanity 'in a common plan to commit these crimes'.<sup>135</sup> This demonstrates how the prosecution was attempting to hold I.G. Farben accountable for the crimes the company, through its officials and agents, allegedly committed without charging I.G. Farben. This is because the applicable law did not consider corporate liability in the context of committing war crimes.<sup>136</sup> The prosecution did this by arguing that the twenty-three people, who held high positions within the 'financial, industrial and economic life of Germany' and were all officials, or agents, of I.G. Farben,<sup>137</sup> were acting together through I.G. Farben to commit these crimes 'wilfully and knowingly'.<sup>138</sup>

The Tribunal only managed to convict thirteen of the twenty-three defendants in this case. The main problem that the prosecution and the Tribunal faced was proving that all twenty-three defendants had the requisite knowledge and intent to be convicted of the crimes they were charged with. For example, regarding the count of offences against public and private property in occupied territory, only eight of the thirteen that were eventually convicted were found guilty of this crime.<sup>139</sup> It was held that it had been proven beyond a reasonable doubt

---

<sup>133</sup> *Trial of Alfried Felix Alwyn Krupp von Bohlen und Halbach and Eleven Others (Judgment)* 1948, 10 LRTWC 69.

<sup>134</sup> See Eric Mongelard, 'Corporate civil liability for violations of international humanitarian law' (2006) 88(863) *International Review of the Red Cross* 665; *Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 10 LRTWC 1; *Trial of Alfried Felix Alwyn Krupp von Bohlen und Halbach and Eleven Others (Judgment)* (United States Military Tribunal Nuremberg, Case No 58, 30 June 1948).

<sup>135</sup> *Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 10 LRTWC 1, 1.

<sup>136</sup> Florian Jessberger, 'On the Origins of Individual Criminal Responsibility under International Law for Business Activity' (2010) 8(3) *Journal of International Criminal Justice* 783, 784.

<sup>137</sup> *Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 10 LRTWC 1, 1, 3.

<sup>138</sup> *Ibid* 4.

<sup>139</sup> See Florian Jessberger, 'On the Origins of Individual Criminal Responsibility under International Law for Business Activity' (2010) 8(3) *Journal of International Criminal Justice* 783, 790-791; *Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 10 LRTWC 1; *Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 8 Trials of War Criminals before the Nuremberg Military Tribunals 1.

that only those eight defendants had the requisite knowledge of what was happening during the negotiations and takeovers of local companies and properties. Meanwhile, there was insufficient proof that the other defendants committed offences against public and private property with the requisite knowledge and intent.<sup>140</sup>

Regarding the Krupp Trial, all twelve defendants were alleged to have committed 'Crimes against Peace, War Crimes and Crimes against Humanity and participated in a common plan and conspiracy' to commit those crimes.<sup>141</sup> The counts the former directors of the Krupp Group were charged with, as suggested by the Tribunal, can be summarised as follows:

- (1) Planning, preparation, initiation and waging aggressive war.
- (2) Plunder and Spoliation.
- (3) Crimes involving prisoners of war and slave labour.
- (4) Common plan or conspiracy.<sup>142</sup>

These four counts were also what the defendants in the I.G. Farben trial were charged with. In this case, eleven of the twelve were found guilty.<sup>143</sup> However, no defendant in this case was found guilty of counts one and four.<sup>144</sup> The Tribunal held that based upon the elements of the first and second counts that needed to be proven, there was insufficient evidence to prove beyond a reasonable doubt that the defendants were guilty of committing crimes under those two counts. The Tribunal also determined that if they did not notify the defendants earlier regarding their findings on counts one and four, the defendants would continue to present evidence for those counts, and proof of facts needed for a conviction may be presented to the advantage of the prosecution when the burden of proof is on the prosecution. Therefore, this would have led to an unfair trial according to the Tribunal.<sup>145</sup> However, the Tribunal expressly stated that '[w]e do not hold that the industrialists as such, could not under any circumstances be found guilty upon such charges'.<sup>146</sup> Therefore, the

---

<sup>140</sup> Florian Jessberger, 'On the Origins of Individual Criminal Responsibility under International Law for Business Activity' (2010) 8(3) *Journal of International Criminal Justice* 783, 790-79.1

<sup>141</sup> *Trial of Alfred Felix Alwyn Krupp von Bohlen und Halbach and Eleven Others (Judgment)* (United States Military Tribunal Nuremberg, Case No 58, 30 June 1948) 69.

<sup>142</sup> *Ibid* 71.

<sup>143</sup> International Military Tribunal No. II, 'Opinion re: Finding as to the first and fourth coun's ' (1948) *Trial -0 - Krupp Case 1*.

<sup>144</sup> *Ibid*.

<sup>145</sup> *Ibid* 4.

<sup>146</sup> *Ibid*.

Tribunal was not dismissing the idea that companies, or industrialists, could not be found guilty of counts one and four at all.

The recent case of *Presbyterian Church of Sudan v Talisman Energy* is an example that demonstrates that a company could be held accountable for violations of IHL. The Presbyterian Church of Sudan brought a claim under the United States Alien Torts Claim Act<sup>147</sup> (ATCA) against Talisman Energy, a Canadian oil and gas company, for violations of human rights and war crimes that occurred in the context of an international armed conflict in Sudan.<sup>148</sup> The lawsuit against Talisman Energy alleged that the company aided the Sudanese government to commit genocide, war crimes and crimes against humanity.<sup>149</sup> More specifically, it was alleged that Talisman Energy collaborated with the Sudanese government to create 'buffer zones around certain oil fields', effectively assisting in the commission of human rights violations and international crimes to get access to oil by displacing the local populations and attacking their villages.<sup>150</sup>

The US District Court for the Southern District of New York held that the theory of aiding and abetting relevant to ICL is applicable in civil claims for violations of IHL.<sup>151</sup> The Court opined that 'whether or not aiding and abetting...[is] recognized with respect to charges of genocide, enslavement, war crimes and the like is a question that must be answered by consulting international law'.<sup>152</sup> The ATCA 'provides a cause of action in tort for breaches of international law'; thus, the Court needs to look to international law to determine whether there is a cause of action.<sup>153</sup> Therefore, applicable international law for accessorial liability can be considered by domestic courts to find companies liable for violations of IHL.

The District Court dismissed the claim which was upheld by the Court of Appeals for the Second Circuit. When considering the standard to be applied for aiding and abetting in international law, the Court of Appeals determined that purposeful intention to violate IHL

---

<sup>147</sup> *Aliens Torts Claim Act*, 28 USC § 1350 (Thomson Reuters Westlaw Classic 1978).

<sup>148</sup> See Eric Mongelard, 'Corporate civil liability for violations of international humanitarian law' (2006) 88(863) *International Review of the Red Cross* 665, 681; *Presbyterian Church of Sudan v Talisman Energy* 244 F. Supp. 2d 289 (U.S District Court for the Southern District of New York, 2003).

<sup>149</sup> International Crimes Database Project, 'The Presbyterian Church of Sudan, et al. v. Talisman Energy, Inc. And Republic of The Sudan', *International Crimes Database* (Web page) <<http://www.internationalcrimesdatabase.org/Case/43/Presbyterian-Church-Of-Sudan-v-Talisman-Energy/>>.

<sup>150</sup> *Ibid.*

<sup>151</sup> *Presbyterian Church of Sudan v Talisman Energy*, 244 F. Supp. 2d 289 (U.S District Court for the Southern District of New York, 2003) 320.

<sup>152</sup> *Ibid.*

<sup>153</sup> *Ibid.*

instead of just knowledge of the violations was the appropriate standard.<sup>154</sup> Applying this standard to the ATCA, the Court held that the plaintiffs were unable to prove that the Talisman Company 'acted with the purpose' to harm civilians and to support the Sudanese government in violating IHL.<sup>155</sup> Consequently, it can be observed from this case and the previous cases that there are still challenges to successfully holding a company liable, but it is nonetheless possible.

Other treaties indicate that companies do have an obligation under international law for violations of IHL that amount to war crimes. For example, the Economic Social Council's *Norms on the responsibilities of transnational corporations and other business enterprises with regard to human rights (ESC Norms)* provides that transnational corporations and other businesses shall not engage in any activity that violates IHL or is deemed a war crime.<sup>156</sup> Despite this, the *ESC Norms* do not provide any substantial mechanism to enforce liability on corporations under international law.<sup>157</sup>

Overall, there are cases as well as international norms and treaties that demonstrate that companies can be held liable for violations of IHL that amount to war crimes. However, it has proven difficult to establish the liability of corporations, particularly when having to prove the requisite elements of knowledge and intent.

Considering what has been discussed in this section, it can be concluded that it would be difficult to find a weapon system developer liable for violations of IHL that amount to war crimes without amendments being made to the current ICL and IHL regime.<sup>158</sup> This is despite the argument made that weapon system developers exercise a form of human

---

<sup>154</sup> International Crimes Database Project, 'The Presbyterian Church of Sudan, et al. v. Talisman Energy, Inc. And Republic of The Sudan', *International Crimes Database* (Web page) <<http://www.internationalcrimesdatabase.org/Case/43/Presbyterian-Church-Of-Sudan-v-Talisman-Energy/>>.

<sup>155</sup> See *Presbyterian Church of Sudan v Talisman Energy*, 244 F. Supp. 2d 289 (U.S District Court for the Southern District of New York, 2003) 320, 8; International Crimes Database Project, 'The Presbyterian Church of Sudan, et al. v. Talisman Energy, Inc. And Republic of The Sudan', *International Crimes Database* (Web page) <<http://www.internationalcrimesdatabase.org/Case/43/Presbyterian-Church-Of-Sudan-v-Talisman-Energy/>>.

<sup>156</sup> See Economic and Social Council, Norms on the responsibilities of transnational corporations and other business enterprises with regard to human rights, 55th sess, 22nd mtg, Agenda Item 4, UN Doc E/CN.4/Sub.2/2003/12/Rev.2 (26 August 2003, adopted 13 August 2003) [3]; Eric Mongelard, 'Corporate civil liability for violations of international humanitarian law' (2006) 88(863) *International Review of the Red Cross* 665, 671.

<sup>157</sup> Eric Mongelard, 'Corporate civil liability for violations of international humanitarian law' (2006) 88(863) *International Review of the Red Cross* 665-671.

<sup>158</sup> See Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 362, 384.

control over the weapon system during the development stage and play a role in determining the behaviour of the weapon system. Nevertheless, to incorporate an inclusive working definition of effective human control, the role of weapon system developers and the control they exercise over weapon systems has to be considered.

#### 5.4.2 THE DEPLOYMENT AND OPERATION STAGE

At the deployment stage, the majority of weapon systems deployed nowadays require an operator to activate them. It is necessary to consider the interaction between an operator and machine (the human-machine interface) at a more technical level to understand the role of operators at the deployment stage. This in turn will help clarify misconceptions about human control during this stage of a weapon system's lifecycle and misconceptions about accountability.

How human control is exercised in the deployment stage may seem straightforward, but one must bear in mind that there are LAWS that may be an exception to this notion. As mentioned in Chapter Two, the only currently operational fully autonomous weapon system that may not need an operator to directly activate it before the weapon system performs its tasks is the encapsulated torpedo mine. It may be set up and placed with the help of an operator, but it is activated by a passing target like a ship which is identified by its sensors.<sup>159</sup> Therefore, there is no need for direct, physical control by an operator to activate the encapsulated torpedo mine.

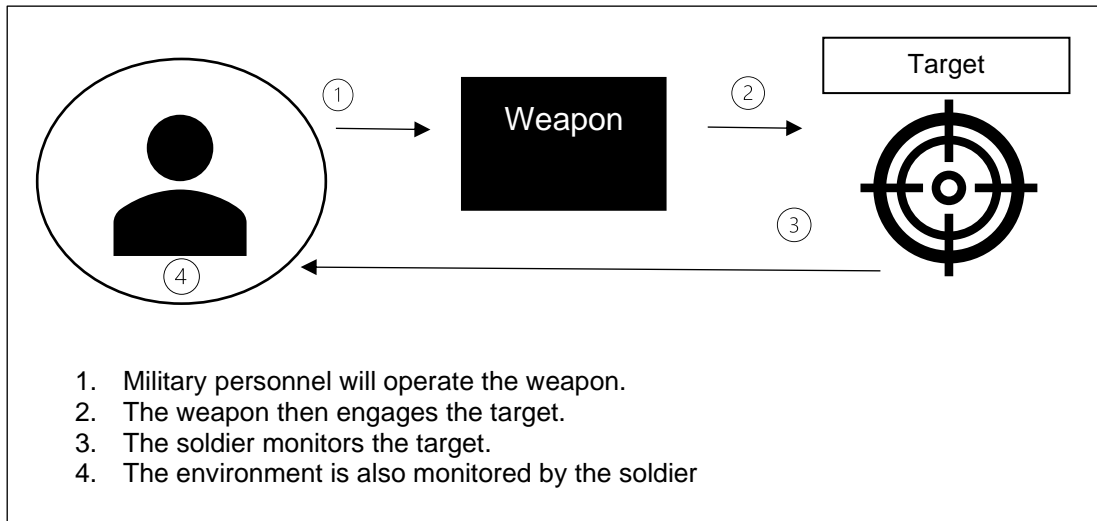
Regarding both the deployment and the operation stages of an autonomous weapon system's lifecycle, the diagrams below demonstrate the general human-machine interactions that occur during these stages. Figure 5.1 demonstrates the interaction between an operator and a manual weapon and Figure 5.2 demonstrates the interaction between an operator and an autonomous weapon system.<sup>160</sup>

---

<sup>159</sup> Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Syst'ems' (Working Paper, Centre for a New American Security, February 2015) 15.

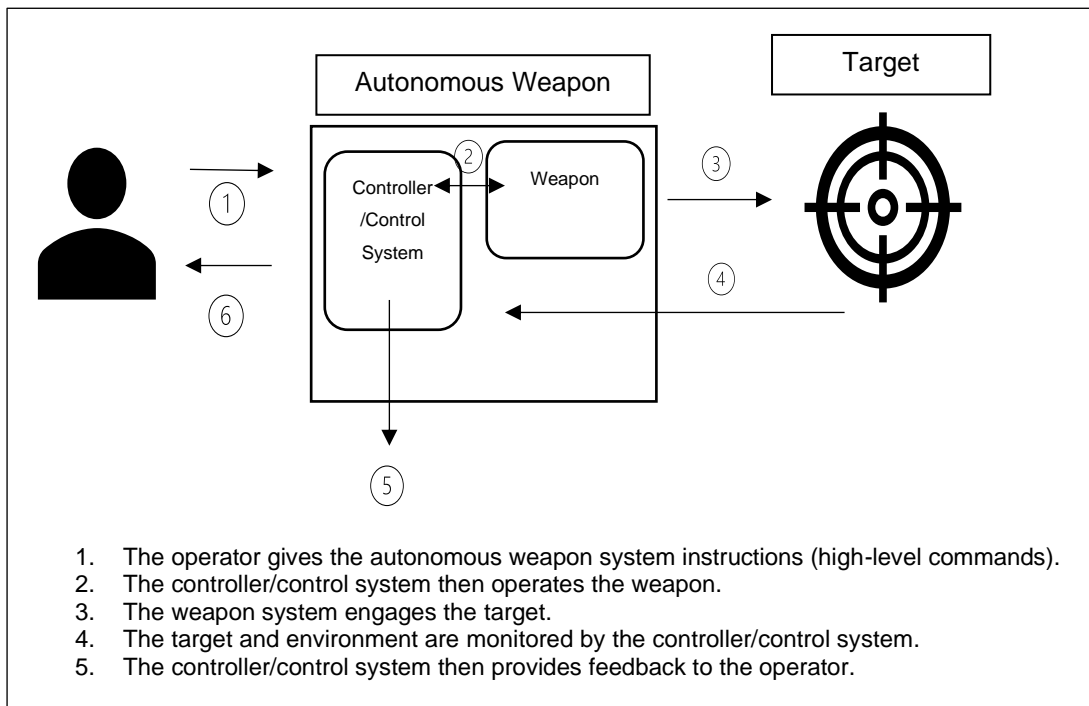
<sup>160</sup> Figures 5.1 and 5.2 are based on Figure 3.1. and 3.2 in Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 32-33.

**Figure 5.1: Diagram of a Manual Weapon System**



Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law*. Reproduced with permission of The Licensor through PLSclear.

**Figure 5.2: Diagram of an Autonomous Weapon System**



Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law*. Reproduced with permission of The Licensor through PLSclear.

Antsaklis, Passino and Wang have suggested a way to describe an 'autonomous controller's functional architecture' that applies to a majority of autonomous controllers.<sup>161</sup> This provides further technical insight into the human-machine interface. Antsaklis, Passino and Wang identified three levels within the autonomous controller. The lowest level is the execution level which includes the interface to the vehicle, in this case the weapon system, and its environment through the sensors and actuators.<sup>162</sup> Furthermore, this is the level that uses conventional control algorithms.<sup>163</sup>

The middle level is the coordination level that provides the link between the lowest and highest levels. This level deals with certain decision-making functions, learning functions and algorithms using a combination of conventional and intelligent control decision-making methods.<sup>164</sup> The highest level is the management and organisation level which includes the interface to the operator(s) or onboard systems. This level involves only intelligent control decision-making methods including learning and planning functions.<sup>165</sup>

Applying this autonomous controller functional architecture to LAWS and the exercise of human control, the execution and coordination levels are where the control exercised by weapon system developers is important because they are the ones who create the algorithms and build the software and hardware that become part of the physical system. The management and organisation level is the level where control exercised by human operators is important since this is the level that has the interface to the operators and where the interaction between humans and machines occurs the most.

---

<sup>161</sup> Panos J Antsaklis, Kevin M Passino and S J Wan, 'An Introduction to Autonomous Control Systems' (1991) 11(4) *IEEE Control Systems Magazine* 5, 8. See figure 1 in the article.

<sup>162</sup> *Ibid.*

<sup>163</sup> Conventional control systems that use conventional control algorithms involve the design of 'mathematical models of physical systems' that captures the dynamic behaviour chosen to be programmed into the system. Control design techniques are then applied 'to design the mathematical model of an appropriate controller'. The mathematical model must be "simple enough" [to] be analysed with available mathematical techniques' but it also needs to be accurate to describe the key aspects of the dynamic behaviour of the physical system: Panos J Antsaklis, Kevin M Passino and S J Wan, 'An Introduction to Autonomous Control Systems' (1991) 11(4) *IEEE Control Systems Magazine* 5, 6.

<sup>164</sup> Intelligent control decision-making methods involve more complex and sophisticated controllers using non-linear or stochastic mathematical models that are considered more complex mathematical models. The controllers that are designed based on intelligent control theory and apply intelligent control decision-making methods are called intelligent autonomous controllers but are also known as enhanced adaptive controllers since they are able to adapt to more significant changes in the vehicle and its surrounding environment: Panos J Antsaklis, Kevin M Passino and S J Wan, 'An Introduction to Autonomous Control Systems' (1991) 11(4) *IEEE Control Systems Magazine* 5, 7.

<sup>165</sup> *Ibid* 8-9.



