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Regulating a Game Changer: Using a Distributed Approach to Develop an Accountability Framework for Lethal Autonomous Weapon Systems

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REGULATING A GAME CHANGER: USING A DISTRIBUTED APPROACH TO DEVELOP AN ACCOUNTABILITY FRAMEWORK FOR LETHAL AUTONOMOUS WEAPON SYSTEMS

TETYANA (TANYA) KRUPIY*

ABSTRACT

The artificial intelligence capabilities of lethal autonomous weapon systems (LAWSs) will revolutionize warfare. States have identified an imperative to create an accountability framework to address situations where use of a LAWS triggers an international crime. Indeed, the advent of LAWSs necessitates that we rethink how we attribute criminal accountability and how we understand traditional legal notions used for assigning accountability. If the goals of international criminal law are to be promoted, the notion of moral agency should not be redefined to include LAWSs. Rather, there is a need for a distributed approach to accountability that ascribes responsibility to a senior political leader, a senior defense official responsible for promulgating policy on LAWSs, a weapon manufacturer, a weapon designer, a military commander, and an operator. The basis for this assertion is that a LAWS is in a matrix of relations with these individuals, meaning that they operate in an interdependent manner. These individuals are additionally in a matrix of relations with each other, and their conduct is interconnected. The criteria for assigning accountability should be whether the individual exercised authority in the circumstances over: (1) the LAWS either directly or through another person and (2) the manner in which the LAWS was integrated with the operator. The context of LAWSs calls for a wider understanding of what constitutes an exercise of authority than the definition the doctrine of command responsibility encapsulates. The conclusion proposes a legal test for assigning accountability for international crimes that arise from LAWSs.

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I.	INTRODUCTION	46
II.	CURRENT ISSUES RELATING TO ACCOUNTABILITY	54
	A. <i>Candidates for Accountability</i>	54
	B. <i>Challenges to Assigning Accountability</i>	63
III.	ENVISAGING LAWSs AS RELATIONAL ENTITIES	70
IV.	LAWS AS EMBEDDED IN A MATRIX OF RELATIONS	82
V.	MAPPING THE INTERACTIONS IN A MATRIX	86
	A. <i>The LAWS-Operator Assemblage</i>	87
	B. <i>The Programmer as the Creator of an Operator-LAWS</i> <i>Assemblage</i>	89
	1. The Programmer’s Authority Over the Operator	92
	2. The Programmer’s Authority Over a LAWS	94
	C. <i>The Politician’s Authority over the LAWS-Operator</i> <i>Assemblage</i>	96
	D. <i>The Politician’s Authority over the Defense Officials</i>	97
	E. <i>The Authority of the Corporate Directors over the</i> <i>Programmers</i>	104
VI.	CONCLUSION: THE FRAMEWORK	109

I. INTRODUCTION

In *I, Robot*, Isaac Asimov envisages the development of robotic technologies that outperform human beings. For instance, Herbie the robot can perform many complex mathematical calculations better than the company mathematician, Lanning.¹ Asimov’s vision reflects the current goal of programmers to invent robots with artificial intelligence that carry out complex tasks as well as or better than human beings.² The overview of military technologies that programmers successfully fielded illustrates the rapid pace of innovation that is taking place. In 2017, the Russian-based Kalashnikov Group released information that it had developed a fully-automated combat module for materiel that operates on artificial intelligence software; the system is able to identify targets and to assess whether to engage them.³ The Russian Federation displayed Su-57 fighter jets at a military parade in May 2018

1. ISAAC ASIMOV, *I, ROBOT* 102 (1963).

2. George Dvorsky, *How Will We Build an Artificial Human Brain?*, IO9 (May 2, 2012, 11:05 AM), <https://io9.gizmodo.com/how-will-we-build-an-artificial-human-brain-30786120>.

3. *Kalashnikov gunmaker develops combat module based on artificial intelligence*, TASS (July 5, 2017), <http://tass.com/defense/954894>.

that autonomously calculate changes in battlefield dynamics and are capable of striking targets.⁴ The United States in 2017 tested Perdix, a system consisting of a swarm of miniature drones which communicate with each other and jointly determine a strategy for implementing their mission.⁵ Currently, the U.S. envisages that Perdix will use lethal force in self-defense.⁶ In May 2018, the U.S. Pentagon allocated a budget of \$1 billion for companies to develop robotic technologies to aid troops.⁷ Paul Scharre commented that there will come a point at which countries will need to decide whether to delegate targeting decisions to machines.⁸

In terms of creating technologies to support the conduct of military operations, the U.S. Army Research Laboratory created a technique relying on artificial intelligence and machine learning that enables a face to be reconstructed from the thermal image of a person's face.⁹ The armed forces will use this technology to identify individuals who are on the "watch list" after nightfall.¹⁰ The software will take information about individuals who are on the watch list from the data contained in a biometric database.¹¹ In addition, the Chinese company Iflytek is working on developing an artificial intelligence robot that will pass entrance examinations at a level on par with students at the best Chinese universities.¹² The Chinese plan to draw on this research to design robots to assist human beings with gathering intelligence.¹³ Moreover, Israel's Tel Aviv University seeks to develop robots that

4. Will Stewart, *Putin to Showcase Russia's New Robot Army at Massive Military Parade in Red Square*, DAILY MIRROR (May 6, 2018), <https://www.mirror.co.uk/news/world-news/putin-showcase-russias-new-robot-12491134>.

5. David Martin, *New Generation of Drones Set to Revolutionize Warfare*, CBS NEWS (Jan. 8, 2017), <http://www.cbsnews.com/news/60-minutes-autonomous-drones-set-to-revolutionize-military-technology>.

6. *Id.*

7. Justin Bachman, *The U.S. Army is Turning to Robot Soldiers*, BLOOMBERG (May 18, 2018), <https://www.bloomberg.com/news/articles/2018-05-18/the-u-s-army-is-turning-to-robot-soldiers>.

8. *Id.*

9. U.S. ARMY RESEARCH LAB., *Face Recognition Technology that Works in the Dark*, SCIENCE DAILY (Apr. 6, 2018), <https://www.sciencedaily.com/releases/2018/04/180416142443.htm>.

10. *Id.*

11. *Id.*

12. John Markoff & Matthew Rosenberg, *China's Intelligent Weaponry Gets Smarter*, N.Y. TIMES (Feb. 3, 2017), <https://www.nytimes.com/2017/02/03/technology/artificial-intelligence-china-united-states.html>.

13. *Id.*

understand the relationship between different parts of an object.¹⁴ This development would enable a robot to analyze the content of a scene and perform a task, such as finding keys.¹⁵

The substantial investments into peaceful applications of artificial intelligence by countries including China, Canada, the United States, the United Kingdom, and the EU is pushing technological progress forward.¹⁶ Against this backdrop of innovation, states have been using the United Nations as a platform to discuss how to regulate the lethal applications of artificial intelligence technology on the battlefield.¹⁷ The provisional term states employ to refer to weapon systems operating on artificial intelligence principles that can select and engage targets without human oversight is “lethal autonomous weapon system” (LAWS).¹⁸

One of the reasons why there are calls to regulate LAWSs stems from the fact that while artificial intelligence systems outperform human beings on some tasks,¹⁹ they lack capabilities needed to accurately identify certain types of targets.²⁰ Artificial intelligence systems are good at tasks where they analyze many datasets and identify patterns.²¹ For instance, artificial intelligence systems can identify cancer by analyzing imagery better than human beings.²² They can also acquire diagnostic

14. Maayan Jaffe-Hoffman, *Tel Aviv University's Smart Artificial Intelligence Program*, JERUSALEM POST (May 1, 2018), <https://www.jpost.com/Israel-News/Tel-Aviv-Universitys-smart-artificial-intelligence-program-553218>.

15. *Id.*

16. Dave Gershgorn, *A.I. is the New Space Race. Here's What the Biggest Countries Are Doing*, QUARTZ (May 2, 2018), <https://qz.com/1264673/ai-is-the-new-space-race-heres-what-the-biggest-countries-are-doing/>.