The role of human control during all stages of a weapon system's lifecycle involves weapon system developers exercising control when designing the algorithms for the controllers and the software and hardware for the weapon system. The role of human control also involves a series of interactions between the human operator and the weapon system. Figures 5.1 and 5.2 as well as the description of the architecture of autonomous controllers demonstrate these interactions. A conclusion can be made that there is still a form of human control being exercised over LAWS throughout its lifecycle which needs to be considered when defining effective human control. For example, operators still have supervisory roles for most weapon systems currently deployed as demonstrated in Figure 5.2. This is because operators are the ones who issue the high-level commands for the autonomous weapon system to process, follow and receive feedback from the control system. Regarding feedback, this may be in terms of the control system providing information as to what it is doing, or what it has done, and or asking for further instructions from the operator.

#### 5.4.3 A BRIEF CASE STUDY OF HUMAN CONTROL OF LAWS IN AUSTRALIA

The working papers that Australia submitted to the GGE on Laws in 2018 and 2019 regarding their policies on the weapons review process and their system of control are comprehensive in describing how Australia ensure that effective human control is exercised over LAWS throughout their lifecycle.<sup>166</sup> Therefore, Australia's weapons review process and system of control provides a good case study into how States can ensure that there is effective human control being exercised over LAWS.

Australia's 'system of control' is described as an 'incremental, layered approach' when applying control over autonomous weapon systems.<sup>167</sup> This encompasses all stages of an autonomous weapon system's lifecycle from research and development to operation.<sup>168</sup> Furthermore, 'control' in the working paper is defined as a 'system of processes and procedures through which a [S]tate achieves its intended military effect [that is] compliant

---

<sup>166</sup> See Australia, 'The Australian Article 36 Review Process' (Working Paper No 6, 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, 30 August 2018); Australia, 'Australia's System of Control and Applications for Autonomous Weapon Systems' (Working Paper No 5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, 26 March 2019). This section is largely based on this working paper submitted by Australia.

<sup>167</sup> Australia, 'Australia's System of Control and Applications for Autonomous Weapon Systems' (Working Paper No 5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, 26 March 2019) 1, [3].

<sup>168</sup> Ibid.

with its legal obligations and policy objectives'.<sup>169</sup> Australia's working paper also defines an autonomous weapon system which is similar to the definition provided by the ICRC and the US Department of Defense. The definition states that an autonomous weapon system 'refers to a weapon or weapon system that can undertake combat functionality without further direction'.<sup>170</sup> These concepts form the basis of Australia's system of control.

It is in the research and development stage where military officials and developers determine the function of autonomous weapon systems and what would be required to make those functions possible. This process involves determining how to translate commands and controls into code as well as considering other technical and safety requirements.<sup>171</sup> Once the initial aspects are determined, the weapon system undergoes reviews and tests to ensure that it meets the requirements previously set and complies with the control parameters. This includes 'software verification, performance reliability testing, compliance with commands, and operational permissions and limitations'.<sup>172</sup> This stage of exercising control is known as the '[t]esting, evaluation and review' stage and this is usually where the article 36 weapons review takes place.<sup>173</sup>

The next step in the system of control is the '[a]cceptance, [t]raining and [c]ertification' stage.<sup>174</sup> This is where further tests are conducted on the weapon system for it to be approved and accepted for service. Operators are then trained to understand how the weapon functions and to be able to operate the weapon system correctly. This is to ensure that the operators are proficient at handling the weapon system. The weapon system then undergoes a certification process that involves evaluating the weapon system's performance and the operators', and their superiors', proficiency in understanding the weapon system.<sup>175</sup> As stated in the working paper, '[t]he acceptance, training and certification controls act as "traffic lights" for a new weapon system'.<sup>176</sup> These steps in the

---

<sup>169</sup> Ibid 1, [5].

<sup>170</sup> Ibid.

<sup>171</sup> Ibid 2, [12]

<sup>172</sup> Ibid 2, [13]-[14].

<sup>173</sup> See generally Australia, 'The Australian Article 36 Review Process' (Working Paper No 6, 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, 30 August 2018).

<sup>174</sup> Australia, 'Australia's System of Control and Applications for Autonomous Weapon Systems' (Working Paper No 5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, 26 March 2019) 3.

<sup>175</sup> Ibid 3, [23]-[24]

<sup>176</sup> Ibid 3. [24].

system of control aid in promoting transparency. The steps also provide an opportunity for military personnel to properly understand how the weapon system functions.

The way Australia's system of control is structured ensures that there is adequate human control being exercised over the autonomous weapon system at each initial step. One can observe the notion of human control being exercised during the research and development stage being implemented into practice. Continuing from the initial research and development stages, human control continues to be exercised before the weapon system is placed into service. This stage in the system of control process is known as the 'pre-deployment selection' where further control specifications are implemented into a weapon system that has been accepted and certified from the earlier stages. According to the working paper, this is 'to address specific use on deployment'.<sup>177</sup> There are further checkpoints where the parameters for weapon systems are refined and specified so the weapon system complies with the particular rules of engagement set.<sup>178</sup> After employing a weapon system, an 'after-action evaluation' is conducted to assess the weapon system's performance.<sup>179</sup> According to the working paper, 'this stage operates as a feedback loop to all prior stages of control'.<sup>180</sup>

The United States arguably also has a comprehensive set of procedures for weapon reviews. Each stage in the Defense Acquisition Management Framework and requirements listed in the acquisition process were designed to ensure that the United States' development and acquisition process complied with both domestic law and international law.<sup>181</sup> The processes and requirements are relatively similar to Australia's system of control.

Other States such as Belgium, Germany, Netherlands, Norway, Sweden and the United Kingdom have also published their weapon review process. However, each State interprets their obligation under article 36 differently. As a result, it is relevant to address how these various interpretations, which lead to various weapon review processes, could affect how the accountability of a State is determined. Therefore, there must be an expressed, common understanding among States that they are responsible for ensuring that the development

---

<sup>177</sup> Ibid 4, [26].

<sup>178</sup> Ibid 4-5, [30]-[38].

<sup>179</sup> Ibid 5, [39]-40].

<sup>180</sup> Ibid 5, [40].

<sup>181</sup> See United States Department of Defense, 'Operation of the Defense Acquisition System' (Instruction No 5000.2, 12 May 2003) 2, 3 (Figure 1 and 2); United States Department of Defense, 'The Defense Acquisition System' (Directive No 5000.01, 12 May 2003) 7, [E1.1.15]. See also United States Department of Defense, 'Review of Legality of Weapons Under International Law' (Instruction No 5500.15, 16 October 1974).

and use of weapon systems comply with IHL and for the consequences that may follow from the use of weapon systems.

## 5.5 FACING THE CONSEQUENCES

It can be concluded that the degree of autonomy a weapon system has and what critical functions of the weapon systems are autonomous can affect how one determines accountability. The reason behind this notion is that weapon systems do not all have the same level of autonomy; thus, the type and level of human control that is exercised over weapon systems can vary. Moreover, if the aim is to keep humans accountable for violations of IHL and war crimes that involve the use of an autonomous weapon system,<sup>182</sup> it is important to keep in mind the role operators have when interacting with an autonomous weapon system. This is to ensure that the working definition of effective human control is realistically applicable.

There are two reasons why State responsibility is discussed in this thesis as part of the larger question of what should be considered effective human control over LAWS. First, there are concerns that it would be difficult to attribute a violation of IHL and war crimes involving the use of LAWS to a State. However, a weapon system is merely another tool armed forces use to achieve a legitimate military goal. Therefore, attributing a violation of IHL and a war crime to a State should be as straightforward as drawing the connection between the weapon employed, the operator or agent of the State who deployed it and the State itself. Therefore, State responsibility may not be considered a major issue when it comes to the use of weapon systems.

Second, States should do their due diligence in ensuring that weapon systems they intend to develop, acquire or modify adhere to IHL. This is because States have positive due diligence obligations 1) concerning the implementation of IHL; and 2) concerning the conduct of hostilities.<sup>183</sup> These positive due diligence obligations apply to the development

---

<sup>182</sup> See Carrie McDougall, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58, 61; *The 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems* (Report, 23 October 2018) 4, [21(b)]; *2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, CCW/GGE.1/2019/3· 2nd sess, Agenda Item 6, (25 September 2019) 13 (Annex IV guiding principle (b)).

<sup>183</sup> Marco Longobardo, 'The Relevance of the Concept of Due Diligence for International Humanitarian 'aw' (2019) 37(1) *Wisconsin International Law Journal* 44, 55-56

and use of LAWS as their development and use are governed by the rules and principles of IHL.

Where there may be issues with LAWS and attributing responsibility is with weapon system developers. As mentioned previously in section 5.4.1.2, there are obstacles to holding weapon system developers accountable which can affect. The issues that may arise concern the threshold requirement that violations and or crimes need to occur within the context of an armed conflict to be applicable under the *Rome Statute*, as well as the requirement for knowledge and intent on the part of weapon system developers. Thus, it would be difficult to prove weapon system developers liable as a primary perpetrator or even as an accessory. As McFarland and McCormack argue, there may need to be amendments to the current ICL regime to ensure that it is easier for prosecutors to prove their case against weapon system developers when necessary.<sup>184</sup>

Article 8(2)(b)(xx) may provide a way for prosecutors to charge and prosecute individuals and weapon system developers for a crime, or crimes, under the *Rome Statute*. However, there are two major issues with article 8(2)(b)(xx). First, a comprehensive set of regulations for LAWS needs to exist, and it is evident that no such regulations exist. Second, these regulations need to be included in an annex to the *Rome Statute*, which there is currently no such annex. Therefore, to ensure that article 8(2)(b)(xx) can be effectively implemented, these issues need to be addressed.

The main effect that the concepts of State responsibility, due diligence and individual criminal responsibility have on constructing a realistic and practical working definition of effective human control is that LAWS bring weapon system developers into the 'accountability picture'. They exercise a form of control in the early stages of a weapon system's lifecycle that is hard to ignore. Weapon system developers are the first group of people to exercise human control and have the capability to determine the functions and parameters of the weapon systems which will affect the behaviour of the weapon systems. Furthermore, the more autonomous functions the weapon system has, particularly in terms of the critical functions, the more control weapon system developers exercise over the weapon system.

---

<sup>184</sup> Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361, 362, 384.

---

## CHAPTER 6: DEFINING 'EFFECTIVE HUMAN CONTROL'

---

## 6.1 INTRODUCTION

This chapter will begin with a discussion of the importance of flexibility in regulating LAWS and why the term effective human control should be flexible. This is followed by a discussion on the practical application of effective human control where general requirements are outlined in Table 6.2. The general requirements assist in breaking down what exercising effective human control would look like at each stage of a weapon system's lifecycle; thus, explaining the meaning of effective human control at each stage.

This chapter will then propose a working definition of effective human control. The working definition incorporates three key factors (the various types of LAWS, the various levels of autonomy that LAWS can possess, and the different forms of human control that can be exercised over LAWS throughout their lifecycle), including the general requirements of human control and the existing norms, rules and principles of IHL.

Concepts concerning state responsibility under international law and individual responsibility under ICL are also considered and integrated into the working definition. This is followed by examining the benefits and limitations of the working definition through the lens of three underlying concerns that have been raised during the informal meeting of experts and the GGE on LAWS.

## 6.2 THE IMPORTANCE OF FLEXIBILITY IN REGULATING LAWS

There are three key factors to consider that demonstrate the reason why there needs to be flexibility in regulating LAWS. These factors are 1) the various types of LAWS; 2) the varying levels of autonomy that LAWS can possess; and 3) the different forms of human control that can be exercised over LAWS throughout their lifecycle. Therefore, autonomy should be viewed on a scale in terms of degrees of autonomy rather than a dichotomy in terms of whether a weapon system is autonomous or is not autonomous.

It has been argued that there is already an implied requirement for 'meaningful human judgment' in decisions to use lethal force.<sup>185</sup> The potential for increased automation to diminish the control human operators have over the use of force over time makes it

---

<sup>185</sup> Michael C. Horowitz and Paul Scharre, 'Meaningful Human Control in Weapon Systems: A Primer' (Working Paper, Centre for a New American Security, March 2015) 6; Michael Biontino, 'CCW Expert Meeting: Lethal Autonomous Weapon Systems' (General Statement, CCW Meeting of Experts on LAWS, 13 May 2014) <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/9FB02F665072E11AC1257CD70066D830/\\$file/Germany+LAWS+2014.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/9FB02F665072E11AC1257CD70066D830/$file/Germany+LAWS+2014.pdf)>

necessary for this requirement to be explicit.<sup>186</sup> Therefore, future regulations on LAWS must address their novel aspect: the ability to identify, select and attack targets with little to no human intervention.<sup>187</sup> This novelty is what warrants the question of whether there is effective human control over LAWS, and this should be the focus of future regulations rather than how technically advanced a weapon system is.<sup>188</sup> That being said, when considering the importance of flexibility in regulating LAWS, existing lethal weapon systems with autonomous functions, such as close-in weapon systems on naval ships, should also be considered.<sup>189</sup> This will ensure that such regulations will be effective in addressing current and future lethal weapon systems with autonomous functions, even if the weapon system would not be considered 'fully' autonomous.<sup>190</sup>

When examining the potential for regulating weapon systems, an important factor to consider is the various stages of a weapon systems lifecycle (research and development, deployment and operation) since different forms of human control apply in the different stages, as well as the levels of autonomy that different weapon systems possess (semi-autonomous, supervised and autonomous).<sup>191</sup> Figure 6.1 below depicts an automation scale to explain how different weapon systems possess various levels of autonomy, in which there is no definitive line between what is considered a semi-autonomous weapon system, a supervised weapon system and a fully autonomous weapon system.

### 6.2.1 THE FLEXIBLE SCALE

---

<sup>186</sup> Ibid.

<sup>187</sup> Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>188</sup> See Michael C. Horowitz and Paul Scharre, 'Meaningful Human Control in Weapon Systems: A Primer' (Working Paper, Centre for a New American Security, March 2015) 9; Neil Davison, 'Characteristics of Autonomous Weapon Systems' (Speech, CCCW Informal Meeting of Experts on LAWS, 14 April 2015).

<sup>189</sup> Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

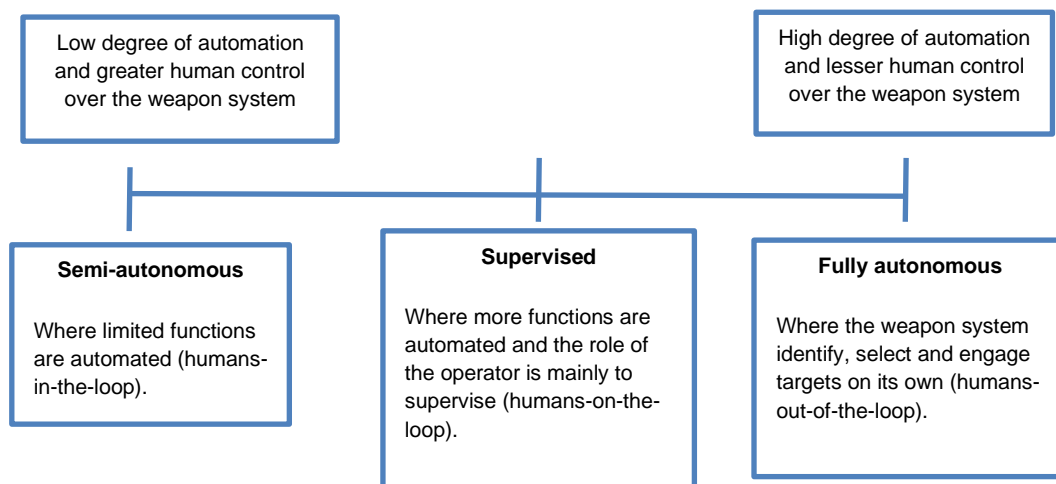
<sup>190</sup> Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>191</sup> See Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 12-15; Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018) 43-50; Paul Scharre and Michael C. Horowitz, 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015); Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.



Figure 6.1 provides a rough visual of the automation scale that reflects the various degrees of automation that exist in current weapon systems.<sup>192</sup> As you slide up and down the automation scale, the degree of automation increases or decreases and the form of human control over weapon systems varies accordingly as well. The three points identified in Figure 6.1 each represent a level of automation and are only highlighted to describe certain points along the scale since ‘there are no discrete levels of machine autonomy in reality’.<sup>193</sup> Therefore, the three points (Semi-autonomous, Supervised and Fully Autonomous) in Figure 6.1 should not be viewed as the only points on the scale but should be viewed as three examples of the varying degrees of autonomy which was also discussed in Chapter Three.

**Figure 6.1: Automation Scale for LAWS<sup>194</sup>**



Overall, it is important to ensure that any standards or rules to regulate LAWS should be relevant and adaptable for current weapon systems and for those that will be developed in

<sup>192</sup> See Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 12; Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 44; Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>193</sup> Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 44. See also Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>194</sup> Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

the future.<sup>195</sup> Whether the regulation takes the form of a separate treaty, an additional protocol to the *Convention on Certain Conventional Weapons* (CCCW) or a manual like the *Tallinn Manual*<sup>196</sup> on cyberwarfare, there needs to be a mechanism included that will address the development and use of current weapon systems effectively and allow for regulations to adapt to future weapon systems as well.<sup>197</sup>

### 6.3 PRACTICAL APPLICATION OF EFFECTIVE HUMAN CONTROL

Exercising control over LAWS can take various forms and have varying degrees of control at different stages.<sup>198</sup> Furthermore, the human-machine interface can vary between weapon systems. Therefore, it is necessary to approach human control in a more general sense while still referring to key touchpoints in the human-machine interface throughout the lifecycle of a weapon system. The following sections in this part will address the general requirements for Human Control over LAWS, depicted in Table 6.2, and explore what would be considered human control according to each stage of a weapon system's lifecycle. This is to build a picture of what effective human control over a weapon system overall could be. However, it is necessary to first provide context as to why the table is structured the way it is.

Table 6.2 focuses on three key stages of a weapon system's lifecycle and the three highlighted points on the automation scale of weapon systems, proposing general requirements for each stage in the lifecycle.<sup>199</sup> There are two reasons why the table is structured this way. First, in each stage of the lifecycle, the form of control humans exercise over the weapon system is different.<sup>200</sup> For example, in the research and development phase, you have developers, whether engineers or coders, developing the weapon as well

---

<sup>195</sup> Kenneth Anderson, Daniel Reisner and Matthew Waxman, 'Adapting the Law of Armed Conflict to Autonomous Weapon Systems' (2014) 90 *International Law Studies* 386, 410.

<sup>196</sup> Michael N. Schmitt, *Tallinn Manual on the International Law Applicable to Cyber Warfare Prepared by the International Group of Experts at the Invitation of the NATO Cooperative Cyber Defence Centre of Excellence* (Cambridge University Press, 2013). For a recent version of the Tallinn Manual see Schmitt, Michael N., *Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations* (Cambridge University Press, 2nd ed, 2017).

<sup>197</sup> Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>198</sup> Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 12.

<sup>199</sup> Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>

<sup>200</sup> *Ibid.*

as people conducting weapon reviews when necessary to ensure the weapon complies with IHL.<sup>201</sup> That is a form of human control that takes place early in the lifecycle.<sup>202</sup> However, a different form of human control applies when a commander decides to deploy the weapon system or when an operator launches the weapon.<sup>203</sup> Second, each category of weapon system has varying degrees of automation and the level of human-machine interaction will vary accordingly as well.<sup>204</sup> Essentially, it would be better to create a set of general requirements covering all weapon systems rather than detailed regulations that individually address each type of weapon system at each stage.<sup>205</sup> Nevertheless, developing a fully comprehensive set of requirements does come with some challenges since there are ‘edge cases’ such as communication-denied environments that may be difficult to address.