17. *2016 Meeting of Experts*, U.N. OFFICE AT GENEVA (June 3, 2016), [http://www.unog.ch/80256EE600585943/\(httpPages\)/37D51189AC4FB6E1C1257F4D004CAFB2?OpenDocument](http://www.unog.ch/80256EE600585943/(httpPages)/37D51189AC4FB6E1C1257F4D004CAFB2?OpenDocument).

18. *See, e.g.*, U.S. DEP'T OF DEF., DEPARTMENT OF DEFENSE DIRECTIVE 3000.09: AUTONOMY IN WEAPON SYSTEMS 13 (2012); The Republic of France, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016), [https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/5FD844883B46FEACC1257F8F00401FF6/\\$file/2016_LAWSMX_CountryPaper_France+CharacterizationofaLAWS.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/5FD844883B46FEACC1257F8F00401FF6/$file/2016_LAWSMX_CountryPaper_France+CharacterizationofaLAWS.pdf); The Kingdom of the Netherlands, Opening Statement, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016), [https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/FC2E59B32F14D791C1257F920057CAE6/\\$file/2016_LAWS+MX_GeneralExchange_Statements_Netherlands.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/FC2E59B32F14D791C1257F920057CAE6/$file/2016_LAWS+MX_GeneralExchange_Statements_Netherlands.pdf).

19. Bernard Marr, *How A.I. and Deep Learning Are Now Used to Diagnose Cancer*, FORBES (May 16, 2017), <https://www.forbes.com/sites/civcnation/2017/10/12/a-catamount-post-mortem-what-does-it-actually-take-to-engage-students/#7c2473c1f3b0>.

20. Noel E. Sharkey, *The Evitability of Autonomous Robot Warfare*, 94 INT'L REV. RED CROSS 787, 788 (2012).

21. Bernard Marr, *supra* note 19.

22. *Id.*

skills faster than human beings.²³ Consequently, LAWSs are likely to be successful at identifying military objectives with a distinctive shape and appearance.²⁴ The Vincennes incident illustrates that machines have the potential to characterize correctly the nature of objects through making precise measurements.²⁵ In this incident, the computer on board a U.S. Navy ship correctly identified an Iranian aircraft as ascending while the crew mistakenly judged the aircraft as descending in an attack mode; the crew proceeded to authorize an attack against the civilian aircraft.²⁶ Had the crew relied on the information the on-board computer had provided, an erroneous attack on a civilian aircraft would have been prevented. Given, however, that adversaries will try to counter technological recognition advances by using camouflage and blending in with civilians,²⁷ it is unclear whether LAWSs will correctly identify lawful targets in such a complex battlefield environment.

An even more difficult task for a LAWS is to identify individuals directly taking part in hostilities.²⁸ This difficulty will be exacerbated where the adversary blends in with civilians to avoid identification or where it is customary for individuals to possess guns. For instance, in Pakistan, it is customary for men to carry guns throughout the day, so it can be hard to determine, based on possession of a weapon alone, who is directly participating in hostilities.²⁹ Human beings rely on emotions, empathy, and intuition to interpret cues in human behavior in order to understand evolving situations on the battlefield.³⁰ Presently, there are systems that can emulate abstract thought and create a strategy for

23. Interview with Joelle Pineau, Assoc. Professor, McGill Univ., in Montreal, Que., Can (May, 22 2017).

24. Markus Wagner, *Taking Humans Out of the Loop: Implications for International Humanitarian Law*, 21 J.L., INFO. & SCI. 155, 160 (2011).

25. U.S. DEP'T OF DEF., FORMAL INVESTIGATION INTO THE CIRCUMSTANCES SURROUNDING THE DOWNING OF IRAN AIR FLIGHT 655 ON 3 JULY 1988 37 (1988), <https://apps.dtic.mil/dtic/tr/fulltext/u2/a203577.pdf>.

26. *Id.* at 42-45.

27. Richard Norton-Taylor, *Asymmetric Warfare*, GUARDIAN (Oct. 3, 2001), <http://www.theguardian.com/world/2001/oct/03/afghanistan.socialsciences>; Rabbi Irwin Kula & Craig Hatkoff, *Fearful Scimitar: I.S.I.S. and Asymmetric Warfare*, FORBES (Sept. 2, 2014), <https://www.forbes.com/sites/offwhitepapers/2014/09/02/the-asymmetric-scimitar-obamas-paradigm-pivot/#3c406c2357b2>.

28. Sharkey, *supra* note 20, at 788-89.

29. AMNESTY INT'L, WILL I BE NEXT? U.S. DRONE STRIKES IN PAKISTAN 28 (2013).

30. JÖRG WELLBRINK, ROBOTER AM ABZUG (Zebis Discussion Seminar 2013), <http://www.zebis.eu/veranstaltungen/archiv/podiumsdiskussion-roboter-am-abzug-sind-soldaten-ersatzbar>.

achieving a mission goal.³¹ However, while artificial intelligence systems can transmit meaning, they lack understanding of the actual meaning and context behind the phenomena.³² This technology will eventually correctly predict human intentions, and it remains to be seen whether programmers will succeed in creating software that will enable artificial intelligence systems to accurately identify human targets.

Because it is unknown how artificial intelligence will evolve, states are in the course of debating how to define a LAWS and what degree of control operators should retain over the decision to employ lethal force.³³ For instance, Canada committed itself to “maintaining appropriate human involvement in the use of military capabilities that can exert lethal force.”³⁴ Other areas of debate involve how states can assure accountability for the use of this technology and whether a new treaty should be concluded to regulate LAWSs.³⁵ Against this background, numerous states, citizens, artificial intelligence experts, and non-governmental organizations stand for banning lethal applications of weapon systems operating on artificial intelligence software.³⁶

This Article addresses the question of how to attribute criminal accountability when a war crime occurs because a LAWS performed in an unforeseen manner or functioned unreliably.³⁷ It is crucial to develop a framework that lays out to whom accountability is to be attributed and how circumstances bear to which individual the commission of the war crime is attributed. The Geneva Conventions of 1949 require

31. Guillaume Chaslot et al., *Monte-Carlo Tree Search: A New Framework for Game A.I.*, AIIDE 216 (2008), <https://www.aaai.org/Papers/AIIDE/2008/AIIDE08-036.pdf>.

32. Jim Guscza, *Smarter Together: Why Artificial Intelligence Needs Human-Centered Design*, 22 DELOITTE REV. (2018).

33. Izumi Nakamitsu, High Representative for Disarmament Affairs of the United Nations, State of Play, presented at the A.I. for Global Good Summit Conference 5 (June 7, 2017).

34. HON. HARJIT S. SAJJAN, MINISTER OF NAT'L DEF., STRONG SECURE ENGAGED: CANADA'S DEFENCE POLICY 73 (2017).

35. Nakamitsu, *supra* note 33; Sajjan, *supra* note 34.

36. *Compilation of Open Letters Against Autonomous Weapons*, BAN LETHAL AUTONOMOUS WEAPONS, <https://autonomousweapons.org/compilation-of-open-letters-against-autonomous-weapons> (last visited Feb. 20, 2019); Stephen Goose & Mary Wareham, *The Growing International Movement Against Killer Robots*, HARV. INT'L REV., Summer 2016, 28; The EU's position on lethal autonomous weapon systems, P-007397-17 (Nov. 30, 2017), <https://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+WQ+P-2017-007397+0+DOC+XML+V0//EN&language=en>; Samuel Gibbs, *Elon Musk Leads 116 Experts Calling for Outright Ban of Killer Robots*, GUARDIAN (Aug. 20, 2017), <https://www.theguardian.com/technology/2017/aug/20/elon-musk-killer-robots-experts-outright-ban-lethal-autonomous-weapons-war>.

37. MICHAEL KURT RIEPL, WAR CRIMES WITHOUT CRIMINAL ACCOUNTABILITY? THE CASE OF ACTIVE PROTECTION SYSTEMS § 2018 (2016); Kelly Cass, *Autonomous Weapons and Accountability: Seeking Solutions in the Law of War*, 48 LOY. L.A. L. REV. 1017, 1048 (2015).

states to take penal measures to punish individuals who commit, or order others to commit, grave breaches of the Conventions; these provisions have customary international law status.³⁸ The targeting of a civilian or a wounded combatant constitutes a grave breach of the Geneva Conventions of 1949.³⁹ This Article advances a normative position that because individuals, rather than organizations, decide what technology is developed, how it is regulated, and how the armed forces use this technology, individuals should bear accountability, rather than organizations. As the judges of the Nuremberg Tribunal explained: “[c]rimes against international law are committed by men [and women], not by abstract entities, and only by punishing individuals who commit such crimes can the provisions of international law be enforced.”⁴⁰

This Article engages with the debate on how accountability may be ascribed to a particular individual or set of individuals when a LAWS brings about a war crime. The analysis addresses the accountability of government officials, the armed forces, and corporations. A determination of who should be held criminally accountable necessitates engagement with two issues: (1) how to conceptualize the nature of LAWSs, and (2) the nature of the link between an individual and a LAWS that warrants imposing accountability on an individual. In the debate over how to characterize artificial intelligence systems, some scholars focus on discussing whether such systems have moral agency⁴¹ and whether LAWSs can be compared to existing categories, such as child soldiers.⁴²

38. Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field art. 41, Aug. 12, 1949, T.I.A.S. 3362; Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea art. 50, Aug. 12, 1949, T.I.A.S. 3363; Geneva Convention (III) Relative to the Treatment of Prisoners of War art. 129, Aug. 12, 1949, T.I.A.S. 3364; Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War art. 146, Aug. 12, 1949, 75 U.N.T.S. 287.

39. *Rule 156. Definition of War Crimes*, INT’L COMM. OF THE RED CROSS, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule156 (last visited Feb. 20, 2019); JEAN-MARIE HENCKAERTS & LOUISE DOSWALD-BECK, CUSTOMARY INTERNATIONAL HUMANITARIAN LAW 568 § 1 (2005).

40. TRIAL OF THE MAJOR WAR CRIMINALS BEFORE THE INTERNATIONAL CRIMINAL TRIBUNAL 223 (1947), https://www.loc.gov/frd/frd/Military_Law/pdf/NT_VoI.pdf.

41. Luciano Floridi & J.W. Sanders, *On the Morality of Artificial Agents*, 14 MINDS & MACHINE 349, 357 (2004); Peter Asaro, *How just could a robot be?*, in CURRENT ISSUES IN COMPUTING AND PHILOSOPHY 51-52 (Adam Briggles, et al. eds., 2008); WENDELL WALLACH & COLIN ALLEN, MORAL MACHINES: TEACHING ROBOTS RIGHT FROM WRONG 34-35 (2009); Patrick Chisan Hew, *Artificial moral agents are infeasible with foreseeable technologies*, 16 ETHICS & INFO. TECH. 197, 199-200 (2014).

42. Rebecca Crootof, *Autonomous Weapon Systems and the Limits of Analogy*, in THE ETHICS OF AUTONOMOUS WEAPON SYSTEMS 24-25 (Claire Finkelstein et al. eds., 2017); Heather Roff, *Killing in War: Responsibility, Liability and Lethal Autonomous Robots*, in ROUTLEDGE HANDBOOK OF ETHICS

In contrast, Nicolas Gianni argues that LAWSs should be understood “through their relational use with humans.”⁴³

It is put forward that while it may be desirable to recognize the legal personality of artificial intelligence systems,⁴⁴ it is objectionable to assign moral agency to LAWSs and thus impute criminal accountability to LAWSs for the war crime.⁴⁵ Treating LAWSs as moral agents moves legal culpability away from the decisions of individuals relating to the design and performance of such systems.⁴⁶ But these individuals should bear responsibility for how a LAWS performs on the battlefield. This is because these individuals determine how to regulate emerging technologies, how to design weapon systems, how to embed weapon systems into the armed forces, and what degree of care operators should exercise when monitoring the performance of the weapon system. Viewing a LAWS as a relational entity allows for assigning accountability to all individuals who are involved in regulating, developing, manufacturing, and operating the LAWS.

By drawing on the scholarship of Giovanni Sartor and Andrea Omicini, Bruno Latour’s actor-network theory, Pieter Vermaas’s concept of a “sociotechnical system,” as well as the writings of Gilles Deleuze and Felix Guattari,⁴⁷ this Article asserts that LAWSs are typically embedded in a matrix. In particular, a LAWS is in a matrix of interactions with a senior politician, a senior defense official responsible for promulgating policy on LAWSs, the chief programmer, corporate directors, a military commander (commander), and an operator. As a result, accountability may be assigned to each of these actors when a LAWS triggers an unlawful killing. For the sake of clarity and simplicity,

AND WAR: JUST WAR THEORY IN THE 21ST CENTURY 356 (Fritz Allhoff et al. eds., 2013); Ugo Pagallo, *Robots of Just War: A Legal Perspective*, 24 PHIL. & TECH. 307, 308 (2011).

43. Nicolas Gianni, *How Can Actor-Network Theory Assist in Rethinking Approaches to Banning or Restricting Lethal Autonomous Weapon Systems?* (Jan. 24, 2017) (M.A. dissertation, Leiden University), <https://openaccess.leidenuniv.nl/bitstream/handle/1887/47447/Final%20Thesis%20Draft.pdf?sequence=1>.

44. *Report with Recommendations to the Commission on Civil Law Rules on Robotics*, at 18, A8-0005/2017 (Jan. 27, 2017), http://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.pdf.

45. Hew, *supra* note 41.

46. Ugo Pagallo, *Vital, Sophia, and Co.—The Quest for the Legal Personhood of Robots*, 9 INFO. 1, 4 (2018).

47. Giovanni Sartor & Andrea Omicini, *The Autonomy of Technological Systems and Responsibilities for Their Use*, in AUTONOMOUS WEAPONS SYSTEMS: LAW, ETHICS, POLICY 55 (2016); BRUNO LATOUR, REASSEMBLING THE SOCIAL: AN INTRODUCTION TO ACTOR-NETWORK-THEORY 71 (2005); PIETER VERMAAS ET AL., A PHILOSOPHY OF TECHNOLOGY: FROM TECHNICAL ARTEFACTS TO SOCIOTECHNICAL SYSTEMS 68-69 (2011); GILLES DELEUZE & FÉLIX GUATTARI, A THOUSAND PLATEAUS: CAPITALISM AND SCHIZOPHRENIA 4 (1987).

the term “defense official” refers to an individual who leads the defense department or ministry responsible for national security in different jurisdictions. Similarly, the term “defense department” is used to refer to institutions responsible for a state’s national security, such as the Ministry of Defense and the Department of Defense.

To determine how to assign accountability within this matrix, this Article will study how individuals who are part of the matrix interact with the LAWS and with each other. Gilles Deleuze and Felix Guattari’s concept of an assemblage is used to establish that the performance of a LAWS can be linked to a point in the matrix at which an individual exercises authority either over a LAWS or over the way in which a LAWS is coupled with an operator.⁴⁸ In Section V, criteria are put forward to attribute accountability based on the position of the individual in the matrix in relation to a LAWS at the time the LAWS targets a protected person or object. The types of authority on the basis of which accountability will be shown to be imputed to a senior politician, a senior defense official responsible for promulgating policy on LAWSs, the chief programmer, corporate directors, a commander, and an operator fit within how philosophers understand authority. However, these conceptions of authority are wider than the type of authority found in the doctrine of command responsibility for attributing accountability to superiors under international criminal law.⁴⁹

The assignment of accountability to multiple stakeholders reflects Armin Krishnan and Amanda McAllister’s proposal that accountability should be “split” or “distributed” among numerous individuals.⁵⁰ The present Article examines how accountability may be attributed to various individuals in Section V for war crimes that a LAWS triggers by analyzing how the decisions of particular individuals relate to the regulation, oversight, development, and operation of LAWSs.⁵¹ This Article uses the notion of authority to link the conduct of individuals in different organizations to the performance of a LAWS. The “distributed” approach to accountability is advantageous despite treating many

48. DELEUZE & GUATTARI, *supra* note 47.

49. Prosecutor v. Kordić & Čerkez, Case No. IT-95-14/2-T, Judgment, ¶ 401 (Int’l Crim. Trib. For the Former Yugoslavia Feb. 26, 2001).