**Table 6.2:** General Requirements for Human Control over LAWS<sup>206</sup>

Categories of Weapon Systems	Research and Development	Deployment	Operation
1. Semi-autonomous 2. Supervised 3. Autonomous	Weapon systems must: a) be designed in a way to ensure that human operators have control over how and when the weapon is used; b) be tested to ensure that they can be used in a manner that complies with IHL; and c) have elements of human control which are: <ul style="list-style-type: none"> <li>• The ability for human supervision and intervention,</li> <li>• Operational restrictions,</li> <li>• Predictability,</li> </ul>	Commanders, operators and others who take part in planning an attack should: <ol style="list-style-type: none"> <li>a) have sufficient information to confirm the lawfulness of the actions taken. This includes sufficient knowledge of how the weapon is supposed to operate and of the situation;</li> <li>b) make ‘informed, conscious decisions’ on the use of weapons</li> </ol>	When a weapon system is operational there should be: <ol style="list-style-type: none"> <li>a) adequate form of monitoring (based on the type of weapon system) of the weapon system and or its payload to ensure the correct target is hit;</li> <li>b) the ability for operators to intervene or terminate an attack when it would no longer be compliant with IHL; and</li> </ol>

<sup>201</sup> Ibid.

<sup>202</sup> Ibid.

<sup>203</sup> Ibid.

<sup>204</sup> See Neil Davison, ‘A legal perspective: Autonomous weapon systems under international humanitarian law’ (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 13; Tarisa Yasin, ‘The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems’, *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>205</sup> Tarisa Yasin, ‘The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems’, *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>206</sup> Tarisa Yasin, ‘The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems’, *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

	<ul style="list-style-type: none"> <li>• Reliability, and</li> <li>• Transparency.<sup>207</sup></li> </ul>	<p>before its deployment;<sup>208</sup> and</p> <p>c) initiate the attack through positive action.<sup>209</sup></p>	<p>c) a clear chain of responsibility where the commander and or operator are legally and ethically responsible for their actions. Therefore, the State is responsible for the actions of its agents.</p>
--	---	--	---

These requirements of human control are broad for the moment. However, as States and their militaries become more familiar with the issues related to the development and use of LAWS, these elements and requirements can be amended to reflect the situation at the time more accurately. Nevertheless, these general requirements assist in breaking down what could be considered effective human control at each stage of the lifecycle. The breakdown of human control at each stage assists in building an overall understanding of what would be considered effective human control and how that can be exercised over LAWS.

### 6.3.1 EFFECTIVE HUMAN CONTROL DURING THE DEVELOPMENT STAGE

Starting with the development stage, exercising human control over a weapon system during this stage involves the developers (the software and mechanical engineers) building and programming the weapon systems. Therefore, the developers would be exercising a form of human control when creating the software, programming the weapon’s computer system and designing the weapon itself. This initial form of human control cannot be ignored because it is at this stage where the developers can ensure, from the beginning, that there is effective human control over weapon systems building the weapon system and its software.<sup>210</sup> This can be done through rigorous testing and review processes. The important point is that the actions of the weapon system developers during the development stage of a weapon system have consequences during the deployment and operation stages.

<sup>207</sup> See International Committee of the Red Cross, ‘Expert Meeting on Lethal Autonomous Weapons Systems’ (Statement, Group of Governmental Expert Meeting on Lethal Autonomous Weapons Systems, 15 November 2017); Richard Moyes, ‘Meaningful human control over individual attacks’ (Presentation, International Committee of the Red Cross Expert Meeting, 15 March 2016) 49-50; Richard Moyes, ‘Key elements of meaningful human control’ (Background Paper, Article 36, April 2016).

<sup>208</sup> Michael C. Horowitz and Paul Scharre, ‘Meaningful Human Control in Weapon Systems: A Primer’ (Working Paper, Centre for a New American Security, March 2015) 4, 13-14, 16.

<sup>209</sup> See Article 3’, ‘Killer Robots: UK Government Policy on Fully Autonomous Weapons’ (Policy Paper, 19 April 2013) 4.

<sup>210</sup> See Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 28-56.

Considering the consequences that could flow from the actions of the developers, the development stage is the reason why it is necessary to have adequate testing and review under article 36 of *Additional Protocol I*. It is also important to consider the elements of human control when testing and reviewing the weapon system under development.<sup>211</sup> Therefore, effective human control during the development stage would include developers and those part of the development planning, acquisition or modification of the weapon system to ensure that the following elements of human control are included.

1. There is a way for military personnel to supervise and or intervene during the deployment and operation of a LAWS.<sup>212</sup>
2. There are appropriate and adequate operational restrictions suitable for the weapon system in question. This can include programming parameters in the LAWS that allow the weapon system to attack specified targets, be deployed at a limited range to avoid collateral damage or only target.<sup>213</sup>
3. The LAWS' actions are predictable and reliable. The operators are trained to understand how the LAWS functions and how it is supposed to perform.<sup>214</sup>

The non-governmental organisation (NGO), Article 36, noted some questions concerning 'key parameters' for what they called the 'sensor-calculation-force process' that is relevant to consider. The sensor-calculation-force process refers to when a weapon system collects data through its sensors (sensor), determines what action to take based on the sensor data collected and on algorithms programmed into the weapon system (calculation), and then applies force if the particular conditions are met (force).<sup>215</sup> The questions Article 36 noted about the key parameters include:

- What patterns of sensor data are considered a 'target'? In other words, what is the 'target profile'?

---

<sup>211</sup> See International Committee of the Red Cross, 'Expert Meeting on Lethal Autonomous Weapons Systems' (Statement, Group of Governmental Expert Meeting on Lethal Autonomous Weapons Systems, 15 November 2017); Richard Moyes, 'Meaningful human control over individual attacks' (Presentation, International Committee of the Red Cross Expert Meeting, 15 March 2016) 49-50.

<sup>212</sup> See Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>213</sup> *Ibid.*

<sup>214</sup> *Ibid.*

<sup>215</sup> Richard Moyes, 'Autonomy in weapon systems - considering approaches to regulation' (Discussion Paper Article 36, March 2020) 2.

- What objects or phenomena fall within the target profile(s)?
- How is/are the target profile(s) constructed?
- Can the target profile(s) change when the weapon system is in operation?
- What type of force does the weapon system apply?
- How many applications of force can a weapon system take while in operation?<sup>216</sup>

These are all relevant questions for weapon system developers, and those involved in the review process, to consider when ensuring that there is effective human control over weapon systems. Furthermore, the answer to these questions will vary according to the type of weapon system under development. Addressing those questions should aid in ensuring that operational parameters are established for the weapon system in question so that it will remain compliant with IHL when it is deployed.

Overall, effective human control during the development stage should mean that weapon system developers consider and act upon the points mentioned above and that a comprehensive weapon review and testing system is in place. This is an early opportunity to guarantee that the fundamental principles and the relevant rules of IHL will be complied with when the weapon system is deployed and in operation. This is when article 51(4) of *Additional Protocol I* becomes a critical rule to consider; thus, ensuring that the LAWS is not inherently indiscriminate.<sup>217</sup> In general, weapon system developers and others involved in the testing and reviewing should understand the obligations under weapons law. This is critical when the weapon system under development will be able to autonomously identify, select and or target a military objective.<sup>218</sup>

However, without a standardised weapons review and testing process, it could be difficult to determine whether such review or testing for LAWS is comprehensive enough as States already have various methods of conducting weapon reviews and tests for existing weapon

---

<sup>216</sup> Richard Moyes, 'Autonomy in weapon systems - considering approaches to regulation' (Discussion Paper Article 36, March 2020) 1.

<sup>217</sup> See *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978); Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 90-91.

<sup>218</sup> See William H. Boothby, *Weapons and the Law of Armed Conflict* (Oxford University Press, 2009) 41 cited in Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 86-87.

systems. While there is no standardised weapons review in the meantime, article 36 weapons review and testing during the development phase cannot be viewed as the only solution to address the issues presented by LAWS.<sup>219</sup>

### 6.3.2 EFFECTIVE HUMAN CONTROL DURING THE DEPLOYMENT STAGE

The second stage of a weapon system's lifecycle is the deployment stage. Human control during the deployment stage involves military personnel deciding to deploy the weapon system based on information they have at the time.<sup>220</sup> This includes determining whether the weapon system is the appropriate weapon, in terms of the means and methods of warfare, to attack a military target at a particular time. Therefore, effective human control at this stage should involve the following.

- Knowledge of the situation and the target environment.
- Knowledge of how the weapon system functions and what that weapon system is supposed to do.
- An assessment of the relevant IHL fundamental principles and rules.
- A conscious decision by the commander or military personnel in charge to deploy the weapon system after making the necessary assessment.
- A positive action by an operator to activate and deploy the weapon system.

This is the stage where human control must be retained over the weapon system as it is the commander or operator who will make the assessment and go through the principles of international humanitarian law before deciding to launch a weapon. Furthermore, this is where the element of transparency becomes an important player. Military personnel tasked with deploying a LAWS must know how it should function and know when it would be appropriate to use. This would require training before the weapon system in question is employed on the battlefield.<sup>221</sup>

---

<sup>219</sup> See Article 36, 'Article 36 reviews and addressing Lethal Autonomous Weapon Systems' (Briefing Paper, Convention on Certain Conventional Weapons (CCW) Meeting of Experts on Lethal Autonomous Weapon Systems (LAWS), 11 April 2016).

<sup>220</sup> Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 13.

<sup>221</sup> See Eve Massingham and Simon McKenzie, 'Testing knowledge: weapons reviews of autonomous weapons systems and the international criminal trial' in Emma Palmer et al (eds), *Futures of International Criminal Justice* (Routledge, 2022) for a more detailed discussion on having knowledge of how the weapon systems function and how to test them.

### 6.3.3 EFFECTIVE HUMAN CONTROL DURING THE OPERATION STAGE

At the operation stage, an example of how humans can maintain control is by supervising the weapon system through a 'two-way communication link'.<sup>222</sup> It would allow operators to adjust the 'engagement criteria' and terminate an attack.<sup>223</sup> However, this may not work for all LAWS. For example, underwater weapon systems such as encapsulated torpedo mines are noted to be difficult for humans to communicate with and deactivate.<sup>224</sup> Even if a two-way communication link during the operation stage may not work for all weapon systems, there should still be some form of effective human control in the previous stages to allow the commander or operator to make an informed decision given the knowledge they have about the target, the weapon and the reason for taking action.<sup>225</sup>

At this stage, how the human-machine interface is designed is an important factor, and this will be different for various weapon systems. The human-machine interface could involve the ability of the operator to reprogram the weapon system, terminate its operation or override the weapon system's programmed instructions. However, in cases where it is not possible to interact with the weapon system once deployed, it would be important to ensure that the weapon system has been designed in a way that would allow the commander or operator to be confident that the weapon system will comply with IHL when deploying it. These are some methods that can help implement effective human control over LAWS during the operational stage.

## 6.4 THE WORKING DEFINITION

Considering what effective human control could look like at the various stages of a weapon system's lifecycle, this section aims to propose a working definition of effective human control that can be amenable to States and various organisations and therefore is implementable. Nevertheless, this working definition is only just that, a working definition. Therefore, it is not set in stone and can be amended. Some may argue that there is no need

---

<sup>222</sup> Neil Davison, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016) 14 cited in Tarisa Yasin, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems', *ANZSIL Perspective* (Online Article 18 July 2021) <<https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>>.

<sup>223</sup> *Ibid.*

<sup>224</sup> International Committee of the Red Cross, 'Views of the International Committee of the Red Cross on Autonomous Weapon System' (Working Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems, 11 April 2016) 2.

<sup>225</sup> See Michael C. Horowitz and Paul Scharre, 'Meaningful Human Control in Weapon Systems: A Primer' (Working Paper, Centre for a New American Security, March 2015) 14-15.



for a definition since the need for human control is implied by IHL.<sup>226</sup> However, based on the circular discussions that have occurred at the CCCW informal meetings and the GGE on LAWS meetings, there needs to be clarity on what effective human control means for the discussion to move forward. Therefore, a working definition of effective human control is a step in providing that much-needed clarity.

Denise Garcia from the International Committee for Robot Arms Control (ICRAC) has presented what ICRAC considers the minimum necessary conditions of meaningful control. She states:

First, a human commander (or operator) must have full contextual and situational awareness of the target area and be able to perceive and react to any change or unanticipated situations that may have arisen since planning the attack.

Second, there must be active cognitive participation in the attack and sufficient time for deliberation on the nature of the target, its significance in terms of the necessity and appropriateness of attack, and likely incidental and possible accidental effects of the attack.

Third, there must be a means for the rapid suspension or abortion of the attack.<sup>227</sup>

The minimum necessary conditions consider human-machine interactions during the deployment and operational stages of a weapon system's lifecycle. It considers the commander and operator and the judgement they should make before deploying the weapon system. Furthermore, the conditions acknowledge the continuing need for human control while the weapon system is in operation by mentioning the need to have a way for the commander or operator to suspend or abort the attack quickly. However, these conditions do not consider the form of human control exercised during the research and development stage when weapon system developers built the physical form of the weapon system as well as the software program.

---

<sup>226</sup> See Federal Republic of Germany Foreign Office, 'CCW Expert Meeting on Lethal Autonomous Weapon Systems: General Statement by Germany' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014).

<sup>227</sup> Denise Garcia, 'Technical statement by the International Committee for Robot Arms Control' (Statement, CCCW Informal Meeting of Experts 14 May 2014) <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>. See also Frank Sauer, 'ICRAC statement on technical issues to the 2014 UN CCW Expert Meeting (Media Release)' <<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>.

Thompson Chengeta has also proposed a working definition of meaningful human control. Chengeta concluded that:

[Meaningful human control] of weapon systems by a combatant or fighter [operator] is control of a nature that ensures the potential responsibility of the operator for all the resulting actions of weapon systems that he or she activates. Such control entails that:

(a) The decision to kill and the legal judgment pertaining to individual attacks must be made by a human in real time, i.e. the actual time during which a target is to be killed.

(b) The weapon system depends on the authorization of the operator to execute his or her decision to kill without which, it cannot proceed.

(c) The weapon system has an abort mechanism that allows the operator to abort an attack in the event that it is no longer lawful to kill a target due to changed circumstances or other reasons prescribed in international law.

(d) Operators have an inherent obligation to monitor weapon systems they activate while the weapon systems execute operators' decisions to kill.<sup>228</sup>

Chengeta's definition incorporates the basic concepts that also exist in the working definition of effective human control proposed below. This includes the need for a positive action from a human operator to activate or release the payload of the weapon system, an opportunity for an operator to intervene and terminate an attack as well as emphasising that operators have an inherent obligation to exercise control while the system is in operation by monitoring the weapon system. However, Chengeta's definition of meaningful human control seems only to focus on the interactions between operators (or commanders) and the machine. Therefore, the definition only addresses the deployment and operation stage of a weapon system's lifecycle and not the research and development stage even though Chengeta acknowledges that '[t]he obligations of designers, roboticists, programmers, manufacturers and states as far as [LAWS] are concerned should subsequently be couched in the above definition'.<sup>229</sup> This is similar to the minimum necessary conditions proposed by Garcia on behalf of the ICRAC which also did not consider the exercise of human control in the research and development phase.

---

<sup>228</sup> Thompson Chengeta, 'Defining the Emerging Notion of Meaningful Human Control in Weapon Systems' (2017) 49(3) *New York University Journal of International Law and Politics* 833, 888-889.

<sup>229</sup> *Ibid* 889.

Another example of when meaningful human control has been defined is demonstrated in a working paper submitted by Argentina and other delegates to the 2022 GGE on LAWS mentioned earlier in section 4.8.2 in Chapter Four.<sup>230</sup> The delegates also recognised that human control is ‘context-based, dynamic, multidimensional, and situation-dependent’.<sup>231</sup> This understanding was implemented in the draft protocol that was proposed where article 2 section 2 of the draft protocol states that:

“Meaningful human control” refers to the threshold of application of human judgment and intervention necessary to ensure the maintenance of human agency, responsibility, proportionality and accountability in undertaking decisions regarding the use of any weapon and the ability of human operators to effectively supervise any weapon, undertake the necessary interaction that could either be directive or preventive, and to deactivate, terminate, or abort the operation of the weapon altogether.<sup>232</sup>

This definition can be interpreted to include all forms of human control over LAWS throughout its lifecycle; however, it would be more beneficial if this was made clearer in the definition. Nevertheless, all the definitions mentioned earlier provide a good foundation for building a working definition of effective human control.

Extrapolating and expanding upon these existing definitions provides an opportunity to ensure that the working definition of effective human control reflects the reality of warfare and the existing LAWS. It would consider all forms of human control and judgement including human control exercised by the weapon system developers. Thus, providing a practical interpretation of effective human control while ensuring that current and future LAWS will comply with the rules and principles of IHL. The working definition proposed below incorporates the general requirements of human control as well as takes into consideration the scale of autonomy.

This thesis proposes the following working definition of effective human control.

Effective human control over LAWS is achieved when:

---

<sup>230</sup> Argentina et al, 'Roadmap Towards a New Protocol on Autonomous Weapons Syst'ems' (Working Paper No CCW/GGE.1/2022/WP.3, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022) 3, [16].

<sup>231</sup> Ibid 3, [15].

<sup>232</sup> Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022) 1 (see Article 2 Section 2).

- 1) The elements of human control are built into the weapon system during the development stage and tested during the weapons review process. These elements of human control include, but are not limited to:
  - a) The capacity for human supervision and intervention,
  - b) Operational restrictions,
  - c) Predictability,
  - d) Reliability, and
  - e) Transparency.
  
- 2) Military personnel that plan and or initiate attacks should decide whether or not to deploy a LAWS based on the knowledge they have of the situation, the target environment and the LAWS they intend to deploy. Therefore, the following should be present.
  - a) Knowledge of the situation and the target environment.
  - b) Knowledge of how to operate the proposed LAWS to be deployed and the purpose of its use.
  - c) An assessment of the relevant IHL fundamental principles and rules as well as the relevant rules of engagement.
  - d) A conscious decision to deploy the weapon system, or not, after making the necessary assessment.
  - e) If a decision to deploy a LAWS is made, there should be a positive action by an operator to activate and deploy the LAWS.
  
- 3) While the LAWS is operational there should be the following elements.
  - a) A form of monitoring (based on the type of weapon system) of the weapon system and or its payload to ensure the correct target is hit.
  - b) An ability for operators to intervene or terminate an attack when it would no longer be compliant with IHL.

- c) A clear chain of responsibility and that military personnel who plan and or initiate attacks are legally responsible for their actions. Consequently, the State shall be responsible for the actions of its agents.

Overall, the working definition is structured in a way that considers the scale of automation, the different types of LAWS and the various degrees of autonomy they can possess. Therefore, the definition has flexibility and can be applied to any LAWS. The working definition also incorporates the three key stages of a weapon system's lifecycle and the general requirements listed in Table 6.2. The following sections address three broad issues that are at the core of the LAWS debate and how those issues are dealt with in the proposed working definition of effective human control.

#### 6.4.1 CONSIDERING THE VARIOUS FORMS OF HUMAN CONTROL AND HUMAN-MACHINE INTERACTIONS

The reason why the proposed working definition is drafted in three-point form is that it aims to encompass the various forms of human control that can be exercised throughout a weapon system's lifecycle. Each point represents one of the three stages of a weapon system's lifecycle. The elements in point one of the working definition consider what effective human control could look like during the research and development stage. The elements in point two consider what effective human control could look like during the deployment stage. Lastly, the elements in point three consider what effective human control could look like during the operation stage. This working definition also aims to include ways to regulate both the means and methods of warfare when it comes to developing and deploying LAWS.