50. ARMIN KRISHNAN, KILLER ROBOTS: LEGALITY AND ETHICALITY OF AUTONOMOUS WEAPONS 105 (2009); AMANDA McALLISTER, *Stranger than Science Fiction: The Rise of A.I. Interrogation in the Dawn of Autonomous Robots and the Need for an Additional Protocol to the U.N. Convention Against Torture*, 101 MINN. L. REV. 2527, 2564 (2017).

51. KRISHNAN, *supra* note 50; McAllister, *supra* note 50.

stakeholders as accountable.⁵² In a context where many individuals interact in an opaque manner and where their contributions play a pivotal role in enabling LAWSs to trigger war crimes, the goals of international criminal law are best served by imposing accountability on numerous stakeholders.

Part II of this Article will discuss how the general public and scholars conceive of accountability in the context of LAWSs. A brief overview of why the current legal doctrine is inadequate to address the context of LAWSs will be provided. Part III will argue that LAWSs should be thought of as relational entities rather than technical artifacts or as possessing moral agency. Part IV will demonstrate that a LAWS is in a network of relations with the operator, commander, senior programmer, corporate directors, senior defense official, and senior political leader. This Section will also posit that the network of relations in which a LAWS operates is best described as a matrix to reflect the fact that individuals in different organizations operate in an interdependent manner. Part V will demonstrate that the operator, commander, senior programmer, corporate directors, senior defense official, and senior political leader each exercise a type of authority over a LAWS. Therefore, each of these individuals should bear accountability where he or she acted within his or her domain of authority and where this action can be linked to a war crime a LAWS carries out. The conclusion contains a legal test of attribution for assigning accountability with a senior politician, senior defense official, corporate directors, senior programmer, commander, and operator.

II. CURRENT ISSUES RELATING TO ACCOUNTABILITY

A. *Candidates for Accountability*

Senior officials who promulgate laws or policies regarding the regulation of LAWSs are candidates for accountability, because governments' decisions regarding how to regulate new technologies have a bearing on the probability that LAWSs will perform in an unforeseen or unreliable manner and trigger war crimes as a result. In failing to adopt adequate regulatory frameworks, government officials create enabling conditions for LAWSs to unlawfully target individuals enjoying immunity from attack under international humanitarian law (IHL). States have been discussing what measures may be put in place to ensure

52. KRISHNAN, *supra* note 50; McAllister, *supra* note 50.

compliance with IHL.⁵³ To mitigate the danger of LAWSs performing in an illegal manner, some states are considering imposing requirements that an operator exercise “meaningful” control over the operation of the system.⁵⁴ An example of what constitutes an exercise of “meaningful” human control is an operator prescribing in what geographical area a LAWS will operate and what types of targets it should search for.⁵⁵ The employment of a LAWS that deploys munitions in a sparsely populated area poses a lesser danger to civilians than that in a densely populated area.⁵⁶ Another example of meaningful human control involves an operator intervening to override the system’s assessment and abort unlawful attacks.⁵⁷ States do not exclude the possibility that there will come a point when LAWSs will operate in an autonomous mode.⁵⁸ If this development takes place, the danger the

53. Delegation of Germany to the Conference on Disarmament, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016), [https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/1A10EE8317A92AA4C1257F9A00447F2E/\\$file/2016_LAWS+MX_Towardaworkingdefinition_Statements_Germany.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/1A10EE8317A92AA4C1257F9A00447F2E/$file/2016_LAWS+MX_Towardaworkingdefinition_Statements_Germany.pdf) [hereinafter Delegation of Germany]; Delegation of Italy, General Exchange of Views, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016), [https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/06A06080E6633257C1257F9B002BA3B9/\\$file/2016_LAWS_MX_towardsaworkingdefinition_statements_Italy.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/06A06080E6633257C1257F9B002BA3B9/$file/2016_LAWS_MX_towardsaworkingdefinition_statements_Italy.pdf) [hereinafter Delegation of Italy]; United Kingdom of Great Britain and Northern Ireland Statement to the Informal Meeting of Experts on Lethal Autonomous Weapons Systems, Opening Statement at the C.C.W.2016 Meeting of Experts on LAWS (Apr. 11-15, 2016), [https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/44E4700A0A8CED0EC1257F940053FE3B/\\$file/2016_LAWS+MX_Towardaworkingdefinition_Statements_United+Kindgom.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/44E4700A0A8CED0EC1257F940053FE3B/$file/2016_LAWS+MX_Towardaworkingdefinition_Statements_United+Kindgom.pdf) [hereinafter Delegation of the United Kingdom]; Delegation of Poland, Towards a Working Definition of L.A.W.S., CCW 2016 Informal Meeting of Experts on LAWS 1 (Apr. 11-15, 2016), [https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/400223F5850705E2C1257F9B002C008E/\\$file/2016_LAWS_MX_towardsaworkingdefinition_statements_Poland.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/400223F5850705E2C1257F9B002C008E/$file/2016_LAWS_MX_towardsaworkingdefinition_statements_Poland.pdf) [hereinafter Delegation of Poland]; DUSTIN LEWIS, GABRIELLA BLUM & NAZ MODIRZADEH, *WAR-ALGORITHM ACCOUNTABILITY* (Aug. 2016).

54. Delegation of Germany, *supra* note 53; Delegation of Italy, *supra* note 53; Delegation of the United Kingdom, *supra* note 53; Delegation of Poland, *supra* note 53; LEWIS, BLUM & MODIRZADEH, *supra* note 53.

55. AUTONOMOUS WEAPON SYSTEMS: THE NEED FOR MEANINGFUL HUMAN CONTROL, ADVISORY COUNCIL ON INT’L AFFAIRS (2015).

56. Rep. of the U.N. Sec’y-Gen. Antonio Guterres Established Pursuant to Res. 2286 (2016) of the Sec. Council, ¶ 11, U.N. Doc. S/PV.8264 (May 14, 2018).

57. Delegation of Israel, Statement of Israel Regarding the Characteristics of L.A.W.S., Part 2 of the Conference on Disarmament convened by United Nations 1 (Apr. 17, 2015), [https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/A02C15B2E5B49AA1C1257F9B0029C454/\\$file/2016_LAWS_MX_GeneralDebate_Statements_Israel.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/A02C15B2E5B49AA1C1257F9B0029C454/$file/2016_LAWS_MX_GeneralDebate_Statements_Israel.pdf).

58. Mattha Busby & Anthony Cuthbertson, ‘Killer Robots’ Ban Blocked by US and Russia at UN Meeting, INDEPENDENT (Sept. 3, 2018), <https://www.independent.co.uk/life-style/gadgets-and-tech/news/killer-robots-un-meeting-autonomous-weapons-systems-campaigners-dismayed-a8519511.html>; Noel Sharkey, *Killer Robots from Russia Without Love*, FORBES (Nov. 28, 2018), <https://www.forbes.com/sites/noelsharkey/2018/11/28/killer-robots-from-russia-without-love/>.

operation of LAWSs poses to civilians will increase dramatically. Retaining a degree of oversight by operators over LAWSs mitigates the danger that LAWSs will violate IHL in the course of operating.⁵⁹ When an operator exercises a degree of supervision over the operation of a LAWS, there is a greater opportunity to detect a risk of an adverse consequence and intervene.⁶⁰ For instance, there is less danger that a LAWS will target a civilian when the system has to ask for authorization before engaging a target,⁶¹ assuming that there is no malfunction,⁶² and that the operator has the requisite degree of skill.⁶³

Because unreliable performance of LAWSs may lead to war crimes,⁶⁴ the framework used to allocate accountability for these crimes should be in line with how international criminal law addresses such grave events. Imposing criminal accountability on senior government officeholders will further the aims of international criminal law. The goals of international criminal law are to deter the commission of war crimes⁶⁵ and to vindicate the victims.⁶⁶ In the United States, the Secretary of Defense controls the Under Secretary of Defense for Acquisition, Technology, and Logistics, who formulates policy regarding what technologies the armed forces employ.⁶⁷ The imposition of accountability on senior military officials, such as the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology, and Logistics, will reduce the number of war crimes LAWSs trigger due to the senior officials having an incentive to formulate stringent policy guidelines.⁶⁸ These guidelines include topics, such as what type of technology the

59. Bonnie Docherty, *Statement by Human Rights Watch on Meaningful Human Control in Lethal Autonomous Weapons Systems to the Convention on Conventional Weapons Group of Governmental Experts*, HUMAN RIGHTS WATCH (Nov. 4, 2018), <https://www.hrw.org/news/2018/04/11/statement-human-rights-watch-meaningful-human-control-lethal-autonomous-weapons>.

60. HUMAN RIGHTS WATCH, *KILLER ROBOTS AND THE CONCEPT OF MEANINGFUL HUMAN CONTROL: MEMORANDUM TO CONVENTION ON CONVENTIONAL WEAPONS (CCW) DELEGATES* (2016), <https://www.hrw.org/news/2016/04/11/killer-robots-and-concept-meaningful-human-control>.

61. *Id.*

62. U.S. DEP'T OF DEF., *supra* note 18.

63. *Id.* ¶ 4 (a) (1).

64. Jonathan O'Callaghan, *Will Robots get Away with War Crimes? Human Rights Watch Warns that NO ONE Will Be Accountable if AI Commits Atrocities*, MAIL ONLINE (April 10, 2015), <https://www.dailymail.co.uk/sciencetech/article-3033840/Will-robots-away-war-crimes-Human-Rights-Watch-warns-NO-ONE-accountable-AI-commits-atrocities.html>.

65. RUSSELL CHRISTIAN, *MIND THE GAP: THE LACK OF ACCOUNTABILITY FOR KILLER ROBOTS* (2015).

66. DINAH SHELTON, *REMEDIES IN INTERNATIONAL HUMAN RIGHTS LAW* 10 (2005).

67. 10 U.S.C. § 133(b) (2012).

68. CHRISTIAN, *supra* note 65, at 14.

armed forces may procure, how the armed forces should embed this technology, how operators should interact with LAWSs, and what quality standards the purchased systems should maintain. Similarly, holding programmers and corporate leaders accountable for how LAWSs perform on the battlefield will provide them with an incentive to develop and manufacture reliable products. Finally, placing accountability on commanders and operators will deter them from failing to exercise insufficient care when choosing how to employ LAWSs and how to monitor the LAWSs.

James Walsh's study shows that the public intuitively ascribes accountability to senior officials in situations where a LAWS brings about "undesirable consequences," such as the targeting of civilians.⁶⁹ Walsh found that U.S. citizens perceived the U.S. Department of Defense officials, such as the Secretary of Defense and commanders, to be the most responsible.⁷⁰ The subjects attributed a lesser degree of responsibility to the designers of the system if the system was non-autonomous, such as a drone.⁷¹ Drones are pilotless aircraft which the operators control remotely.⁷² The respondents assigned greater responsibility to developers of weapon systems with greater degrees of autonomy, such as LAWSs.⁷³ Although the subjects' responses are not representative of how individuals worldwide view the ascription of accountability in the context of LAWSs,⁷⁴ the responses are consistent with how one would frame attribution with a view to promote the aims of international criminal law.

It is additionally important to hold accountable a senior political leader who either proposes draft legislation regarding the modalities for regulating LAWSs on which the legislature votes or endorses the legislation the legislative bodies had voted on. The senior political leader who occupies such a position knows that there is a direct link between how the legislation regulates LAWSs and the likelihood that a LAWS will trigger a war crime.⁷⁵ He or she voluntarily chooses to

69. James Igoe Walsh, *Political accountability and autonomous weapons*, 2 RES. & POL. 1, 3 (2015).

70. *Id.* at 4.

71. *Id.*

72. *Drones: What are they and how do they work?*, BBC NEWS (Jan. 31, 2012), <http://www.bbc.com/news/world-south-asia-10713898>.

73. Walsh, *supra* note 69.

74. *Id.*

75. For the relationship between legal regulation and the commission of crimes see Jack Karsten, *As Criminals Adapt to New Technology, so Must International Law*, BROOKINGS INST. (2017), <https://www.brookings.edu/blog/techtank/2017/04/21/as-criminals-adapt-to-new-technology-so-must-international-law/>.

represent the views of the collective⁷⁶ and the value system underpinning the collective's decision-making.⁷⁷ As such, this individual should bear responsibility for bringing into existence a regulatory framework governing LAWSs. For instance, the Prime Minister and members of Parliament in France have the right of legislative initiative.⁷⁸ In the United Kingdom and Canada, the members of Parliament introduce bills.⁷⁹ In the United States, the Senate and the House of Representatives introduce bills.⁸⁰ In many jurisdictions, such as China, the United States, and Germany, the Heads of State and Senior Executives are responsible for signing the bills on which the government voted so as to bring them into force.⁸¹ Holding senior politicians criminally accountable by prosecuting them in court would promote the goals of international criminal law by deterring the commission of war crimes⁸² by ensuring that they adopt appropriate legislation to regulate LAWSs.⁸³

A key question for the purpose of determining to whom to allocate criminal accountability is why the senior politician and the senior defense official should bear criminal accountability given that legislative acts are political in nature.⁸⁴ Legal accountability relates to criminal and civil sanctions being applied to members of the government who

76. *Government Election Process and Political Parties*, ACTIVE U.S.A. CTR., <http://www.theusaonline.com/government/political-parties.htm> (last visited Feb. 16, 2019).

77. GARY L. GREGG II, *THE PRESIDENTIAL REPUBLIC: EXECUTIVE REPRESENTATION AND DELIBERATIVE DEMOCRACY* 27 (1997); Reuven Rivlin, President of the State of Israel, *The Institution of the Presidency in Israel* (Nov. 26, 2018), http://www.president.gov.il/English/The_Presidency_In_Israel/Pages/PresidencyNew.aspx.

78. 1958 CONST. art. 39 (Fr.).

79. *Legislative Process*, HOUSE OF COMMONS OF CAN., http://www.ourcommons.ca/About/Compendium/LegislativeProcess/c_g_legislativeprocess-e.htm (last visited Feb. 21, 2019); *Public Bills*, U.K. PARLIAMENT, <http://www.parliament.uk/about/how/laws/bills/public> (last visited Feb. 21, 2019).

80. U.S. CONST. art. I, §7.

81. *Id.*; GRUNDGESETZ [GG] [BASIC LAW] art. 82, *translation at* http://www.gesetze-im-internet.de/englisch_gg/index.html; BUNDES-VERFASSUNGSGESETZ (B-VG) [CONSTITUTION] art. 47(1) (Austria); Barbara Darimont, *Rechtsetzung und Kontrolle der Gesetzesdurchführung in der V.R. China* [*Legislation and Control of Law Implementation in the People's Republic of China*], 36 L. & POL. IN AFR. & LAT. AM. 511, 515 (2003); XIANGGANG JIBEN FA arts. 48, 76 (H.K.).