To demonstrate that the working definition encompasses the various forms of human control throughout a weapon system's lifecycle, it can be assessed against the uniform policies of meaningful human control.<sup>233</sup> The uniform policies, discussed by Amoroso and Tamburrini, considered altogether, provide a guide to understanding the different approaches to human control and provide a useful checklist to guarantee that the working definition has considered the various approaches to human control throughout the lifecycle of various LAWS.

Starting with the box autonomy policy, examples of how it has been incorporated into the proposed working definition are demonstrated in points 1(b), 2(a) and (b) as well as point 3.

---

<sup>233</sup> Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187, 189-190.

The box autonomy policy provides that humans are assigned the role of limiting the weapon system's autonomy 'within an operational box' with 'predefined parameters, a fixed time period and geographical borders'.<sup>234</sup> Therefore, any action taken by the LAWS under the operational box policy reflects the initial human judgment that was exercised either during the development stage or just before the deployment of the LAWS.<sup>235</sup> This policy is best considered with LAWS that have a high level of autonomy. That high level of autonomy would involve software designed for the LAWS to select targets and initiate attacks based on mission goals that were defined and programmed into the system during the development or deployment stage without further human intervention.<sup>236</sup>

The second uniform policy on meaningful human control to consider is the supervised autonomy policy. This policy stems from the concept that LAWS that are supervised by human operators are designed to enable the operators to intervene and terminate engagements.<sup>237</sup> Examples of how the supervised autonomy policy is incorporated into the working definition are demonstrated in points 1(a) and 3(b). This policy is best considered with LAWS that are designed and programmed to assist in defensive, 'time-critical or saturation attacks' from, for example, missiles, in which human reaction times would not be sufficient.<sup>238</sup> An example of a LAWS that would fit within the supervised autonomy policy would be the Phalanx Close-in Weapon System (CIWS) mentioned in Chapter Three. To summarise, the Phalanx CIWS is a weapon system whose main purpose is to defend naval ships against incoming missiles. The advantage of the Phalanx is that it can autonomously respond to a missile attack at speeds beyond human ability once activated while humans can still supervise the weapon system.

---

<sup>234</sup> See International Panel on the Regulation of Autonomous Weapons, 'Focus on Human Control' ("Focus on" Report No 5, International Panel on the Regulation of Autonomous Weapons (iPRAW), August 2019) 13; Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187, 190.

<sup>235</sup> International Panel on the Regulation of Autonomous Weapons, 'Focus on Human Control' ("Focus on" Report No 5, International Panel on the Regulation of Autonomous Weapons (iPRAW), August 2019) 13.

<sup>236</sup> See Noel Sharkey, 'Staying in the loop: human supervisory control of weapons' in Nehal Bhuta, et al (eds), *Autonomous Weapon Systems: Law, Ethics, Policy* (Cambridge University Press, 2016) 23; Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187, 191.

<sup>237</sup> See United States Department of Defense, 'Autonomy in Weapon Systems' (Directive No 3000.09, 21 November 2012) 13; Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187, 190.

<sup>238</sup> See United States Department of Defense, 'Autonomy in Weapon Systems' (Directive No 3000.09, 21 November 2012); Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187, 190.

The third uniform policy is denied autonomy which does not allow for any autonomy in the critical targeting functions of LAWS; thus, providing the most restrictive interpretation of human control compared to the two other uniform policies.<sup>239</sup> Taking that into consideration, this uniform policy may not be very useful when deliberating on autonomy in LAWS. It instils a very high threshold for machine autonomy which does not reflect the realities of modern-day warfare and the weapons, possessing autonomous functions, that have been considered acceptable to deploy.<sup>240</sup> Therefore, this thesis will not consider this uniform policy of meaningful human control any further.

The concepts of distributed autonomy and socio-technical systems are also considered in the working definition. Since the working definition does not deny autonomy in the critical targeting functions of LAWS, it implies the fact that most LAWS are multi-agent and socio-technical systems with a combination of software, hardware and human agents. For example, part 1 of the working definition provides for elements of human control to be built or programmed into the weapon system and actualised through software or hardware agents. Parts 2 and 3 of the working definition outline what kind of roles and tasks a human agent should have to ensure that effective human control is exercised.

#### 6.4.2 ENSURING RESPECT FOR IHL

The working definition of effective human control proposed includes elements drafted in a way that promotes respect for IHL by ensuring that the fundamental principles of IHL are incorporated. Point 1(b) provides that developers of LAWS should ensure that operational restrictions are included in the design of the weapon system in question. Operational restrictions should enable the LAWS in question to comply with the principles of distinction and proportionality as well as the prohibition on indiscriminate attacks. An example is when the weapon system can only engage a particular target, such as radars, that the weapon system has been programmed to identify. This restriction can assist the commanders and operators in complying with the principle of distinction. Another example is when a weapon system's movements are restricted to only be operational within a certain area and or for a

---

<sup>239</sup> See Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187, 190; Thompson Chengeta, 'Defining the Emerging Notion of Meaningful Human Control in Weapon Systems' (2017) 49(3) *New York University Journal of International Law and Politics* 833.

<sup>240</sup> See Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187, 191; Michael C. Horowitz and Paul Scharre, 'Meaningful Human Control in Weapon Systems: A Primer' (Working Paper, Centre for a New American Security, March 2015).

certain period. Restrictions such as these can help ensure that the weapon system does not operate in a civilian-populated area.

All the elements in point 2 of the working definition aim to ensure that respect for IHL is maintained. Furthermore, it is drafted in a way that ensures the responsibility of adhering to IHL remains with humans, in particular, 'those who plan or decide upon an attack',<sup>241</sup> thus, complying with article 57(2)(a) of *Additional Protocol I*. Point 2 also makes it clear that for there to be effective human control, humans must still exercise discretion before launching an attack and deploying a weapon system. Therefore, concerns about whether LAWS can comply with IHL and whether there is effective human control during the deployment stage of a weapon system's lifecycle are addressed by point 2 of the working definition of effective human control.

Elements in point 3 of the working definition continue to place respect for IHL at the forefront during the operation stage of a weapon system's lifecycle. Commanders and or operators should have the ability to monitor the progress of the weapon system deployed to ensure that the rules and principles of IHL are observed. Furthermore, should a LAWS experience an operational malfunction, whether it is misidentifying a target or straying off course, there should be opportunities for operators to intervene and have the ability to correct the misidentification of a target or redirect the LAWS to return to the correct course if the weapon system cannot correct itself. This is to ensure that an operational malfunction does not lead to a violation of IHL. If there is a change in the target environment that makes the deployment of a LAWS no longer appropriate, the option for a commander and or operator to terminate the operation of the weapon system should be available.

Overall, the aim of points two and three of the working definition is to ensure that human discretion is still exercised in accordance with IHL during the deployment and operation stage of a weapon system's lifecycle. In other words, points two and three ensure that commanders and operators are still the ones to assess the situation, apply the fundamental principles and make the ultimate decision as to whether it is appropriate to deploy a LAWS. Points two and three also assist in providing clarity on who is accountable for a violation of IHL that results from the use of a weapon system.

---

<sup>241</sup> See *Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978) art 57(2)(a).



### 6.4.3 CLARIFYING WHO IS ACCOUNTABLE

Guiding principle two in the Guiding Principles agreed upon in the 2019 GGE on LAWS provides that;

[H]uman responsibility for decisions on the use of weapon systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapon system.<sup>242</sup>

Therefore, the participants of the GGE on LAWS have agreed that commanders and or operators are to remain accountable for their decision to employ a weapon system as a means of attacking a target. Consequently, States should also remain responsible for the actions of their agents.<sup>243</sup> Addressing this in the definition of effective human control can assist in providing a bit more clarity concerning the accountability issue with LAWS. That is why point 3(c) is part of the proposed working definition of effective human control. It provides an express certainty that accountability is to remain with those who plan and decide on attacks such as military personnel and the States they act for.

However, it is by no means the ultimate solution to solving the accountability issue as there are other considerations such as corporate accountability under IHL and ICL when you bring weapon system developers into the picture. This thesis agrees with the notion that current IHL and ICL regimes may need to be amended to properly address corporate accountability.<sup>244</sup> Nevertheless, this is a step towards establishing clear norms regarding accountability when developing and using LAWS.

## 6.5 BENEFITS AND LIMITATIONS OF THE WORKING DEFINITION

Considering the notion that the regulation of LAWS has not been sufficiently addressed in State practice, it can be concluded that the logical step in the progressive development of international law is to codify a set of rules to provide a clear guideline as to where the limit

---

<sup>242</sup> *Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 9, UN Doc CCW/GGE.1/2019/3) 13.

<sup>243</sup> *The International Law Commission's Articles on State Responsibility: Introduction, Text and Comments* (Cambridge University Press, 2002) 84, [10].

<sup>244</sup> See Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes?' (2014) 90 *International Law Studies* 361.

is in the automation of lethal weapon systems.<sup>245</sup> This set of rules should include a definition of effective human control. Thus, the codification of regulations on LAWS, including the definition of effective human control, would encourage a more uniform and transparent approach to ensuring that the development and use of LAWS remain compliant with IHL. However, there may be those who would not agree with the codification and implementation of a working definition of effective human control. Thus, this section will discuss some of the concerns about adopting and implementing a working definition of effective human control over LAWS.

#### 6.5.1 TO CODIFY OR NOT TO CODIFY?

One of the recurring questions in recent discussions is whether to establish and codify a new international legal framework that specifically addresses the development and use of LAWS. There are States such as Australia that do not see the need to codify and create a new international legal framework to regulate LAWS. This is because complying with existing IHL is sufficient to mitigate concerns with the development and use of LAWS.<sup>246</sup> Nevertheless, some States take the opposing view and consider it necessary to create and codify an international legal framework specific to LAWS.<sup>247</sup> This is still a divisive topic in the discussions on LAWS.

One line of thought concerning the concept of effective human control is that it may be considered an interpretive concept that would be difficult to articulate and codify.<sup>248</sup> Thus, the concept should be left unwritten and State practice should be relied upon to interpret the

---

<sup>245</sup> See Arthur Watts, Michael Wood and Omri Sender 'Codification and Progressive Development of International Law', *Max Planck Encyclopedias of International Law* (Web Page article, April 2021) <<https://opil-ouplaw-com.ezproxy.bond.edu.au/view/10.1093/law:epil/9780199231690/law-9780199231690-e1380>; 'Home', *Codification and Progressive Development of International Law* (Web Page) <<https://legal.un.org/cod/>>.

<sup>246</sup> See, eg, Australia, 'Convention on Certain Conventional Weapons (CCW) Lethal Autonomous Weapons Systems' (National Commentary, Group of Governmental Experts on Lethal Autonomous Weapon Systems, 2020) 2.

<sup>247</sup> See, eg, Permanent Mission of Austria to the United Nations in Geneva, 'Contribution of Austria to the Chair's request on the Guiding Principles on emerging technologies in the area of LAWS' (Speech, CCCW Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, September 2020); Austria et al, 'Joint "Commentary" on Guiding Principles A, B, C and D' (Joint Statement, CCCW Group of Governmental Experts on Lethal Autonomous Weapon Systems, September 2020); Campaign to Stop Killer Robots, 'Commentary for the Convention on Conventional Weapons Group of Governmental Experts on lethal autonomous weapons systems' CCCW Group of Governmental Experts on Lethal Autonomous Weapon Systems, 5 June 2021) 3-4.

<sup>248</sup> See Neil McCormick, 'Norms, Institutions, and Institutional Facts' (1998) 17(3) *Law and Philosophy* 301, 306, citing Ronald Dworkin, *Law's Empire* (The Belknap Press of Harvard University Press, 1986).

implicit meaning of effective human control.<sup>249</sup> However, this approach may not help promote the transparency of the term as well as the IHL rules and norms applicable to LAWS. This is an important consideration since the participants of the Informal Meeting of Experts on LAWS and the GGE on LAWS have recognised transparency as a potential solution to some of the challenges posed by LAWS.<sup>250</sup> Therefore, if transparency is to be one of the solutions to addressing some of the challenges of LAWS, then codification of a definition of effective human control can assist in promoting transparency of the norms and principles governing the development and use of LAWS.

Article 13(1)(a) of the *Charter of the United Nations* provides the General Assembly with the authority to 'initiate studies and make recommendations to encourage 'the progressive development of international law and its codification'.<sup>251</sup> Thus, it is encouraged for many norms of international law to be codified. This provides a good foundation for the argument to establish norms and rules for the development and use of LAWS, including the definition of effective human control, and codifying them like other weapons that are subject to the protocols of the CCCW. Furthermore, it would solve some of the issues regarding trust and transparency that would arise should regulations on the development and use of LAWS not be codified.

#### 6.5.2 A BROAD WORKING DEFINITION AND ITS CONSEQUENCES

If the working definition of effective human control is codified, it may still be too broad to be efficiently implemented. A consequence of this is that the working definition may be susceptible to varying interpretations by States and other institutions. Thus, contributing to the fragmentation of IHL and the possibility of a conflict arising between existing IHL principles and a new legal framework specifically for LAWS. This could be considered as fragmentation of IHL stemming from the emergence of a special law (*lex specialis*) as the exception to the general law.<sup>252</sup> The special law would be a legally binding instrument specifically regulating LAWS and the general law would be existing IHL principles.

---

<sup>249</sup> See Neil McCormick, 'Norms, Institutions, and Institutional Facts' (1998) 17(3) *Law and Philosophy* 301, 306.

<sup>250</sup> See *Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015) 5, 9, 21-22 and note paragraphs [22]-[23], [31] and [73]-76].

<sup>251</sup> *Charter of the United Nations* art 13(1)(a). See also, 'Home', *Codification and Progressive Development of International Law* (Web Page) <<https://legal.un.org/cod/>>.

<sup>252</sup> See International Law Commission, *Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law*, 58 sess, UN Doc A/CN.4/L.682) 33-34.

Nevertheless, if a definition of effective human control is left as an unwritten norm of IHL, the meaning of effective human control can still be susceptible to varying interpretations by States and other institutions.<sup>253</sup> Thus, susceptibility to multiple and conflicting interpretations remains an issue even if a definition is not codified. For example, Australia has argued that its process of ensuring a 'system of control' over LAWS indicates that a 'substantial degree of control already exists'.<sup>254</sup> Therefore, it can be concluded that Australia has already adopted their concept of effective human control. If other States and institutions adopt their own definition of effective human control, this can still lead to fragmentation in IHL and does not help in addressing the concerns of the international community about the use and development of LAWS. Codifying the working definition can provide more clarity as to the meaning of effective human control than it could if the concept was left as an unwritten norm.

The working definition needs to be broad enough to encompass a range of LAWS and to reflect the reality of how human control is exercised at various stages of a weapon system's lifecycle as operational context is important to consider.<sup>255</sup> Sweden, for example, has expressed sentiments that there is a need for a practical outlook on human control.<sup>256</sup> Moreover, the International Panel on the Regulation of Autonomous Weapons (iPRAW) stated that human control can be conceptualised as 'the requirement for situational understanding by the human [operator] and the option to intervene built-in by design and available any time during use'.<sup>257</sup> Thus, covering all forms of human control, for various LAWS and throughout the lifecycle of weapon systems. Overall, the broadness of the working definition is a manifestation of the importance of flexibility in regulating LAWS.

---

<sup>253</sup> See International Law Commission, *Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law*, 58 sess, UN Doc A/CN.4/L.682) 31-32. See specifically the discussion on fragmentation of international law through conflicting interpretations of general law in the International Law Commission's report.

<sup>254</sup> Australia, 'Convention on Certain Conventional Weapons (CCW) Lethal Autonomous Weapons Systems' (National Commentary, Group of Governmental Experts on Lethal Autonomous Weapon Systems, 2020) 1-2. For an explanation of Australia's system of control see Australia, 'Australia's System of Control and Applications for Autonomous Weapon Systems' (Working Paper No 5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, 26 March 2019).

<sup>255</sup> See Richard Moyes, 'Autonomy in weapon systems - considering approaches to regulation' (Discussion Paper, Article 36, March 2020) 2; Anja Dahlmann, 'Statement on Agenda 5c (Human Element)' (Speech, International Panel on the Regulation of Autonomous Weapons, 23 September 2020)

<sup>256</sup> Sweden, 'Statement by Sweden' (Statement, CCCW Group of Governmental Experts on Lethal Autonomous Weapons 21-25 September 2020). See also, Permanent Mission of Austria to the United Nations in Geneva, 'Contribution of Austria to the Chair's request on the Guiding Principles on emerging technologies in the area of L'WS' (Speech, CCCW Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, September 2020).

<sup>257</sup> Anja Dahlmann, 'Statement on Agenda 5c (Human Element)' (Speech, International Panel on the Regulation of Autonomous Weapons, 23 September 2020).

### 6.5.3 APPROACHING THE CONCEPT OF HUMAN CONTROL AND ACCOUNTABILITY

There may also still be disagreements among States about whether focusing on the concept of human control to ensure that the development and use of LAWS would comply with IHL would help at all. The United States has expressed the view that human control as a shared framework for understanding the human-machine interface does not help improve the 'collective understanding of risks and benefits related to LAWS and how technology can be used to reduce suffering in war'.<sup>258</sup> The United States considers 'the notion of [LAWS] being under human control to be an overly simplistic construct that fails to capture the various human touchpoints through the [LAWS]' lifecycle.'<sup>259</sup> Nevertheless, discussions of meaningful, or effective, human control in the GGE on LAWS and Informal Meetings of Experts on LAWS have considered the various 'human touchpoints'.<sup>260</sup> Thus, the United States's concern about human control over LAWS being an overly simplistic construct may not be much of a concern now.

It is widely regarded that the concept of human control is viewed as essential to the legality of future LAWS.<sup>261</sup> Even from the early days of international discussion on the challenges of LAWS, delegations have recognised that maintaining human control over the critical functions of weapon systems is important.<sup>262</sup> Therefore, the concept of human control

---

<sup>258</sup> Karl Chan, 'Intervention by the United States' (Statement CCW Group of Governmental Experts on LAWS, 21-25 September 2020).

<sup>259</sup> Karl Chan, 'Intervention by the United States' (Statement CCW Group of Governmental Experts on LAWS, 21-25 September 2020).

<sup>260</sup> See, eg, *Report of the 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 7, UN Doc CCW/GGE.1/2018/3 (23 October 2018) 13-16; Jason Millar, 'Meaningful Human Control' (Expert Testimony, CCCW Informal Meeting of Experts on LAWS, 15 April 2015); Daniele Amoroso and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187; Anja Dahlman, 'Statement on Agenda 5c (Human Element)' (Speech, International Panel on the Regulation of Autonomous Weapons, 23 September 2020).

<sup>261</sup> See Kathleen Lawand, 'Statement of the International Committee of the Red Cross' (Speech, CCCW Informal Meeting of Experts on Laws, 13 April 2015); Campaign to Stop Killer Robots, 'Commentary for the Convention on Conventional Weapons Group of Governmental Experts on lethal autonomous weapons systems' (CCCW Group of Governmental Experts on Lethal Autonomous Weapon Systems, 5 June 2021); *Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 9, UN Doc CCW/GGE.1/2019/3; *Report of the 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems*, Agenda Item 7, UN Doc CCW/GGE.1/2018/3 (23 October 2018); *Report of the 2017 Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS)*, Agenda Item 7, UN Doc CCW/GGE.1/2017/3 (22 December 2017).