82. CHRISTIAN, *supra* note 65.

83. For the relationship between legal regulation and the commission of crimes see Karsten, *supra* note 75.

84. Lynn Mather, *Law and Society*, in *THE OXFORD HANDBOOK OF POLITICAL SCIENCE* (Robert E. Goodin ed. 2013), <http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199604456.001.0001/oxfordhb-9780199604456-e-015>.

break the law.⁸⁵ Political accountability involves government bodies criticizing or asking members of the government to resign in response to a failure to meet the expectations associated with holding the relevant office.⁸⁶ Political accountability is wider than legal accountability.⁸⁷ In democratic countries, chief executive officers, such as a government minister, a secretary of a department,⁸⁸ or a member of a cabinet, are oftentimes expected to resign even if they were not personally responsible for an incident.⁸⁹ Political accountability reflects the position that in democratic societies rulers should justify their decisions and answer for their actions to the citizens when they exercise their power in the capacity as representatives of the people.⁹⁰

It is important to hold individuals involved in regulating LAWS criminally accountable to give effect to the underlying purpose of international criminal law where it was foreseeable that lack of sufficient safeguards would result in LAWS engaging in the commission of war crimes. It is suggested that legal accountability is more appropriate than political accountability in such instances, because a war crime involves an unlawfully-inflicted death.⁹¹ The gravity of international crimes is reflected in the fact that states treat such crimes as impinging the interests of the international community.⁹² The proposal to assign accountability to a senior politician mirrors the domestic laws of some states.⁹³ For example, many European countries apply criminal sanctions to the conduct of civil servants and elected officials when the nature of the offense is linked to the performance of public office,⁹⁴ and

85. Eur. Comm'n for Democracy Through Law, *Report on the Relationship Between Political and Criminal Ministerial Responsibility*, 94th Sess., Doc. No. CDL-AD(2013)001 (2013) at 4 [hereinafter Venice Comm'n].

86. *Id.*

87. *Id.*

88. U.S. Secretary of Defense Chuck Hegel resigned in 2014, because he thought that this decision would serve the interests of the Department of Defense. See Paul D. Shinkman, *Chuck Hagel Explains Why He Resigned as Secretary of Defense*, U.S. NEWS (Dec. 4, 2014), <https://www.usnews.com/news/articles/2014/12/04/chuck-hagel-explains-why-he-resigned-as-secretary-of-defense>.

89. Venice Comm'n, *supra* note 85, at 4.

90. PHILIPPE C. SCHMITTER, *POLITICAL ACCOUNTABILITY IN 'REAL-EXISTING' DEMOCRACIES: MEANING AND MECHANISMS* 4-5 (2007).

91. INT'L COMM. OF THE RED CROSS, *supra* note 39; Henckaerts & Doswald-Beck, *supra* note 39.

92. Rome Statute of the International Criminal Court, art. 17, July 17, 1998, 2187 U.N.T.S. 90, U.N. Doc. A/CONF. 183/9 [hereinafter Rome Statute]. (1998); *CrimC (Jer) 40/61 Attorney-General of the Government of Israel v. Adolf Eichmann*, ¶ 12 (1961) (Isr.); *Filartiga v. Peña Irala*, 630 F.2d 876 (2d Cir. 1980).

93. Venice Comm., *supra* note 85, at 9.

94. *Id.* at 7, 9.

when the gravity of the consequences merits such a response.⁹⁵ Examples include the diversion of public funds to be used for private purposes,⁹⁶ abuse of powers associated with the office, and maladministration.⁹⁷ Additionally, some European countries apply criminal sanctions to ministers who breach their constitutional obligations toward parliament, the cabinet, the civil service, or the public.⁹⁸ In 2012, Iceland charged its former Prime Minister Geir H. Haarde for exhibiting gross negligence in failing to take action to reduce or avert the foreseeable risk of an imminent banking crisis under section 10(b) of the Act on Ministerial Responsibility 1963,⁹⁹ but then later acquitted him of this criminal charge.¹⁰⁰ However, the judges found that the Prime Minister violated Article 17 of the Icelandic Constitution¹⁰¹ and Article 8(c) of the Act on Ministerial Accountability 1963¹⁰² by failing to place the risk of a banking crisis on the agenda of cabinet meetings.¹⁰³ In

95. *Id.* at 5.

96. *Id.* at 7.

97. *Id.* at 9.

98. *Id.* at 11.

99. Act on Ministerial Responsibility 1963, Act no. 4/1963, art. 10 (Ice.) [hereinafter Act on Ministerial Responsibility] (The provision states, “Finally a Minister will be deemed guilty according to this Act: a) if he severely misuses his power, although he may not have directly exceeded his executive boundaries; b) if he carries out something or causes something to be carried out that foreseeably jeopardizes the State’s fortunes although its execution is not specifically forbidden by law, as well as if he allows a failure to carry out something that could avert such danger or causes such execution to fail.”).

100. Alþingi v. Geir Hilmar Haarde, Doc. No. 3/2011, Judgment (Landsdómur Apr. 23, 2012) (Iceland); Rupert Neate, *Iceland Ex-PM Geir Haarde Cleared of Bank Negligence*, GUARDIAN (Apr. 23, 2012), <https://www.theguardian.com/world/2012/apr/23/iceland-geir-haarde-found-guilty>.

101. STJÓRNARSKRÁ LYÐVELDISINS ÍSLANDS [CONSTITUTION OF THE REPUBLIC OF ICELAND], art. 17. Article 17 of Iceland’s Constitution stipulates that “Ministerial meetings shall be held in order to discuss new legislative proposals and important State matters. Furthermore, Ministerial meetings shall be held if a Minister wishes to raise a matter there. The meetings shall be presided over by the Minister called upon by the President of the Republic to do so, who is designated Prime Minister.” *Id.*

102. Act on Ministerial Responsibility, *supra* note 99, art 8. Article 8 of the Act on Ministerial Responsibility 1963 states, “In conformity with the provisions above, a Minister is accountable according to law as follows: a) If he personally issues instructions or sees to the issuance of instructions by the president on matters which, according to the Constitution, can only be determined by law or fall under the auspices of the courts; b) if he does not seek the consent of parliament (Althingi) when obligated to do so according to the Constitution; c) if he by other means personally implements, orders the implementation of or allows the implementation of any such measure that contravenes the Constitution of the Republic, or omits implementing any such measure as ordered or causes an implementation not taking place; d) if he causes any decision or implementation that could reduce the freedom or sovereignty of the country.” *Id.*

103. *Haarde*, Doc. No. 3/2011; Neate, *supra* note 100.

principle, European countries could employ existing legislation to prosecute a public official for failing to adopt appropriate legislation governing the employment of LAWSs.

Some countries, such as the United States, favor political accountability of officeholders through impeachment.¹⁰⁴ Article II, Section 4 of the U.S. Constitution provides that “[t]he President, Vice President and all civil Officers of the United States, shall be removed from Office on Impeachment for, and Conviction of, Treason, Bribery, or other high Crimes and Misdemeanors.”¹⁰⁵ The processes of impeachment and criminal trial in the United States are separate processes.¹⁰⁶ The Senate may pass a vote concluding that the commission of an offense did not warrant an impeachment or conviction.¹⁰⁷

The following example involving domestic law in the United States illustrates why political accountability is an insufficient response to rigorous regulation of LAWSs. If politicians fail to adopt legislation to create common standards for the manufacturing of self-driving cars operating on artificial intelligence principles, and, as a result, the sensors that the manufacturers installed enabled the cars to recognize only the cars of the same brand, then many collisions might ensue on the first day of the introduction of the self-driving cars on the road. As a result, some passengers would more than likely die. The politicians could foresee that lack of common regulatory standards would lead to cars colliding due to lacking the means to detect the cars of other brands.

If such an incident were to occur, citizens would likely demand accountability of their politicians.¹⁰⁸ The citizens are likely to perceive resignation from office as a response that does not reflect their disapproval of the public officials’ conduct and of the seriousness of the

104. U.S. CONST. art. II, § 4.

105. *Id.*

106. *Excerpts from Justice Department Memorandum*, N.Y. TIMES (Oct. 6, 1973), <https://nyti.ms/1MNTK9D>.

107. *Id.*

108. For example, in the United States, the prosecutors opened criminal charges against police officers who allegedly used excessive force against racialized individuals. Moreover, “In Baltimore and Chicago, the [Justice] department opened broader investigations into the practices of the Police Departments.” Haeyoun Park & Jasmine C. Lee, *Looking for Accountability in Police-Involved Deaths of Blacks*, N.Y. TIMES (May 3, 2017), <https://www.nytimes.com/interactive/2016/07/12/us/looking-for-accountability-in-police-involved-deaths-of-blacks.html>. This response recognizes both the importance of individual prosecutions and the institutional context in which the crimes take place.

consequences.¹⁰⁹ By the same token, government officials should be held criminally accountable when their failure to adopt appropriate regulation results in the deaths of civilians of a different country. Countries that do not impose criminal sanctions on public officials for failing to adopt appropriate laws and policies should enact such legislation in cases where a failure to adopt the legislation results in international crimes being brought about by systems operating on artificial intelligence software. The countries should adopt legislation that provides for impeachment proceedings to enable criminal prosecutions of the officials to take place when insufficiently stringent regulations facilitate the possibility of LAWSs engaging in unlawful killings.