<sup>262</sup> See Kathleen Lawand, 'Statement of the International Committee of the Red Cross' (Speech, CCCW Informal Meeting of Experts on Laws, 13 April 2015); International Committee of the Red Cross, 'Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects' (Expert Meeting Report, 26-28 March 2014).

cannot be easily dismissed when addressing the challenges of LAWS and providing solutions to ensure that the development and use of LAWS are compliant with IHL.

The concept of human control is also important in resolving accountability issues arising from the use of LAWS which possess a high degree of autonomy in their critical functions. This is a major concern with highly autonomous lethal weapon systems that can identify, select and or engage targets using algorithms programmed into its computer system with little to no need for human operators to interfere. It is important to ensure that the State deploying the weapon system remains accountable for any violation of IHL that may result from the use of the weapon system.<sup>263</sup>

The point of the proposed working definition is to assist in building a concept of human control over LAWS that is an accurate reflection of how human control is exercised over weapon systems with autonomous functions. It is clear from discussions with experts that a one-size-fits-all, rigid description of human control is unfeasible.<sup>264</sup> Therefore, all forms of human control exercised throughout the lifecycle of various LAWS must be considered. This would be the most appropriate approach to the concept of human control so the working definition of effective human control reflects the realities of modern warfare.

#### 6.5.3 SITUATIONS WHERE NOT ALL ELEMENTS OF EFFECTIVE HUMAN CONTROL CAN BE SATISFIED

As mentioned earlier in section 6.3.3 regarding effective human control during the operation stage, there may be weapon systems, such as the encapsulated torpedo mine, where a two-way communication link between the operator and the weapon system will not be possible. In such situations, it seems that it would be impossible to have effective human control over the weapon system during the operation stage. However, this is where flexibility in regulating LAWS can come into play.

To ensure effective human control is exercised over weapon systems where operators can no longer interact with the weapon system once it is deployed, weapon system developers can design the weapon system with strict environmental and operational parameters. To

---

<sup>263</sup> See Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020) 130-137; Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crim's?' (2014) 90 *International Law Studies* 361.

<sup>264</sup> Anja Dahlmann, 'Statement on Agenda 5c (Human Element)' (Speech, International Panel on the Regulation of Autonomous Weapons, 23 September 2020).

ensure that the weapon system is predictable and reliable, rigorous testing can be done to ensure that the outcome of deploying the weapon system is reliable. Furthermore, the commanders and operators would still be able to exercise human judgement and take precautions when planning how best to deploy the weapon system, for example when and where to lay the encapsulated torpedo mines, to ensure that the weapon systems used will comply with IHL.

## 6.6 CONCLUSION

Flexibility in regulating LAWS is essential. Three key factors contribute to this need for flexibility. First, there are various types of LAWS. Second, the different types of LAWS can have varying levels of autonomy. Third, there are varying forms of human control that can be exercised over LAWS throughout their lifecycle. Thus, there is a need to think of autonomy on a scale to reflect the different types of LAWS that have varying levels of autonomy.<sup>265</sup> Moreover, there is a need to consider various general requirements of human control to reflect all three factors mentioned earlier.

The general requirements provide a breakdown of what it means to have effective human control exercised at each stage of a weapon system's lifecycle. This, in turn, then provides an overall understanding of what effective human control means and how it can be exercised throughout the lifecycle. The key takeaways from the table of general requirements for human control are listed below:

1. Ensure weapon system developers consider and incorporate the elements of human control into the design of the weapon system during the development stage.
2. Military personnel who plan and decide upon attacks should still exercise human discretion in accordance with IHL before deploying a weapon system.
3. The exercise of human discretion should be maintained as the weapon system is in operation, and there are opportunities for military personnel to intervene or terminate the operation.

---

<sup>265</sup> See eg, Neil Davison, 'Characteristics of Autonomous Weapon Systems' (Speech, CCCW Informal Meeting of Experts on LAWS, 14 April 2015); Tim McFarland and Tim McCormack, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes' (2014) 90 *International Law Studies* 361.

The working definition of effective human control proposed consists of three points which incorporate the general requirements for human control, take into consideration the flexible scales and address how human control can be exercised at each stage of a weapon system's lifecycle. It also takes into consideration three broad issues that have been underlying the discussion on the challenges of LAWS. The three broad issues are: 1) accommodating the various forms of human control that can be exercised over LAWS; 2) ensuring respect for IHL; and 3) clarity on who is accountable for violations of IHL that result from the use of LAWS.

The benefits and the limitations of the proposed working definition of effective human control were discussed to address some of the overarching concerns regarding LAWS and the concept of human control. First, the concern regarding the codification of the working definition was addressed and the benefits and limitations of codifying the working definition were discussed. This included discussing whether codification will promote transparency in the norms and principles that should govern the development and use of LAWS. It has been argued that there is no need to codify norms and principles that govern the development and use of LAWS. However, the General Assembly has been given authority to initiate studies, make recommendations and encourage the progressive development of international law and its codification. Thus, codification is seen to be a positive step in the development of IHL.

Second, the broadness of the working definition and whether that would be a limitation on the effective implementation of the working definition was discussed. Moreover, the working definition may be susceptible to multiple interpretations if it was codified because of how broad it is; thus, contributing to the fragmentation of IHL. However, effective human control can still be susceptible to multiple interpretations and contribute to the fragmentation of IHL if it is left as an unwritten norm of IHL. Therefore, codifying the working definition could provide more clarity as to what it means to exercise effective human control.

Third, the concern regarding the concept of human control was discussed. There have been disagreements concerning what approach to human control should be adopted. States, such as the United States have argued that there is no need to focus on human control. However, it has been more widely accepted by experts and participants of the GGE on LAWS that the concept of human control is necessary to ensure the legality of LAWS. A one-size-fits-all approach to the concept of human control is not feasible since it would not reflect the reality



of human and machine interactions. Thus, an approach that accommodates all forms of human control that can be exercised over LAWS is necessary.

There is certainly room to further refine this working definition. However, it is already comprehensive in the sense that it has addressed the relevant considerations to reflect the realities of LAWS and how it is used in warfare. These considerations include the different types of LAWS, the varying levels of autonomy different LAWS can possess, the various forms of human control that can be exercised over LAWS and the different stages of a weapon system's lifecycle. Overall, the working definition of effective human control provides a good comprehensive start to building a uniform understanding of what it means to exercise effective human control over LAWS. It is also a step towards the progressive development of IHL regarding LAWS and the codification of the norms, rules and principles that govern the development and use of LAWS.

---

## CHAPTER 7: THE NEXT STEPS FOR EFFECTIVE HUMAN CONTROL

---

This chapter draws upon the analyses in chapters two to six and summarises the answers to the research questions posed in this thesis. This chapter will then review the proposed definition of effective human control, emphasise key factors that have been considered in the working definition of effective human control and discuss why they are important. Furthermore, the limitations of the research conducted for this thesis will be noted. The chapter will conclude by outlining recommendations as to the next steps the international community can take to move the debate on regulating LAWS forward so that we can reach a consensus as to how to regulate LAWS and implement the working definition of effective human control.

## **7.1 THE ANSWERS TO THE RESEARCH QUESTIONS**

The research questions and the answers provided contextual information to address this thesis's main issue, which is how to practically define effective human control over LAWS. Below is a summary of the answers to the research questions.

### **7.1.1 WHAT CURRENT INTERNATIONAL HUMANITARIAN LAW RULES AND PRINCIPLES ARE APPLICABLE TO LAWS?**

The principles and rules of IHL are puzzle pieces from various public international law sources that apply to LAWS when pieced together. This includes the fundamental principles of IHL (principle of humanity, principle of military necessity, principle of distinction, principle of proportionality and the prohibition on indiscriminate attacks) that are codified in the Geneva Conventions and its Additional Protocols as well as the Hague Conventions. These fundamental principles are a part of customary international law; therefore, they are important to consider and incorporate into the working definition of effective human control. Other relevant IHL rules to consider when building the working definition include article 36 of *Additional Protocol I* regarding reviews of weapons that a State has developed, acquired or significantly modified.

The Convention on Certain Conventional Weapons also plays a role in governing the development and use of LAWS. This is because the Informal Meeting of Experts and the GGE on LAWS have been meeting under the banner of the Convention on Certain Conventional Weapons. This treaty can also be the starting point for drafting a protocol that specifically regulates LAWS and can be added to the already existing collection of protocols that make up the Convention on Certain Conventional Weapons.

### 7.1.2 WHY ARE MILITARIES INTERESTED IN DEVELOPING AND USING LAWS?

Several reasons have been noted in the literature on LAWS as to why militaries are interested in developing and using LAWS. The first reason concerns economic factors since militaries can reduce operational costs and personnel burden, making it cheaper for militaries to conduct operations. The second reason concerns operational factors such as increasing the speed of the decision-making process and reducing the dependency on communication and human errors. The third reason concerns the ability to protect combatants with LAWS during military operations and undertake tasks that would be risky for combatants.

The fourth reason concerns humanitarian factors since LAWS may help the military comply with IHL more effectively. For example, GPS technology has enabled the use of precision-guided munitions; therefore, militaries can target military objectives more accurately. Furthermore, a State's desire to keep up with other State militaries can be an incentive to invest in LAWS so that the State can improve their defence capabilities and not be at a disadvantage compared to other States that possess and deploy LAWS.

Despite the disadvantages of increased automation in weapon systems such as the inability of current computer software to conduct sophisticated qualitative assessments needed to comply with principles of distinction and proportionality, the advantages of developing and using LAWS are compelling for militaries and outweigh the disadvantages of increased automation. Therefore, it cannot be denied that it is important to address the growing concern about the proliferation of LAWS, discuss how to regulate current weapon systems and ensure that the development and use of LAWS continue to conform with IHL.

### 7.1.3 WHAT ARE THE CURRENT PRACTICES OF STATES CONCERNING THE DEVELOPMENT AND USE OF LAWS?

Current practices regarding the development and use of LAWS vary from State to State depending on their international obligations and their interpretation of those obligations. Due to the customary status of the fundamental principles of IHL, States are bound by these principles and are obligated to abide by them. States have implemented the fundamental principles by incorporating them into the military manuals or codes of conduct for their military personnel to abide by. However, it is the interpretation of how to implement those principles that have led to variations in State practices.

Regarding weapon reviews under article 36, States that have signed and ratified *Additional Protocol I* to the Geneva Conventions are obligated to conduct reviews of weapons. However, only a few States have publicly shared their process and or policies regarding weapon reviews. Based on the States that have made their process and policies public, it can be concluded that States have implemented certain aspects of their obligation to review weapons similarly, like the fact that the reviews begin early in the development or acquisition process, and other aspects of their obligation differently, like the entity who conducts the reviews. Therefore, States' interpretation of how to implement their obligation under article 36 also varies to a certain extent.

#### 7.1.4 WHAT ARE COMMON LAWS USED BY STATES TODAY?

The US Department of Defense has categorised LAWS into three types. The first type is the semi-autonomous weapon system where human operators still select and initiate the attack. Therefore, the human is still in the Observe, Orient, Decide and Act (OODA) loop. The second type is the supervised autonomous weapon system where human operators can intervene and terminate the weapon system. The third type is the fully autonomous weapon system where there is little to no need for human intervention once the weapon system is activated.

Examples of LAWS under the semi-autonomous weapon system category are precision-guided munitions and drones such as the MQ-1B Reaper. BAE Systems based in the United Kingdom is currently developing and testing the Taranis which is also a drone; however, it has not yet been deployed in military operations. Examples of LAWS under the supervised weapon system category are CIWS such as the Phalanx, the Goalkeeper, the Millennium Gun, the Kashtan, Type 730 and the SeaRAM. Other examples of LAWS in the supervised weapon systems category are the MAARS, the Aegis Weapon System and the MQ-8C Fire Scout. An example of a LAWS in the fully autonomous weapon systems category is the loitering munition called the Harpy.

These weapon systems are currently being deployed by several countries and demonstrate the wide range of LAWS that exist. In addition, the various LAWS have different degrees of autonomy. Therefore, the various LAW and the varying degrees of autonomy they possess is important to consider when building a working definition of effective human control.

#### 7.1.5 WHAT ARE SOME OF THE LEGAL CHALLENGES POSED BY LAWS?

Some of the legal challenges posed by LAWS are: 1) ensuring that LAWS can abide by IHL; and 2) clarifying who would be accountable should there be a violation of IHL due to an attack involving the use of LAWS. The literature on LAWS and compliance with IHL suggests there is nothing to indicate that LAWS are inherently illegal and cannot comply with IHL. This is the case provided that the weapon system in question is not by nature indiscriminate or likely to cause superfluous or unnecessary suffering. Nevertheless, it would still be beneficial to define effective human control and ensure that effective human control is exercised over LAWS to guarantee that the use of LAWS complies with IHL.

Regarding the issue of accountability, there is debate as to whether there is an accountability gap or not. In this debate, one of the questions is whether a weapon system could be assigned individual criminal responsibility and there are different perspectives on this question. One perspective is that LAWS can never be assigned individual criminal responsibility and be held liable for their actions. Another perspective is that individual criminal responsibility should be assigned to the commanders or relevant high-ranking military officials based on the concept of command responsibility. Another aspect of the accountability issue concerns whether weapon system developers can be held liable. The current IHL and ICL regimes do not seem to address corporate responsibility; therefore, it would be difficult to hold a weapon system developer accountable unless there is some reform to the IHL and ICL regimes.

#### 7.1.6 WHAT FACTORS SHOULD BE CONSIDERED WHEN BUILDING A DEFINITION OF EFFECTIVE HUMAN CONTROL?

The factors to consider when building a definition of effective human control include the following:

- The principles and rules of IHL,
- The different types of LAWS,
- The varying degrees of autonomy different LAWS possess, and
- The different stages in the lifecycle of a LAWS.

It is important to consider these factors to ensure that the development and use of LAWS comply with IHL principles and rules. The working definition can encompass the various types of LAWS with varying degrees of autonomy and the working definition can encompass

the different human-machine interactions that occur during different stages of a weapon system's lifecycle. Furthermore, it is important to address the accountability issue in the working definition to make it clear that the commander and or operator of the weapon system are responsible for violations of IHL due to the use of LAWS; therefore, the States they are acting for are responsible.

## **7.2 OVERVIEW OF THE WORKING DEFINITION**

Incorporating the factors mentioned above, this thesis proposed the following working definition of effective human control.

Effective human control over LAWS is achieved when:

- 1) The elements of human control are built into the weapon system during the development stage and tested during the weapons review process. These elements of human control include, but are not limited to:
  - a) The capacity for human supervision and intervention,
  - b) Operational restrictions,
  - c) Predictability,
  - d) Reliability, and
  - e) Transparency.
- 2) Military personnel should decide whether or not to deploy a LAWS based on the knowledge they have of the situation, the target environment and the LAWS they intend to deploy. Therefore, the following should be present.
  - a) Knowledge of the situation and the target environment.
  - b) Knowledge of how to operate the proposed LAWS to be deployed and the purpose of its use.
  - c) An assessment of the relevant IHL fundamental principles and rules as well as the relevant rules of engagement.
  - d) A conscious decision by the commander or military personnel in charge to deploy the weapon system, or not, after making the necessary assessment.

- e) If a decision to deploy a LAWS is made, there should be a positive action by an operator to activate and deploy the LAWS.
- 3) While the LAWS is operational there should be the following elements.
- a) An adequate form of monitoring (based on the type of weapon system) of the weapon system and or its payload to ensure the correct target is hit.
  - b) An ability for operators to intervene or terminate an attack when it would no longer be compliant with IHL.
  - c) Clarity regarding the chain of responsibility and that the commander and or operator are legally and ethically responsible for their actions. Consequently, the State shall be responsible for the actions of its agents.

There are benefits and limitations to adopting and codifying this working definition of effective human control. However, the benefits that defining effective human control brings to the progress of international humanitarian law cannot be ignored and would help move the discussion on the challenges of LAWS forward.

### **7.3 LIMITATIONS OF THE THESIS**

This thesis focused on how the term effective human control can be defined by considering the rules and principles of IHL applicable to the development and use of LAWS, the range of existing LAWS and those under development, the varying degrees of autonomy different LAWS possess and the discussions on LAWS that have occurred. However, there are other aspects of the debate on LAWS that this thesis has not focused on or addressed. This includes the moral and ethical aspects of the development and use of LAWS; the challenges LAWS poses to international human rights law (IHRL); and how to hold weapon systems developers liable under the IHL and ICL regimes.

Another limitation is that this thesis may not have discussed all weapon systems with autonomous capabilities. There are often issues of national interest and confidentiality attached to the development, acquisition and use of LAWS that make certain information on LAWS inaccessible to the public. Furthermore, the methodology of this thesis did not include interviewing members of organisations that deal with the development, acquisition and use of LAWS; therefore, this thesis is limited to the information on LAWS that is accessible to the public. Nevertheless, there is room for further research to address the limitations of this



thesis to provide a more detailed and realistic picture of the development and use of LAWS and how autonomy functions in existing weapon systems or how autonomy will be incorporated in LAWS that are currently under development.

#### **7.4 RECOMMENDATIONS FOR FURTHER RESEARCH**

This thesis addressed a specific issue within the broader discussion of LAWS. Since this thesis focused on how to define effective human control, it would be worthwhile to conduct further research on how to implement the working definition as well as how to develop regulations on LAWS that could lead to a treaty, protocol or manual on LAWS. This would enable the discussion on LAWS to result in a tangible outcome.

One topic that is significant to the debate on LAWS where further research would be beneficial concerns the challenges that LAWS pose on IHRL as well the philosophical, moral and ethical underpinnings of the broader LAWS debate. This research could involve discussing whether the use of LAWS has the potential to violate certain principles and rules of IHRL. It has been mentioned in some literature on LAWS that the use of LAWS may violate an individual's right to life if the LAWS could autonomously select and engage a target without human intervention. That would make a good starting point for further research into LAWS and IHRL.

Another topic that is significant to the debate on LAWS that would be worthwhile to conduct further research on is corporate liability under the IHL and ICL regimes. Research into this topic could involve discussing how weapon system developers could be held accountable for violations of IHL and crimes under the *Rome Statute* and how the IHL and ICL regimes could be reformed, if necessary, to address corporate liability.

#### **7.5 CLOSING STATEMENT**

The working definition this thesis proposed is just a working definition. Therefore, it is open for further discussions and amendments. The aim of proposing a working definition was to provide clarity to the term effective human control so that the discussion on LAWS could progress and result in a tangible outcome instead of stagnating. Overall, the hope is that the challenges LAWS poses could be addressed before the proliferation and use of LAWS becomes a serious threat to international peace and security or results in a human-made disaster.