A potential setback to having a senior politician bear criminal accountability is that heads of government may enjoy immunity under domestic law for the executive acts associated with the maintenance of national security and defense.¹¹⁰ However, Eric M. Freedman interprets the Constitution as allowing the President of the United States to be criminally prosecuted while in office for wrongdoing committed while in office; impeachment is a complementary measure rather than a condition for the prosecutions to take place.¹¹¹ It is desirable for countries to consider creating mechanisms for holding senior politicians criminally accountable for failure to appropriately regulate LAWSs. As Freedman points out, citizens should subject the President to the law and not treat the President as enjoying absolute immunity.¹¹² His statement may be modified to state that citizens have a responsibility to safeguard the lives of civilians in other countries through holding their senior officeholders criminally accountable for failing to appropriately regulate weapon systems, such as LAWSs.

The present Article does not exclude the concurrent use of other remedies. An example of a complementary remedy is victims suing

109. *Id.* The states in the United Nations adopted a position that the immunity of the United Nations staff should be lifted for the purpose of the prosecution of war crimes. U.N. GAOR, 69th Sess., 27th mtg., U.N. Doc. A/C.6/69/SR.27 (Nov. 5, 2014). The response of states indicates the gravity of international crimes and the fact that it is felt that resignations are an insufficient response.

110. English courts will not review the conduct of a public official pertaining to national security or defense where to do so would damage the public interest. Defense lies within the exclusive responsibility of the executive government. *Campaign for Nuclear Disarmament v. Prime Minister and Others* [2002] EWHC 2759, ¶¶ 41-42, (Eng.). For the U.S. context see *Schneider v. Kissinger*, 412 F.3d 190 (D.C. Cir. 2005). For the context of Hong Kong, see XIANGGANG JIBEN FA art. 19 (H.K.).

111. Eric M. Freedman, *On Protecting Accountability*, 27 HOFSTRA L. REV. 677, 680 (1999).

112. *Id.* at 726-27.

weapon manufacturers for compensation for damage caused by the employment of defective weapon systems.¹¹³ The article proposes that individuals involved in regulating, developing, manufacturing, and employing weapon systems should be held criminally accountable where they could foresee that the lawful use of the system may result in deaths of individuals entitled to immunity from attack and where they nevertheless enabled such systems to operate on the battlefield.

B. *Challenges to Assigning Accountability*

There are challenges to imputing a war crime caused by a LAWS under existing criminal law and international criminal law frameworks. There exist three bases for ascribing responsibility to an individual in criminal law. These are: (1) the existence of a causal link between the act of an individual and the outcome,¹¹⁴ (2) a legal duty to act or to abstain from an act,¹¹⁵ and (3) a moral duty to act or to abstain from an act.¹¹⁶ The weaker the element of causality between the conduct of an individual and the wrongful outcome, the harder it will be to justify imposing criminal responsibility on an individual on any of the three bases. Traditionally, criminal law has been concerned with blameworthy conduct where an individual made a conscious decision to carry out or to contribute to a wrongful act.¹¹⁷

Broadly, international criminal law requires that “for the accused to be criminally culpable his [or her] conduct must . . . have contributed to, or have had an effect on, the commission of the crime.”¹¹⁸ In the absence of a sufficiently close link between the act and the outcome, it is difficult to argue that the individual had the necessary mental element to carry out the act in question.¹¹⁹ In the context of LAWSs, it is

113. Richard R. Murray & Kellye L. Fabian, *Compensating the World's Landmine Victims: Legal Liability and Anti-Personnel Landmine Producers*, 33 SETON HALL L. REV. 323 (2003).

114. ALEX LEVERINGHAUS, *ETHICS AND AUTONOMOUS WEAPONS* 69 (2016).

115. *Id.*

116. *Id.*

117. *Id.* at 72; IRYNA MARCHUK, *THE FUNDAMENTAL CONCEPT OF CRIME IN INTERNATIONAL CRIMINAL LAW: A COMPARATIVE LAW ANALYSIS* chs. 2-3 (2014).

118. *Prosecutor v. Kayishema*, Case No. ICTR-95-1, Judgment by Trial Chambers II, ¶ 199 (Int'l Crim. Trib. For Rwanda May 21, 1999).

119. A distinction has traditionally been drawn between the material elements and the mental elements of offences, with issues of fault or culpability being identified with the latter rather than the former. This scheme, however, obscures the role of certain general principles and rules respecting material elements, such as those which pertain to causation.” However, rules of causation in criminal law are “not independent of issues of culpability.” He continues that “The function of these principles and rules is to identify persons who may be held guilty of offences in

challenging to trace the link between the conduct of a particular programmer, corporate employee, or government official and the international crime of a LAWS.¹²⁰ There may be a lack of sufficient proximity between the politicians' decision to bring into effect a law regulating LAWSs and the developer's decision relating to a particular LAWS design. The hypothetical legislation discussed here sets a range of parameters that specifies reliability and design criteria for a LAWS. Since the reliability of the LAWS is linked to its architecture, the flawed design of a particular LAWS creates an opportunity for a LAWS to execute a war crime. Similarly, when the policies of the defense department relating to how LAWSs are to be embedded into the armed forces are silent on how LAWS will be designed, there is no causal link between the promulgated policy and the LAWS's architecture. From this perspective, senior officials bear no accountability for war crimes committed by LAWSs, because these individuals are not involved in developing and manufacturing the weapon systems.

The existing legal frameworks, such as the doctrine of command responsibility,¹²¹ render it difficult to impute accountability to officials, such as a senior defense official, for a war crime that a LAWS carries out. Since states designed the doctrine of command responsibility with natural persons and military organizations in mind, this doctrine is difficult to apply to the relationship between a human superior and a LAWS.¹²² Article 28 of the Rome Statute of 1998 imposes criminal responsibility on civilian and military superiors who have "effective command and control" or "effective authority and control" over subordinates who commit an international crime.¹²³ The International Criminal Court interpreted the test of "effective control" in a manner identical to the customary international law definition.¹²⁴ Under

the event that the mental elements are also established." Eric Colvin, *Causation in Criminal Law*, 1 BOND L. REV. 253, 253 (1989).

120. ANTHONY FINN & STEVE SCHEDING, DEVELOPMENTS AND CHALLENGES FOR AUTONOMOUS UNMANNED VEHICLES 182-84 (2010).

121. Statute of the Special Tribunal for Lebanon, art. 3(2), S.C. Res. 1757, Annex, U.N. Doc. S/RES/1757 (May 30, 2007); Law on the Establishment of the Extraordinary Chambers in the Courts of Cambodia for the Prosecution of Crimes Committed During the Period of Democratic Kampuchea (2001) (Cambodia), as amended by NS/RKM/1004/006, art. 29 (Oct. 27, 2004); Statute of the Special Court for Sierra Leone, art. 6(3), Jan. 16, 2002, 2178 U.N.T.S. 145, U.N. Doc. S/2002/246, appendix II; Statute of the International Criminal Tribunal for Rwanda, art. 6(3), S.C. Res. 955, Annex, U.N. Doc. S/RES/955 (Nov. 8, 1994).

122. *In re Yamashita*, 327 U.S. 3 (1946).