---

## REFERENCES

---

## ARTICLES, BOOKS AND REPORTS

*Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of Yugoslavia*, (Report, International Criminal Tribunal for the former Yugoslavia, <<https://www.icty.org/en/press/final-report-prosecutor-committee-established-review-nato-bombing-campaign-against-federal>>

*Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts Volume XV*, (Report No CDDH/215/Rev.1, 3 February-18 April)

*Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts Volume XV* (Second Session Report CDDH/215/Rev.1, 3 February-18 April 1975) 269

*Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflict Volume VI*, (Report, Swiss Federal Council for the Preparation of Two Protocols to the Geneva Conventions, 17 March - 10 June 1997)

Altmann, Jürgen and Frank Sauer, 'Autonomous Weapon Systems and Strategic Stability' (2017) 59(5) *Survival Global Politics and Strategy* 117

Amoroso, Daniele and Guglielmo Tamburrini, 'Autonomous Weapons Systems and Meaningful Human Control: Ethical and Legal Issues' (2020) 1(4) *Current Robotics Report* 187

Amoroso, Daniele and Guglielmo Tamburrini, 'Filling the Empty Box – A Principled Approach to Meaningful Human Control over Weapons Systems' (2019) 8(5) *European Society of International Law* 1

Bedjaoui, Mohammed, 'An international contentious case on the threshold of the Cold War (Routledge Taylor and Francis Group 1st ed, 2012)' in Theodore Christakis and Sarah Heathcote Karine Bannelier (ed), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 3

Boothby, Bill, 'How Far Will the Law Allow Unmanned Targeting to Go International Humanitarian Law and the Changing Technology of War' in Dan Saxon (ed), *International Humanitarian Law and the Changing Technology of War* (Martinus Nijhoff Publishers, 2013) 43

Boothby, William, 'Dehumanization: Is There a Legal Problem with Article 36 7)' in Robert Frau and Tassilo Singer Wolff Heintschel von Heinegg (ed), *Dehumanization of Warfare: Legal Implications of New Weapon Technologies* (Springer, 2017) 21

Boothby, William H., *Weapons and the Law of Armed Conflict* (Oxford University Press, 2009)

Boulanin, Vincent et al, *Limits on Autonomy in Weapon Systems* (Report, June 2020)

Boulanin, Vincent and Maaïke Verbruggen, *Mapping the Development of Autonomy in Weapon Systems* (SIPRI Report, November 2017)

Chengeta, Thompson, 'Defining the Emerging Notion of Meaningful Human Control in Weapon Systems' (2017) 49(3) *New York University Journal of International Law and Politics* 833

Case Matrix Network, *International Criminal Law Guidelines: Command Responsibility* (Report, January 2016)

Crawford, James, *The International Law Commission's Articles on State Responsibility: Introduction, Text and Comments* (Cambridge University Press, 2002)

Crootof, Rebecca, 'A Meaningful Floor for Meaningful Human Control' (2016) 30(1) *Temple International & Comparative Law Journal*

Danks, Heather M. Roff and David, "'Trust but Verify": The Difficulty of Trusting Autonomous Weapon Systems' (2018) 17(1) *Journal of Military Ethics* 2

de Vries, Barry, *Individual Criminal Responsibility for Autonomous Weapons Systems in International Criminal Law* (Brill, 1 ed, 2023) vol 65

Henckaerts, Jean-Marie and Louise Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules* (Cambridge University Press, 2005)

Henckaerts, Jean-Marie and Louise Doswald-Beck, *Customary International Humanitarian Law Volume II: Practice* (Cambridge University Press, 2005)

Doswald-Beck, Louise, *San Remo Manual on International Law Applicable to Armed Conflict at Sea* (Cambridge University Press, 1995)

Dworkin, Ronald, *Law's Empire* (The Belknap Press of Harvard University Press, 1986)

Ekelhof, Merel, 'Complications of a Common Language: Why It Is so Hard to Talk about Autonomous Weapons' (2017) 22(2) *Journal of Conflict and Security Law* 311

Ekelhof, Merel, 'Moving Beyond Semantics on Autonomous Weapon Systems: Meaningful Human Control in Operation' (2019) 10(3) *Global Policy* 343

Fast, Larissa, 'Unpacking the principle of humanity: Tensions and implications' (2016) 97(897/898) *International Review of the Red Cross* 111

Fong, Kelvin, 'CIWS: The Last-ditch Defence' (2008)(July/August) *Asian Defense Journal* 18

Gillespie, Tony, *Systems Engineering for Ethical Autonomous Systems* (Institution of Engineering & Technology, 2019)

Hall, Brian K, 'Autonomous Weapon Systems Safety' [2017] (86) *Joint Force Quarterly*

Hangos, Katalin M, Rozália Lakner and Miklós Gerzson, *Intelligent Control Systems: An Introduction with Examples* (Kluwer Academic Publishers, 2004)

Heathcote, Sarah, 'State omissions and due diligence' in Karine Bannelier *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* in Theodore Christakis and Sarah Heathcote Karine Bannelier (ed), *ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 1st ed, 2012) 295

Heinegg, William H. Boothby and Wolff Heintschel von, *The Law of War* (Cambridge University Press, 2018)

Heinsch, Robert, 'Methodology of Law-Making: Customary International Law and New Military Technologies' in Dan Saxon (ed), *International Humanitarian Law and the Changing Technology of War* (Martinus Nijhoff Publishers, 2013) 18

Henderson, Ian S, Patrick Keane and Josh Liddy, 'Remote and autonomous warfare systems: precautions in attack and individual accountability' in Jens David Ohlin (ed), *Research Handbook on Remote Warfare* (Edward Elgar Online 2017)

Human Rights Watch, *Off Target: The Conduct of the War and Civilian Casualties in Iraq* (Report, Human Rights Watch, 2003)

International Committee of the Red Cross, 'A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977' (2006) 88(864) *International Review of the Red Cross* 931

International Committee of the Red Cross, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons* (Expert Meeting Report, 15-16 March 2016)

International Committee of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects* (Expert Meeting Report, 26-28 March 2014)

International Committee of the Red Cross, *Conference of Governmental Experts on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflict: Second Session 3 May – 3 June 1972* (Report on the Work of the Conference Volume I, July 1972)

International Military Tribunal No. III, 'Opinion re: Finding as to the first and fourth counts' (1948) *Trial 10 - Krupp Case 1*

International Panel on the Regulation of Autonomous Weapons, *Focus on Human Control* ("Focus on" Report No 5, International Panel on the Regulation of Autonomous Weapons (iPRAW), August 2019)

Jessberger, Florian, 'On the Origins of Individual Criminal Responsibility under International Law for Business Activity' (2010) 8(3) *Journal of International Criminal Justice* 783

Kaldor, Christine Chinkin and Mary, *International Law and New Wars* (Cambridge University Press, 2017)

Kenneth Anderson, Daniel Reisner and Matthew Waxman, 'Adapting the Law of Armed Conflict to Autonomous Weapon Systems' (2014) 90 *International Law Studies* 386

Klincewicz, Michal, 'Autonomous Weapons Systems, the Frame Problem and Computer Security' (2015) 14(2) *Journal of Military Ethics* 162

Landau, Ioan Doré et al, *Adaptive Control: Algorithms, Analysis and Applications* (Springer, 2nd ed, 2011)

Lawand, Kathleen, 'Reviewing the Legality of New Weapons, Means and Methods of Warfare' (2006) 88(864) *International Review of the Red Cross* 925

Longobardo, Marco, 'The Relevance of the Concept of Due Diligence for International Humanitarian Law' (2019) 37(1) *Wisconsin International Law Journal* 44

Liivoja, Rian, Kobi Leins and Tim McCormack, 'Emerging technologies of warfare' in Rian Liivoja and Tim McCormack (ed), *Routledge Handbook of the Law of Armed Conflict* (Routledge, 2016)

MacCormick, Neil, 'Norms, Institutions, and Institutional Facts' (1998) 17(3) *Law and Philosophy* 301

Mahmoud, Magdi S, *Multiagent Systems: Introduction and Coordination Control* (CRC Press Taylor & Francis Group, 2020)

Massingham, Eve and Simon McKenzie, 'Testing knowledge: weapons reviews of autonomous weapons systems and the international criminal trial' in Emma Palmer et al (eds), *Futures of International Criminal Justice* (Routledge, 2022)

McCormack, Tim McFarland and Tim, 'Mind the Gap: Can Developers of Autonomous Weapon Systems be Liable for War Crimes?' (2014) 90 *International Law Studies* 361

McDonald, Jack, 'Autonomous Agents and Command Responsibility' in James Gow et al (ed), *Routledge Handbook of War, Law and Technology* (Routledge Taylor & Francis Group, 2019) 141

McDougall, Carrie, 'Autonomous Weapon Systems and Accountability: Putting the Cart Before the Horse' (2018) 20(1) *Melbourne Journal of International Law* 58

McFarland, Tim, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge University Press, 2020)

McLaughlin, Robert and Hitoshi Nasu, 'Conundrum of New Technologies in the Law of Armed Conflict' in Hitoshi Nasu and Robert McLaughlin (ed), *New Technologies and the Law of Armed Conflict* (T.M.C Asser Press, 2014)



McNeal, Gregory S., "Targeted Killing and Accountability" (2014) 102(3) *Georgetown Law Journal* 681

Meron, Theodor, 'The Martens Clause, Principles of Humanity, and the Dictates of Public Conscience' (2000) 94(1) *American Journal of International Law* 78

Mongelard, Eric, 'Corporate civil liability for violations of international humanitarian law' (2006) 88(863) *International Review of the Red Cross* 665

Noone, Laurie R. Blank and Gregory P., *International Law and Armed Conflicts: Fundamental Principles and Contemporary Challenges in the Law of War* (Wolters Kluwer, 2016)

Antsaklis, Panos J, Kevin M Passino and S J Wang, 'An Introduction to Autonomous Control Systems' (1991) 11(4) *IEEE Control Systems Magazine* 5

Pellerin, Cheryl, 'Project Maven to Deploy Computer Algorithms to War Zone by Year's End' (Media Release, U.S. Department of Defense, 21 July 2017)

Pert, Emily Crawford and Alison, *International Humanitarian Law* (Cambridge University Press, 2015)

Roberts, Sarah, Greg Eggins and Caroline Ireland, 'International Court of Justice - Requests for Advisory Opinions on the Legality of Nuclear Weapons - Australian Statement' (1996) 17 *Australian Year Book of International Law* 685

Sample, Ian, 'Thousands of leading AI researchers sign pledge against killer robots', *The Guardian* (online, 18 July 2018)

<<https://www.theguardian.com/science/2018/jul/18/thousands-of-scientists-pledge-not-to-help-build-killer-ai-robots>>

Sandoz, Yves, Christophe Swinarski and Bruno Zimmermann (ed), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Martinus Nijhoff Publishers, 1987)

Scharre, Paul, *Army of None: Autonomous Weapons and the Future of War* (W.W. Norton & Company, 2018)

Schulzke, Marcus, 'Autonomous Weapons and Distributed Responsibility' (2013) 26(2) *Philosophy & Technology* 203

Sehrawat, Vivek, 'Autonomous weapon systems: Law of armed conflict (LOAC) and other legal challenges' (2017) 33(1) *Computer Law & Security Review: The International Journal of Technology Law and Practice* 38

Sharkey, Noel, 'Staying in the loop: human supervisory control of weapons' in Susanne Beck Nehal Bhuta, Robin Geiß, Hin-Yan Liu and Claus Kreß (ed), *Autonomous Weapon Systems: Law, Ethics, Policy* (Cambridge University Press, 2016) 23

Sparrow, Robert, 'Killer Robots' (2007) 24(1) *Journal of Applied Philosophy* 62

Thurnher, Jeffrey S., 'The Law That Applies to Autonomous Weapon Systems' (2013) 17(4) *American Society for International Law Insights*

Thurnher, Michael N. Schmitt and Jeffrey S., "'Out of the Loop": Autonomous Weapon Systems and the Law of Armed Conflict' (2013) 4 *Harvard National Security Journal* 231

Ticehurst, Rupert, 'The Martens Clause and the Laws of Armed Conflict' (1997) 37(317) *International Review of the Red Cross* 125

Truver, Scott C, 'Taking Mines Seriously: Mine Warfare in China's Near Seas' (2012) 65(2) *U.S Naval War College Review* 30

Tsagourias, Nicholas and Alasdair Morrison, *International Humanitarian Law: Cases, Materials and Commentary* (Cambridge University Press, 2018)

Sragovich, Vladimir Grigor'evich, *Mathematical Theory of Adaptive Control* (World Scientific Publishing Company, 2006)

Wagner, Markus, 'The Dehumanization of International Humanitarian Law: Legal, Ethical, and Political Implications of Autonomous Weapon Systems' (2014) 47(5) *Vanderbilt Transnational Law* 1371

Walsh, James Igoe, 'Political accountability and autonomous weapons' (2015) 2(4) *Research & Politics* 1

Zagor, Matthew, 'Elementary Considerations of Humanity' in Karine Bannelier in Theodore Christakis and Sarah Heathcote Karine Bannelier (ed), *The ICJ and the Evolution of International Law: The enduring impact of the Corfu Channel case* (Routledge Taylor and Francis Group, 2012) 264

## **CASES**

*Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v Serbia and Montenegro) (Judgment)* [2007] ICJ Rep 43

*A.P., M.P., T.P. v Switzerland* (Eur Court HR, Chamber, Application No 71/1996/690/882, 29 August 1997)

*Beit Sourik Village Council v The Government of Israel and the Commander of the IDF* (Supreme Court of Israel sitting as the High Court of Justice, No HCJ 2056/04, 4 May 2004)

*Case Concerning Pulp Mills on the River Uruguay (Argentina v Uruguay) (Judgment)* [2010] ICJ Rep 18

*Case Concerning the Barcelona Traction, Light and Power Company, Limited (Belgium v Spain) (Judgment)* [1970] ICJ Rep 3

*Continental Shelf Case (Libyan Arab Jamahiriya v. Malta) (Judgment)* [1985] ICJ Rep 13

*The Corfu Channel Case (United Kingdom of Great Britain and Northern Ireland v Albania) (Judgment)* [1949] ICJ Rep 4

*Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory (Advisory Opinion)* [2004] ICJ Rep 136

*Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion)* [1996] ICJ Rep 226

*Military and Paramilitary Activities in and against Nicaragua (Nicaragua v United States of America) (Judgment)* [1986] ICJ Rep 14

*Military Juntas Case (National Court of Appeals of Argentina)* No 13/84, 9 December 1985)

*North Sea Continental Shelf Cases (Federal Republic of Germany v Denmark/ Federal Republic of Germany v Netherlands) (Judgment)* [1969] ICJ Rep 4

*Phosphates in Morocco (Italy v France) (Preliminary Objections)* [1938] PCIJ (ser A/B No. 74) 10

*Presbyterian Church of Sudan v Talisman Energy*, 244 F. Supp. 2d 289 (U.S District Court for the Southern District of New York, 2003)

*Prosecutor v Blaškić (Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Appeals Chamber, Case No IT-95-14-A, 9 July 2004)

*Prosecutor v Boškoski and Tarčulovski (Trial Judgment)* (International Criminal Tribunal for the former Yugoslavia, Trial Chamber I, Case No IT-04-82-T, 10 July 2008)

*Prosecutor v Galić (Trial Judgment and Opinion)* (International Criminal Tribunal for the former Yugoslavia, Trial Chamber I, Case No IT-98-29-T, 5 December 2003)

*Prosecutor v Hadžihascović v Kubura (Trial Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Trial Chamber, Case No IT-01-47-T, 15 March 2006)

*Prosecutor v Katanga (Judgment Pursuant to Article 74 of the Statute)* (International Criminal Court, Trial Chamber II, Case No ICC-01/04-01/07, 7 March 2014)

*Prosecutor v Kupreškić (Trial Judgment)* (International Criminal Tribunal for the Former Yugoslavia, Trial Chamber, Case No IT-95-16-T, 14 January 2000)

*Prosecutor v Martić (Decision)* (International Criminal Tribunal for the Former Yugoslavia, Trial Chamber, Case No IT-95-11-R61, 8 March 1996)

*Prosecutor v Martić (Trial Judgment)* (International Criminal Tribunal for the former Yugoslavia, Trial Chamber I, Case No IT-95-11-T, 12 June 2007)

*Prosecutor v Sessay (Judgment)* (Special Court of Sierra Leone, Trial Chamber I, 2 March 2009)

*Prosecutor v Tadić (Decision on the Defence Motion for Interlocutory Appeal on Jurisdiction)* (International Criminal Tribunal for the Former Yugoslavia, Appeals Chamber, Case No IT-94-1, 2 October 1995)

*Prosecutor v Taylor (Trial Judgment)* (Special Court for Sierra Leone, Trial Chamber II, Case No SCSL-03-01-T, 18 May 2012)

*Ryuichi Shimoda v State* (1964) 8 Japanese Annual of International Law 231

*Trial of Alfred Felix Alwyn Krupp von Bohlen und Halbach and Eleven Others (Judgment)* (United States Military Tribunal Nuremberg, Case No 58, 30 June 1948)

*Trial of Carl Krauch and Twenty-two Others (Judgment)* (United States Military Tribunal Nuremberg, Case No 57, 29 July 1948)

*Trial of Carl Krauch and Twenty-two Others (Judgment)* 1948, 8 Trials of War Criminals before the Nuremberg Military Tribunals 1

*United States v Wilhelm List et al (Judgment)* (United States Military Tribunal, Nuremberg), Case No 47, 8 July 1947 - 19 February 1948)

*United States v Wilhelm Von Leeb et al (Judgment)* (United States Military Tribunal, Nuremberg, Case No 72, 30 December 1947 - 28 October 1948)

## **LEGISLATION**

*Aliens Torts Claim Act*, 28 USC § 1350 (Thomson Reuters Westlaw Classic 1978)

*Crimes (Biological Weapons) Act 1976* (Cth)

*Förordning (2007:936) om folkrättslig granskning av vapenprojekt* [Ordinance (2007:936) on international law review of weapons projects]

## **TREATIES**

*Additional Protocol 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 (Protocol IV Protocol on Blinding Laser Weapons)*, opened for signature 10 April 1981, 1342 UNTS 137 (entered into force 2 December 1983)

*African Charter on Human's and People's Rights*, opened for signature 27 June 1981, CAB/LEG/67/3 rev. 5, 21 I.L.M. 58 (1982), (entered into force 21 October 1986)

*American Convention on Human Rights*, opened for signature 22 November 1969 (entered into force 18 July 1978)

#### *Charter of the United Nations*

*Comprehensive Agreement on Respect for Human Rights and International Humanitarian Law, Government of the Republic of the Philippines and the National Democratic Front of the Philippines*, ILM (signed and entered into force 16 March 1998)

*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*, opened for signature 10 April 1981, 1342 UNTS 137 (entered into force 2 December 1983)

*Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight (St Petersburg Declaration)*, opened for signature 11 December 1868, ILM (entered into force 11 December 1868)

*Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field*, opened for signature 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950)

*Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea*, opened for signature 12 August 1949, 75 UNTS 85 (entered into force 21 October 1950)

*Geneva Convention (III) Relative to the Treatment of Prisoners of War*, opened for signature 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950)

*Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War*, opened for signature 12 August 1949, 75 UNTS 287 (entered into force 21 October 1950)

*Hague Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land*, opened for signature 29 July 1899, 187 CTS 429 (entered into force 4 September 1900)

*Hague Convention (IV) Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, opened for signature 18 October 1907, 205 CTS 277 (entered into force 26 January 1910)

*Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I)*, opened for signature 7 December 1977, 1125 UNTS 3 (entered into force 7 December 1978)

*Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of non-international armed conflicts (Protocol II)*, opened for signature 7 December 1977, 1125 UNTS 609 (entered into force 7 December 1978)

*Protocol on Prohibitions or Restrictions on the use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 (Protocol II to the 1980 CCW Convention as amended on 3 May 1996)*, opened for signature 3 May 1996, 2048 UNTS 93 (entered into force 3 December 1998)

*Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 (Protocol II, as amended on 3 May 1996) annexed 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*, opened for signature 3 December 1998, 2048 UNTS 93 (entered into force 3 December 1998)

*Rome Statute of the International Criminal Court*, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002)

*Statute of the International Court of Justice*

## **OTHERS**

'2017 Group of Governmental Experts on Lethal Autonomous Weapon Systems (LAWS)', *United Nations Geneva* (Web page)

<[https://www.unog.ch/80256EE600585943/\(httpPages\)/F027DAA4966EB9C7C12580CD0039D7B5?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/F027DAA4966EB9C7C12580CD0039D7B5?OpenDocument)>

'Aegis The Shield of the Fleet', *Lockheed Martin* (Webpage)

<<https://www.lockheedmartin.com/en-us/products/aegis-combat-system.html>>

'AEGIS Weapon System Mk 7', *Global Security* (Website, 7 July 2011)

<<https://www.globalsecurity.org/military/systems/ship/systems/aegis-core.htm>>

'AvantGuard Unmanned Ground Combat Vehicle', *Army Technology* (Website)

<<https://www.army-technology.com/projects/avantguardunmannedgr/>>

'Chairperson's Summary', (Working Paper No CCW/GGE.1/2020/WP.7, Group of Governmental Experts on Lethal Autonomous Weapon Systems, 19 April 2021)

'Convention on Certain Conventional Weapons Group of Governmental Experts on Lethal Autonomous Weapons Systems', *United Nations Office for Disarmament Affairs* (Web Page, 2020) <<https://meetings.unoda.org/meeting/62100>>

'Fire Scout Unmanned Aircraft System', *Northrop Grumman* (Web page)

<<https://www.northropgrumman.com/what-we-do/air/fire-scout/>>

'Home', *Codification and Progressive Development of International Law* (Webpage)

<<https://legal.un.org/cod/>>

'Lethal Autonomous Weapons Pledge', *Future of Life Institute* (Web page)

<<https://futureoflife.org/lethal-autonomous-weapons-pledge/?cn-reloaded=1>>

'Modular Advanced Armed Robotic System', *QinetiQ North America* (Web page)

<<https://www.qinetiq.com/en-us/what-we-do/services-and-products/maars-weaponized-robot>>

*Report of the 2014 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, 2014 sess, Agenda Item 8, UN Doc CCW/MSP/2014/3 (14 November 2014)



*Report of the 2015 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 2015 sess, Agenda Item 8, UN Doc CCW/MSP/2015/3 (12 November 2015)*

*Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), Agenda Item 13, UN Doc CCW/CONF.V/2 (10 June 2016)*

*Report of the 2017 Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS), Agenda Item 7, UN Doc CCW/GGE.1/2017/3 (22 December 2017)*

*Report of the 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, Agenda Item 7, UN Doc CCW/GGE.1/2018/3 (23 October 2018)*

*Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, CCW/GGE.1/2019/3, 2nd sess, Agenda Item 6, (25 September 2019)*

Republic of Zambia, 'General Comment made during the debate on recommendations over the challenges to international humanitarian law' (Speech, CCCW Informal Meeting of Experts on LAWS, 14 April 2016)

*Report of the 2021 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, 3rd sess, Agenda Item 7, UN Doc CCW/GGE.1/2021/3 (22 February 2022)*

*Report of the 2022 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, Agenda Item 7, UN Doc CCW/GGE.1/2022/2 (31 August 2022)*

*Responsibility of States for Internationally Wrongful Acts, GA Res 56/83, UNGAOR, 6th Comm, 56th sess, Agenda Item 162, UN Doc A/RES/56/83 (28 January 2001))*

'Taranis', BAE Systems (Website) <<https://www.baesystems.com/en/product/taranis#>>

*Third UN Meeting on Killer Robots: Convention on Conventional Weapons (CCW)*  
(Campaign to Stop Killer Robots, 2016)

*Général de Corps d'Armée Voinot (France), Fiche de Synthèse sur les Règles Applicables dans les Conflits Armés (Summary Note No 432/DEF/EMA/OL.2/NP, 1992)*

*Ministère de la Défense Etat-Major de l'Armée de Terre Bureau Emploi (France), Règlement de Discipline Générale dans les Armées (Decree No 75-675, 28 July 1975)*

Abdelnasser, Walid M, 'Statement of the Arab Republic of Egypt' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 May 2014)

Air Combat Command, Public Affairs Office, 'MQ-1B Predator', *U.S. Air Force* (Website, 23 September 2015) <<https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104469/mq-1b-predator/>>

Air Combat Command, Public Affairs Office, 'MQ-9 Reaper', *U.S Air Force* (Website, 23 September 2015) <<https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104470/mq-9-reaper/>>

Akram, Zamir, 'Statement by [Pakistani] Ambassador Zamir Akram Permanent Representative' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 May 2014)

Appelqvist, Pekka, 'Systems approach to LAWS: characteristics, considerations and implications' (Presentation, CCCW Informal Meeting of Experts on LAWS, 15 April 2015)

Arkin, Ronald C, 'Lethal Autonomous Weapon Systems and the Plight of the Noncombatant' (Presentation, CCW Informal Meeting of Experts, 13 May 2014)

Article 36, 'Killer Robots: UK Government Policy on Fully Autonomous Weapons' (Policy Paper, April 2013)

Article 36, 'Key areas for debate on autonomous weapons systems' (Briefing Paper, Article 36, 13-16 May 2014)

Article 36, 'Article 36 reviews and addressing Lethal Autonomous Weapon Systems' (Briefing Paper, Convention on Certain Conventional Weapons (CCW) Meeting of Experts on Lethal Autonomous Weapon Systems (LAWS), 11 April 2016)

Argentina et al, 'Draft Protocol VI' (Working Paper No CCW/GGE.1/2022/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 9 August 2022)

Argentina et al, 'Roadmap Towards a New Protocol on Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2022/WP.3, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022)

The Argentine Republic et al, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.7, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021)

Asaro, Peter, 'Ethical questions raised by military applications of robotics' (Presentation, CCCW Informal Meeting of Experts, 13-16 May 2014)

Australia, 'The Australian Article 36 Review Process' (Working Paper No 6, 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, 30 August 2018)

Australia, 'Australia's System of Control and Applications for Autonomous Weapon Systems' (Working Paper No 5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, 26 March 2019)

Australia, 'Convention on Certain Conventional Weapons (CCW) Lethal Autonomous Weapons Systems' (National Commentary, Group of Governmental Experts on Lethal Autonomous Weapon Systems, 2020)

Australia et al, 'Building on Chile's Proposed Four Elements of Further Work for the Convention on Certain Conventional Weapons (CCW) Group of Governmental Experts

(GGE) on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems (LAWS)' (Working Paper No CCW/GGE.1/2021/WP.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon System, 27 September 2021)

Australia et al, 'Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law (“IHL”)' (Working Paper No CCW/GGE.1/2023/WP.4/Rev.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 15 May 2023)

Australia et al, 'Principles and Good Practices on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2022/WP.2, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 August 2022)

Australian Defence Force Publication, 'Law of Armed Conflict Commanders' Guide' (Operation Series ADFP 37 Supplement 1, 7 March 1994)

Australian Defence Force Publication, 'Manual on Law of Armed Conflict ' (Defence Force Manual Operation Series ADFP 37, 1994)

Australian Department of Defence, 'Legal Review of New Weapons' (Defence Instruction No OPS 44-1, 2 June 2005)

Austria et al, 'Joint "Commentary" on Guiding Principles A, B, C and D' (Joint Statement, CCCW Group of Governmental Experts on Lethal Autonomous Weapon Systems, September 2020)

Austria, 'Joint Statement on Lethal Autonomous Weapons Systems' (Statement, United Nations General Assembly, 77th session, First Committee 21 October 2022)

Austria, 'Revised Working Paper' (Working Paper No CCW/GGE.1/2023/WP.1/Rev.1, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 3 March 2023)

Azulai, Yuval, 'Israel's Defense Ministry scraps robot vehicle venture', *Globes* (online, 4 May 2016) <<https://en.globes.co.il/en/article-idf-scraps-robot-vehicle-development-1001122079>>

Belgium, 'Towards a definition of lethal autonomous weapon systems' (Working Paper No 3, 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, 7 November 2017)

Biontino, Michael, 'CCW Expert Meeting: Lethal Autonomous Weapon Systems' (General Statement, CCW Meeting of Experts on LAWS, 13 May 2014) <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/9FB02F665072E11AC1257CD70066D830/\\$file/Germany+LAWS+2014.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/9FB02F665072E11AC1257CD70066D830/$file/Germany+LAWS+2014.pdf)>

Bokhari, Irfan Mahmood, 'Statement by Irfan Mahmood Bokhari, Second Secretary' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015)

Bolivarian Republic of Venezuela et al, 'Joint Working Paper' (Working Paper No CCW/GGE.1/2021/WP.8, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 December 2021)

Bosnia and Herzegovina Ministry of Defence, *Letter to the Headquarters of the Yugoslav Army in Belgrade* (Report on the Practice of Bosnia and Herzegovina 2000 No 02/333-232, 17 May 1992)

Boulanin, Vincent, 'Mapping autonomy: current developments in the military sphere' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016)

Brehm, Maya, 'Meaningful Human Control' (Presentation, CCCW Informal Meeting of Experts on LAWS, 15 April 2015)

British Forces Broadcasting Service (BFBS), 'MAARS Mission: The Military Patrol Robot', *Forces.Net* (Online News Article, 5 July 2016) <<https://www.forces.net/services/tri-service/maars-mission-military-patrol-robot>>

Campaign to Stop Killer Robots, 'Commentary for the Convention on Conventional Weapons Group of Governmental Experts on lethal autonomous weapons systems' (Statement, CCCW Group of Governmental Experts on Lethal Autonomous Weapon Systems, 5 June 2021)

Chang, Karl, 'Intervention by the United States' (Statement, CCW Group of Governmental Experts on LAWS, 21-25 September 2020)

Chatila, Raja, 'On the Concept of Autonomy' (Presentation, CCCW Informal Meeting of Experts on LAWS, 13 May 2014)

Chatila, Raja and Cathrine Tessier, 'A Guide to Lethal Autonomous Weapon Systems', *CNRS News* (Blog, 4 September 2018) <<https://news.cnrs.fr/opinions/a-guide-to-lethal-autonomous-weapons-systems>>

Chile and Mexico, 'Elements for a Legally Binding Instrument to Address the Challenges Posed by Autonomy in Weapon Systems' (Working Paper No CCW/GGE.1/2022/WP.5 Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System 8 August 2022).

Command, Office of Corporate Communication Navy Sea Systems, 'Aegis Weapon System', *United States Navy Fact File*, 10 January 2019) <[https://www.navy.mil/navydata/fact\\_display.asp?cid=2100&tid=200&ct=2](https://www.navy.mil/navydata/fact_display.asp?cid=2100&tid=200&ct=2)>

Crawford, James R, 'State Responsibility', *Max Planck Encyclopedias of Public International Law* (Web page, September 2006) <<https://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1093#law-9780199231690-e1093-p-3>>

Dahlmann, Anja, 'Statement on Agenda 5c (Human Element)' (Speech, International Panel on the Regulation of Autonomous Weapons, 23 September 2020)

Danet, Didier, 'Progrès technique, utilité militaire et autonomie des systems d'armes' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016)

Davison, Neil, 'Characteristics of Autonomous Weapon Systems' (Speech, CCCW Informal Meeting of Experts on LAWS, 14 April 2015)

Davison, Neil, 'A legal perspective: Autonomous weapon systems under international humanitarian law' (Conference Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016)

Davison, Neil, 'Autonomous weapon systems: An ethical basis for human control?', *Humanitarian Law & Policy* (Blog Post, 3 April 2018) <<http://blogs.icrc.org/law-and-policy/2018/04/03/autonomous-weapon-systems-ethical-basis-human-control/>>

Economic and Social Council Commission on Human Rights, *Norms on the responsibilities of transnational corporations and other business enterprises with regard to human rights*, 55th sess, 22nd mtg, Agenda Item 4, UN Doc E/CN.4/Sub.2/2003/12/Rev.2 (26 August 2003, adopted 13 August 2003)

Estado Mayor Conjunto de las Fuerzas Armadas Argentina, 'Leyes de Guerra' (Manual, 1989)

Federal Republic of Germany Foreign Office, 'CCW Expert Meeting on Lethal Autonomous Weapon Systems: General Statement by Germany' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014)

*Final Report*, 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 Comm, 2013 sess, Agenda Item 13, UN Doc CCW/MSP/2013/10 (16 December 2013)

*Australian Defence Force, The Manual on Law of Armed Conflict (Australian Defence Doctrine Publication 06.4, 2006)*

Foreign and Commonwealth Office of the United Kingdom of Great Britain and Northern Ireland, 'Statement to the Informal Meeting of Experts on Lethal Autonomous Weapons Systems' (Speech, CCCW Informal Meeting of Experts on LAWS, 11-15 April 2016)

France, 'Possible consensus recommendations in relation to the clarification, consideration and development of aspects on the normative and operational framework on emerging technologies in the area of LAWS' (Working Paper No CCW/GGE.1/2021/WP.4, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021)

France and Germany, 'For consideration by the Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS)' (Working Paper No 4, 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, 7 November 2017)

France and Germany, 'Outline for a normative and operational framework on emerging technologies in the area of LAWS' (Working Paper No CCW/GGE.1/2021/WP.5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021)

Gaeta, Paola, 'Autonomous weapon systems and the alleged responsibility gap' (Presentation, International Committee of the Red Cross Expert Meeting, 15-16 March 2016)

Garcia, Denise, 'Technical statement by the International Committee for Robot Arms Control' (Statement, CCCW Informal Meeting of Experts, 14 May 2014)  
<<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>

Germany, 'Statement on the implementation of weapons reviews under Article 36 Additional Protocol I by Germany' (Speech, CCCW Informal Meeting of Experts on LAWS, 11-15 April 2016)

Graham, Bradley, 'U.S. Moved Early for Air Supremacy', *The Washington Post* (online, 20 July 2003) <<https://www.washingtonpost.com/archive/politics/2003/07/20/us-moved-early-for-air-supremacy/366576c0-d064-4ee8-a9ed-9efeaf1c0740/>>



Hajnoczi, Thomas, 'Statement by Austria: General Debate' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapons Systems, 13 May 2014)

Hargerott, Mark, 'Lethal Autonomous Weapons Systems from a Military Officer's Perspective...this time is different: Offering a Framework and Suggestions' (Presentation, CCCW Informal Meeting of Experts, 13-16 May 2014)

Heyns, Christof, 'Increasing autonomous weapon systems; Accountability and responsibility' (Presentation, International Committee of the Red Cross Expert Meeting, 8-26 March 2014)

Heyns, Christof, Special Rapporteur on extrajudicial, summary or arbitrary executions, *Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions*, UN GAOR, 23rd sess, Agenda Item 3, UN Doc A/HRC/23/47 (9 April 2013)

Hoepflinger, Mark, 'CCW Expert Meeting' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016)

Horowitz, Paul Scharre and Michael C., 'An Introduction to Autonomy in Weapon Systems' (Working Paper, Centre for a New American Security, February 2015)

Hækkerup, Susanne Rumohr, 'General statement by Susanne Rumohr Hækkerup, [Danish] Ambassador for Disarmament, Non-Proliferation and Arms Control' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015)

Hunt, Erin, 'Statement on Article 36 Weapon Reviews' (Speech, Mines Action Canada, CCCW Informal Meeting of Experts on LAWS, 11-15 April 2016)

International Committee of the Red Cross, 'Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land. The Hague, 29 July 1899 Treaties ', *State Parties and Commentaries*)  
<[https://ihl-](https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=CD0F6C83F96FB459C12563CD002D66A1&action=openDocument)  
[databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=CD0F6C83F96FB459C12563](https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=CD0F6C83F96FB459C12563CD002D66A1&action=openDocument)  
[CD002D66A1&action=openDocument](https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=CD0F6C83F96FB459C12563CD002D66A1&action=openDocument) >

International Committee of the Red Cross, 'Autonomous weapons: Decisions to kill and destroy are a human responsibility', *International Committee of the Red Cross* (Online article, 11 April 2016) <<https://www.icrc.org/en/document/statement-icrc-lethal-autonomous-weapons-systems>>

International Committee of the Red Cross, 'Customary International Humanitarian Law', *International Committee of the Red Cross* (Online Article 29 October 2010) <<https://www.icrc.org/en/document/customary-international-humanitarian-law-0>>

International Committee of the Red Cross, 'Expert Meeting on Lethal Autonomous Weapons Systems' (Statement, Group of Governmental Expert Meeting on Lethal Autonomous Weapons Systems, 15 November 2017) <<https://www.icrc.org/en/document/expert-meeting-lethal-autonomous-weapons-systems>>

International Committee of the Red Cross, 'Legal review of new weapons: Scope of the obligation and best practices', *Humanitarian Law & Policy* (Blog Post, 6 October 2016) <<https://blogs.icrc.org/law-and-policy/2016/10/06/legal-review-new-weapons/>>

International Committee of the Red Cross, 'Views of the International Committee of the Red Cross on Autonomous Weapon System' (Working Paper, Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems, 11 April 2016)

International Committee of the Red Cross, 'Proposal for consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework' (Working Paper No CCW/GGE.1/2021/WP.6, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 27 September 2021)

International Crimes Database Project, 'The Presbyterian Church of Sudan, et al. v. Talisman Energy, Inc. And Republic of The Sudan', *International Crimes Database* (Web page) <<http://www.internationalcrimesdatabase.org/Case/43/Presbyterian-Church-Of-Sudan-v-Talisman-Energy/>>

International Criminal Tribunal for the Former Yugoslavia, 'Judgement in the Case the Prosecutor v. Stanislav Galic: Stanislav Galic Sentenced to 20 Years' Imprisonment' (Press Release, 5 December 2003) <<https://www.icty.org/en/sid/8148>>

International Law Commission, *Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law*, 58 sess, UN Doc A/CN.4/L.682)

Ireland, 'Irish General Statement at the CCW Informal Consultations on Lethal Autonomous Weapons' (Statement, CCCW Informal Meeting of Experts on LAWS, 13 May 2014)

Islamic Conference of Foreign Ministers, *Cairo Declaration on Human Rights in Islam*, UN GAOR, 4th sess, Agenda Item 5, UN Doc A/CONF.157/PC/62/Add.18 (5 August 1990)

Japan, 'Japan's views on issues relating to LAWS' (Working Paper, CCCW Informal Meeting of Experts on LAWS, 11-15 April 2016)

Kester, Leon, 'Mapping Autonomy' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016)

Klare, Michael T., 'Autonomous Weapon Systems and the Laws of War' 49 (March 2019) *Arms Control Today*

Koskenniemi, Martti, Chairman of the Study Group, *Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law*, A/CN.4/L.682, Study group of the International Law Commission Comm, 58 sess, UN Doc A/CN.4/L.682 (13 April 2006)

Lawand, Kathleen, 'Statement of the International Committee of the Red Cross' (Speech, CCCW Informal Meeting of Experts on Laws, 13 April 2015)

McKendrick, Kathleen, 'Banning Autonomous Weapons Is Not the Answer', *Chatham House The Royal Institute of International Affairs* (Blog Post, 2 May 2018)  
<<https://www.chathamhouse.org/expert/comment/banning-autonomous-weapons-not-answer>>

McNeal, Greg, 'The US Practice of Collateral Damage Estimation and Mitigation', *GSMcNeal* (Blog, 11 May 2019) <<https://gsmcneal.com/the-u-s-practice-of-collateral-damage-estimation-and-mitigation/>>

Millar, Jason, 'Meaningful Human Control' (Expert Testimony, CCCW Informal Meeting of Experts on LAWS, 15 April 2015)

Misión Permanente del Ecuador ante las Naciones Unidas y Organismos Internacionales en Ginebra, 'Reunión Informal de Expertos Sober Armas Letales Autónomas en el Marco de la CCAC [Informal Meeting of Experts on Lethal Autonomous Weapon Systems of the CCCW]' (Speech, CCCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014)

Møller, Michael, 'Opening Remarks: Convention on Certain Conventional Weapons (CCW)' (Speech, Meeting of Experts on Lethal Autonomous Weapon Systems, 13 May 2014)  
<[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/FE367AE0FEC9C034C1257CD7005FB685/\\$file/DG+UNOG+MX+LAWS.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/FE367AE0FEC9C034C1257CD7005FB685/$file/DG+UNOG+MX+LAWS.pdf)>

Moyes, Richard, 'Key elements of meaningful human control' (Background Paper, Article 36, April 2016)

Moyes, Richard, 'Meaningful human control over individual attacks' (Presentation, International Committee of the Red Cross Expert Meeting, 15 March 2016)

Moyes, Richard, 'Autonomy in weapon systems - considering approaches to regulation' (Discussion Paper, Article 36, March 2020)

Netherlands, 'Examination of various dimensions of emerging technologies in the area of lethal autonomous weapons systems, in the context of the objectives and purposes of the Convention' (Working Paper No 2, 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, 9 October 2017)

Northrop Grumman, 'Northrop Grumman-Built MQ-8C Fire Scout Makes Operational Deployment with US Navy' (News, 24 January 2022)

<[https://news.northropgrumman.com/news/releases/northrop-grumman-built-mq-8c-fire-scout-makes-operational-deployment-with-the-us-navy?\\_gl=1\\*1oi15qs\\*\\_ga\\*MjA2ODg3MDA1Ni4xNjY2ODMwNDA1\\*\\_ga\\_7YV3CDX0R2\\*MTY2NjgzMDQwNC4xLjEuMTY2NjgzMDU2NS4wLjAuMA..](https://news.northropgrumman.com/news/releases/northrop-grumman-built-mq-8c-fire-scout-makes-operational-deployment-with-the-us-navy?_gl=1*1oi15qs*_ga*MjA2ODg3MDA1Ni4xNjY2ODMwNDA1*_ga_7YV3CDX0R2*MTY2NjgzMDQwNC4xLjEuMTY2NjgzMDU2NS4wLjAuMA..)>

Norway, 'Statement on Norway on "Challenges to International Humanitarian Law"' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2016)

Norwegian Ministry of Defence, 'Direktiv om folkerettslig vurdering av våpen, krigføringsmetoder og krigføringsvirkemidler [Directive on the legal review on weapons, methods and means of warfare]' (Directive, 18 June 2003)

Omicini, Andrea, 'The Distributed Autonomy' (Presentation, CCCW Informal Meeting of Experts on LAWS, 13 April 2015)

Pakistan, 'Proposal for an international legal instrument on Lethal Autonomous Weapons Systems (LAWS)' (Working Paper No CCW/GGE.1/2023/WP.3/Rev.1, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 8 March 2023)

Permanent Mission of Austria to the United Nations in Geneva, 'Contribution of Austria to the Chair's request on the Guiding Principles on emerging technologies in the area of LAWS' (Speech, CCCW Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, September 2020)

Piccone, Ted, 'How can international law regulate autonomous weapons?', *The Brookings Institution: Order from Chaos* (Blog Post, 10 April 2018)

<<https://www.brookings.edu/blog/order-from-chaos/2018/04/10/how-can-international-law-regulate-autonomous-weapons/>>

Quintana, Elizabeth, 'Operational Considerations for LAWS' (Presentation, CCCW Informal Meeting of Experts on LAWS, 14 April 2015)

Reed, John, 'Israel's killer robot cars', *Foreign Policy* (online, 20 November 2012)

<<https://foreignpolicy.com/2012/11/20/israels-killer-robot-cars/>>

République Française, 'Characterization of LAWS' (Working Paper, CCCW Informal Meeting of Experts on LAWS, 11-15 April 2016)

Richter, Wolfgang, 'Technical Issues: Military rationale for autonomous functions in weapon systems (AWS)' (Presentation, CCCW Informal Meeting of Experts on LAWS, 14 April 2015)

Roff, Heather M., 'Strategic, Operational and Tactical Considerations for Lethal Autonomous Weapon Systems' (Presentation, CCCW Informal Meeting of Experts, 14 April 2015)

Russian Federation, 'Considerations for the report of the Group of Governmental Experts of the High Contracting Parties to the Convention on Certain Conventional Weapons on emerging technologies in the area of Lethal Autonomous Weapons Systems on the outcomes of the work undertaken in 2017-2021' (Working Paper, CCW/GGE.1/2021/WP.1, 27 September 2021)

Russell, Stuart, 'Artificial Intelligence: Implications for Autonomous Weapons' (Presentation, CCCW Informal Meeting of Experts on LAWS, 13 April 2015)

Salazar-Albornoz, Mariana, 'Intervención de México Durante el Debate General [Statement from Mexico during the General Debate]' (Speech, CCCW Informal Meeting of Experts, 13 May 2014)

Sano, Toshio, 'Statement by H.E. Ambassador Toshio Sano' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 May 2014)

Sassòli, Marco, 'Can autonomous weapon systems respect the principles of distinction, proportionality and precaution?' (Presentation, International Committee of the Red Cross Expert Meeting, 26-28 March 2014)

Sauer, Frank, 'ICRAC statement on technical issues to the 2014 UN CCW Expert Meeting' (Media Release)

<<https://web.archive.org/web/20221110073330/https://www.icrac.net/icrac-statement-on-technical-issues-to-the-2014-un-ccw-expert-meeting/>>

Scharre, Michael C. Horowitz and Paul, 'Meaningful Human Control in Weapon Systems: A Primer' (Working Paper, Centre for a New American Security, March 2015)

Scharre, Paul, 'Where does the Human Belong in the Loop?' (Presentation, CCCW Informal Meeting of Experts, 13 May 2014)

Scharre, Paul, 'Presentation at the United Nations Convention on Certain Conventional Weapons' (Presentation, CCCW Informal Meeting of Experts on LAWS, 13 April 2016)

Senegal Ministry of Defence, 'Senegal Ministry of Defence, *Règlement de Discipline dans les Forces Armées* (Decree No 90-1159, 12 October 1990)' (1990)

Shamah, David, 'As Google Dreams of Driverless Cars, IDF Deploys Them', *The Times of Israel* (online, 3 June 2014) <<https://www.timesofisrael.com/as-google-dreams-of-driverless-cars-idf-deploys-them/>>

Sharkey, Noel, 'The pros and cons of LAWS' (Presentation, CCCW Informal Meeting of Experts, 13 May 2014)

Shim, David, 'UNOG Laws' (Presentation, CCCW Informal Meeting of Experts on LAWS, 11 April 2016)

Siegrist, Michael, 'A purpose-oriented working definition for autonomous weapon systems' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2016)

South Africa, 'CCW Statement by South Africa' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015)

Spain, 'Intervención de la Delegación Española [Statement of the Spanish Delegation]' (Speech, CCCW Informal Meeting of Experts, 13 May 2014)

Sri Lanka, 'Statement by Sri Lanka' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 April 2015)

Law, ICRC Advisory Service on International Humanitarian, '1980 Convention on Certain Conventional Weapons' (Fact Sheet, International Committee of the Red Cross, 30 June 2018) <<https://www.icrc.org/en/document/1980-convention-certain-conventional-weapons>>

Sweden, 'Statement by Sweden' (Statement, CCCW Group of Governmental Experts on Lethal Autonomous Weapons, 21-25 September 2020)

Swedish Ministry of Defence, 'Swedish Ministry of Defence, International Humanitarian Law in Armed Conflict (IHL Manual, January 1991)' (1991)

Switzerland, 'A “compliance-based” approach to Autonomous Weapon Systems' (Working Paper No 9, 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, 10 November 2017)

The Defence Development, Concepts and Doctrine Centre (United Kingdom Ministry of Defence), 'UK Weapon Reviews' (Report, 11 March 2016)

Tomasi, Silvano M., 'Statement by H.E Archbishop Silvano M. Tomasi' (Speech, CCCW Informal Meeting of Experts on LAWS, 13 May 2014)



Townley, Stephen, 'Statement by the United States' (Audio Speech, CCCW Informal Meeting of Experts on LAWS, 16 May 2014)

Turner, Julian, 'Sea Hunter: inside the US Navy's autonomous submarine tracking vessel', *Naval Technology* (Webpage, 3 May 2018) <<https://www.naval-technology.com/features/sea-hunter-inside-us-navys-autonomous-submarine-tracking-vessel/>>

United Kingdom, 'Written contributions on possible consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems' (Working Paper No CCW/GGE.1/2021/WP.11, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System, 11 January 2022)

United Kingdom Ministry of Defence, 'The Joint Service Manual of the Law of Armed Conflict' (Joint Service Publication No 383, 23 October 2004) <<https://www.gov.uk/government/publications/jsp-383-the-joint-service-manual-of-the-law-of-armed-conflict-2004-edition>>

United Kingdom Ministry of Defence, 'United Kingdom Ministry of Defence, *The Joint Service Manual of the Law of Armed Conflict* (Joint Service Publication No 383, 10 February 2011)' (2011)

United States Department of the Air Force, 'International Law – The Conduct of Armed Conflict and Air Operations' (Air Force Pamphlet No 110-31, 1976)

United Nations Office of Disarmament Affairs, 'Presentations and statements from the Meeting of Experts', *Convention on Certain Conventional Weapons – Meeting of Experts on Lethal Autonomous Weapons Systems*: (Web page) <<https://meetings.unoda.org/section/ccw-gge-2014-statements/>>

United States of America, 'U.S. Proposals on Aspects of the Normative and Operational Framework' (Working Paper No CCW/GGE.1/2021/WP.3, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon System, 27 September 2021)

United States Department of Defense, 'Autonomy in Weapon Systems' (Directive No 3000.09, 21 November 2012)

United States Department of Defense, 'The Defense Acquisition System' (Directive No 5000.01, 12 May 2003)

United States Department of Defense, 'Law of War Manual ' (Manual, December 2016)

United States Department of Defense, 'Operation of the Defense Acquisition System' (Instruction No 5000.2, 12 May 2003)

United States Department of Defense, 'Review of Legality of Weapons Under International Law' (Instruction No 5500.15, 16 October 1974)

United States Department of Defense, 'Unmanned Systems Roadmap 2007-2032' (Report, 10 December 2007)

United States of America, 'Characteristics of Lethal Autonomous Weapons Systems ' (Working Paper No 7, 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, 10 November 2017)

United States of America, 'Humanitarian benefits of emerging technologies in the area of lethal autonomous weapon systems ' (Working Paper No. 4, 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 28 March 2018)

United States of America, 'Implementing International Humanitarian Law in the Use of Autonomy in Weapon Systems ' (Working Paper No 5, Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, 28 March 2019)

Varma, D.B Venkatesh, 'Statement at the CCW Experts Meeting on Lethal Autonomous Weapon Systems' (Speech, CCCW Informal Meeting of Experts, 13 May 2014)

Watts, Arthur, Michael Wood and Omri Sender 'Codification and Progressive Development of International Law', *Max Planck Encyclopedias of International Law* (Web page article, April 2021) <<https://opil-ouplaw-com.ezproxy.bond.edu.au/view/10.1093/law:epil/9780199231690/law-9780199231690-e1380>>

Warnotte, Pauline, 'Belgian Commission for the Legal Review of New Weapons' (Presentation, CCCW Informal Meeting of Experts on Laws, 13 April 2016)

Werner, Ben, 'Navy Declares Unmanned MQ-8C Fire Scout Helicopter Mission Capable', *US Naval Institute News* (online, 9 July 2019) <<https://news.usni.org/2019/07/09/navy-declares-unmanned-mq-8c-fire-scout-helicopter-mission-capable>>

Wolfgang Richter, 'Utility and limitations of the use of LAWS in military operations' (Presentation, CCCW Informal Meeting of Experts on LAWS, 15 May 2014)

Woolcott, Peter, 'Australian Statement for the General Debate' (Speech, CCW Informal Meeting of Experts on Lethal Autonomous Weapon Systems (LAWS), 13 May 2014)

Xinli, Zhang, 'Legal issues concerning autonomous weapon systems' (Presentation, International Committee of the Red Cross Expert Meeting, 15-16 March 2016)

Yasin, Tarisa, 'The Importance of Flexibility in Regulating Lethal Autonomous Weapon Systems' *ANZSIL Perspective* (Editorial, 18 July 2021) <https://anzsilperspective.com/the-importance-of-flexibility-in-regulating-lethal-autonomous-weapon-systems/>

---

## APPENDICES

---

APPENDIX 1 TABLE 4.1 SUMMARY OF KEY ISSUES AND POINTS FROM THE 2014 MEETING

TABLE 4.1: SUMMARY OF KEY ISSUES AND POINTS FROM THE 2014 MEETING				
Key Issues	1. Clarifying terminology	2. The technical concept of autonomy	3. Understanding the operational and military aspects of LAWS	4. Prohibition, Moratorium or none? The ongoing debate
<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>Delegates agree that terms such as LAWS, autonomy and human control need to be clarified.</li> <li>Delegates have different conceptions of the terminologies discussed. There was no consensus as to the meaning of any of the three terms mentioned in the previous point.</li> <li>This section suggests a foundational description of 'effective human control' based on the discussions.</li> </ul>	<ul style="list-style-type: none"> <li>There are many factors to consider when describing autonomy.</li> <li>It was suggested that when looking at autonomy in a weapon system, the focus should be on autonomy in the critical functions of the weapon system.</li> <li>Building upon the foundational description of 'appropriate levels of human control', this thesis suggests an addition which is that a human operator is exercising <i>effective control</i> over the <i>critical functions</i> of a weapon system.</li> </ul>	<ul style="list-style-type: none"> <li>States are not necessarily interested in replacing human soldiers with LAWS.</li> <li>Militaries view commanders retaining control over military operations as essential</li> <li>The two points above demonstrate the need to be a common understanding of what levels of human control would be considered appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>It is a contentious debate that will be ongoing for the foreseeable future.</li> <li>It does not assist in building a working definition of 'appropriate levels of human control'. However, it is an aspect of the larger debate on LAWS that cannot be ignored as it is relevant to whether there needs to be additional regulations on LAWS.</li> <li>There was no consensus as to the most appropriate approach to dealing with the challenges of LAWS.</li> <li>This thesis agrees with the implementation of a moratorium as a compromise.</li> </ul>	

**APPENDIX 2: TABLE 4.2 SUMMARY OF KEY ISSUES AND POINTS FROM THE 2015 MEETING**

TABLE 4.2: SUMMARY OF KEY ISSUES AND POINTS FROM THE 2015 MEETING			
Key Issues	1. Whether or not to consider existing weapon systems	2. The concept of Distributed Autonomy	3. The characteristics of LAWS
<b>Key Points</b>	<ul style="list-style-type: none"> <li>This is an aspect of the debate that seems to have split participating delegations into two camps: those who believe that existing weapon systems should not be considered in the LAWS debate, and those who believe they should.</li> <li>This thesis argues that existing weapon systems should be considered in the LAWS debate, especially for developing the working definition of appropriate levels of human control.</li> <li>The reason that this thesis takes the position mentioned in the point above is that considering existing weapon systems along with future possibilities of LAWS would be a better approach for creating regulations for LAWS to ensure the effectiveness of the regulation and its implementation. This in turn will help ensure that the development and use of LAWS will not violate IHL.</li> </ul>	<ul style="list-style-type: none"> <li>There are two main elements in the concept of distributed autonomy.                             <ol style="list-style-type: none"> <li>Autonomous systems consist of software systems and various components.</li> <li>Autonomous systems are modelled as 'multi-agent systems', and each agent, whether human or software, has its own tasks to accomplish.</li> </ol> </li> <li>Therefore, autonomy is distributed amongst the various agents within the system and each of them is programmed or assigned to complete a particular task.</li> <li>The concept of distributed autonomy needs to be a key element in defining autonomy as it provides a more realistic picture of how autonomy works in a weapon system.</li> <li>The concept of distributed autonomy also needs to be a key element in the working definition of appropriate levels of human control since it will reflect the reality that humans are still involved in the overall operation of a weapon system.</li> </ul>	<ul style="list-style-type: none"> <li>There are two terms that are an essential part of describing the characteristics of LAWS which are 'meaningful human control' and 'critical functions'.</li> <li>From the discussions of this panel, a potential working definition of appropriate levels of human control should include the following components:                             <ol style="list-style-type: none"> <li>consideration of the interaction between a human operator and the weapon system (i.e., the human-machine interface) to ensure there is sufficient human control; and</li> <li>the critical functions of LAWS and the tasks the weapon systems are designed to perform.</li> </ol> </li> <li>The considerations mentioned in the point above provides support to the earlier description of appropriate levels of human control proposed under Key Issue two in section two of this chapter.</li> </ul>

**APPENDIX 3: TABLE 4.3 SUMMARY OF THE KEY ISSUE AND KEY POINTS FROM THE 2016 MEETING**

TABLE 4.3: SUMMARY OF THE KEY ISSUE AND KEY POINTS FROM THE 2016 MEETING	
Key Issue	1. So, what is autonomy?
<p><b>Key Points</b></p>	<ul style="list-style-type: none"> <li>• It is better to view autonomy using a scale rather than delineating it between what is automated and what is autonomous.</li> <li>• Using a scale of automation ensure that the criteria for determining whether a weapon system is more automated compared to autonomous (or vice versa) should be flexible enough to include existing weapon systems, possible future weapon systems and evolving autonomous technologies.</li> <li>• For the purpose of this thesis autonomy, in the context of AWS, is the ability for a weapon system to identify, select and attacks targets on its own.</li> </ul>

APPENDIX 4: TABLE 4.4 SUMMARY OF KEY THEMES AND POINTS FROM THE 2017 MEETING

TABLE 4.4: SUMMARY OF KEY THEMES AND POINTS FROM THE 2017 MEETING		
Key Theme	1. Emphasising the need to focus on autonomy in the critical functions of weapon systems	2. The importance of clarity in the regulation of weapon systems
Key Points	<ul style="list-style-type: none"> <li>When drafting regulations for LAWS such regulations must focus on the critical functions of LAWS because of the following reasons:               <ol style="list-style-type: none"> <li>It would ensure that the regulation addresses what differentiates LAWS from other commonly used weapons.</li> <li>it would allow drafters to address where it is important to have human control without being too ambiguous on exactly where, and what form of, human control is needed</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>There is an ethical basis to the legality of LAWS.</li> <li>Considerations such as whether LAWS should be given the capability to use lethal force without human supervision and whether life and death decisions should be delegated to weapon systems underpin the concerns surrounding the legality of LAWS under IHL.</li> <li>There needs to be 'legal clarity' as to what would be considered ethically unacceptable, and therefore unlawful when it comes to the development and use of LAWS.</li> </ul>