123. Rome Statute, *supra* note 92, at art. 28(a).

124. Prosecutor v. Jean-Pierre Bemba Gombo, ICC-01/05-01/08-3343, Judgment, ¶ 188 (Mar. 21, 2016).

customary international law, such superiors should have had the “material ability” to prevent and punish the commission of these offenses.¹²⁵ For instance, the superior should have had the power to “initiate measures leading to proceedings against the alleged perpetrators.”¹²⁶ Moreover, the superior should have failed to take “necessary and reasonable” measures within his or her power to prevent the subordinate from committing an international crime or to punish the subordinate.¹²⁷ When states formulated the doctrine of command responsibility, they assumed that individuals are in a hierarchical relationship to each other.¹²⁸ This can be gleaned from the nature of the indicia states require to establish effective control. Indicators that a superior possesses “effective control” over a subordinate include the fact that a superior has the ability to issue binding orders¹²⁹ and that the subordinate has an expectation that he or she has to obey such orders.¹³⁰

Hin-Yan Liu posits that the doctrine of command responsibility applies to a relationship between two human beings and therefore does not regulate an interface between a LAWS and an individual.¹³¹ This assertion is well-founded, because how LAWSs function does not fit with how subordinates interact with superiors. In principle, a LAWS could be programmed to check that the order lies within a set of orders that it can implement. However, a LAWS does not make decisions in the sense in which human beings think of decision-making.¹³² Since a LAWS lacks moral agency,¹³³ a LAWS cannot reflect on whether it is under an obligation to obey an order. Neither does the threat of punishment play a role in its decision-making process. A LAWS is guided by

125. Prosecutor v. Mucić, IT-96-21-A A.Ch., Judgment, ¶ 256 (Feb. 20, 2001) [hereinafter Čelebići Case], <http://www.icty.org/x/cases/mucic/acjug/en/cel-aj010220.pdf>.

126. Prosecutor v. Blaškić, IT-95-14-A A.Ch., Judgment, ¶ 69 (July 29, 2004), <http://www.icty.org/x/cases/blaskic/acjug/en/bla-aj040729e.pdf>.

127. *Gombo*, ICC-01/05-01/08-3343 at ¶ 188.

128. Prosecutor v. Kordić & Čerkez, IT-95-14/2-T T.Ch., Judgment, ¶ 421 (Feb. 26, 2001); Prosecutor v. Jose Cardoso Ferreira, Case No. 04/2001, Judgment, ¶ 516 (The Special Panels for Serious Crimes in Dili, Republic of the East Timor Apr. 5, 2003).

129. *Kordić & Čerkez*, IT-95-14/2-T, ¶ 421.

130. *Ferreira*, Case No. 04/2001, ¶ 516.

131. Hin-Yan Liu, *Autonomy in Weapons Systems*, in *ENCYCLOPEDIA OF PUBLIC ADMINISTRATION AND PUBLIC POLICY 5* (Domic A. Bearfield & Melvin J. Dubnick eds., Taylor & Francis Group 3d ed. 2015).

132. Interview with Geert-Jan Houben, Full Professor of Web Info. Sys., Delft Univ. of Tech., in Delft, Neth. (Oct. 31, 2018).

133. Christof Heyns (Special Rapporteur), *Rep. on Extrajudicial, Summary or Arbitrary Execution*, ¶¶ 43-44, U.N. Doc. A/HRC/23/47 (Apr. 9, 2013).

its software when it performs an action.¹³⁴ The operator activates processes in the software by inputting an instruction into a LAWS.¹³⁵ There is a temporal and geographical gap between a LAWS's acts and the creation of the architecture guiding how a LAWS performs.¹³⁶

The operator lacks a material ability to prevent a LAWS from operating in an unreliable manner and triggering a war crime due to not being involved in its design.¹³⁷ Furthermore, it is impossible to employ the doctrine of command responsibility to attribute a war crime to an individual in a corporation. An indicator of "effective control" is that the alleged superior was, "by virtue of his or her position, senior in some sort of formal or informal hierarchy to the perpetrator."¹³⁸ Where the corporation is a separate organization from the defense department and where the defense staff does not have the responsibility to oversee the day-to-day operations of contractors via a chain of command,¹³⁹ defense officials lack "effective control" over corporate employees.¹⁴⁰ In such cases, the defense officials or a similar body can neither issue binding orders nor expect obedience from individuals who are not subordinate to them through a chain of command.¹⁴¹

The fact that customary international law requires that the conduct associated with the war crime take place during an armed conflict¹⁴² is not a setback for imputing accountability to individuals involved in developing and regulating LAWSs. As the International Criminal Tribunal for the Former Yugoslavia held in the *Prosecutor v. Kunarac* case:

134. Adriano Iaria, *Lethal Autonomous Weapon Systems and the Future of Warfare*, 17 IAI COMMENTARIES 1, 1 (2017).

135. Neil Davison, *A Legal Perspective: Autonomous Weapon Systems under International Humanitarian Law*, in PERSPECTIVES ON LETHAL AUTONOMOUS WEAPON SYSTEMS, U.N.O.D.A. OCCASIONAL PAPERS NO. 30 5, 6 (2017).

136. Rebecca Crootof, *War Torts: Accountability for Autonomous Weapons*, 165 U. PENN. L. REV. 1347, 1394-95 (2016).

137. CHRISTIAN, *supra* note 65, at 24.

138. *Prosecutor v. Čelebići*, IT-95-21-A Judgment of the App. Chamber, ¶ 303 (Int'l Crim. Trib. For the Former Yugoslavia, Feb. 20, 2001).

139. *The Challenges Facing the Dep't of Def.: Hearing Before the S. Comm. on Armed Serv.*, 111th Cong. (2009).

140. Kate Neilson, *Ending Impunity: Bringing Superiors of Private Military and Security Company Personnel to Justice*, 9 N.Z.Y.B. INT'L L. 121, 153 (2011).

141. *Id.*

142. *Prosecutor v. Blaškić*, IT-95-14-T, Judgment, ¶ 69 (Int'l Crim. Trib. For the Former Yugoslavia Mar. 3, 2000).

The armed conflict need not have been causal to the commission of the crime, but the existence of an armed conflict must, at a minimum, have played a substantial part in the perpetrator's ability to commit it, his decision to commit it, the manner in which it was committed or the purpose for which it was committed. Hence, if it can be established, as in the present case, that the perpetrator acted in furtherance of or under the guise of the armed conflict, it would be sufficient to conclude that his acts were closely related to the armed conflict.¹⁴³

Because the legislature¹⁴⁴ and the individual defense ministries typically promulgate regulations relating to the armed forces,¹⁴⁵ and because the armed forces employ LAWSs in an armed conflict, there is a nexus between the conduct of the officials and the performance of a LAWS on the battlefield. In principle, it should not matter that there is a time gap between the conduct of a government official and the use of a LAWS during an armed conflict. This scenario is akin to a situation where an individual starts planning to commit a war crime during peacetime but carries out the crime during an armed conflict.

On the development level, the fact that many organizations are likely to produce individual components for a LAWS poses a challenge for assigning accountability to a particular individual.¹⁴⁶ Even when a single corporation designs and manufactures a LAWS, there will be numerous individuals collaborating on designing a LAWS and on determining product specifications.¹⁴⁷ For instance, a team of programmers could work together on proposing alternative blueprints for the architecture of a LAWS. The board of directors or senior managers could decide what product specifications to give to programmers to develop. The collaborative nature of the decision-making related to the architecture of a LAWS poses difficulty for attributing a flawed design of a LAWS to a particular individual.

143. Prosecutor v. Kunarac, IT-96-23-T, Judgment, ¶ 58 (Int'l Crim. Trib. For the Former Yugoslavia June 12, 2002).

144. SAMUEL FLÜCKIGER, ARMED FORCES, CIVIL SOCIETY AND DEMOCRATIC CONTROL: CONCEPTS AND CHALLENGES 7 (2008).

145. *Id.* at 9-10. For the U.K. practice, see MINISTRY OF DEF., HOW DEFENCE WORKS 6-8 (2015); U.S. DEP'T OF DEF., *supra* note 18.

146. Tim McFarland & Tim McCormack, *Mind the Gap: Can Developers of Autonomous Weapons System be Liable for War Crimes?*, 90 INT'L L. STUD. 361, 381 (2014).

147. *Id.* at 363; Marchant et al., *International Governance of Autonomous Military Robots*, 7 SCI. & TECH. L. REV. 271, 284 (2011).

Furthermore, because the armed forces deploy the LAWS at the time it brings about a war crime,¹⁴⁸ it “may not be possible to establish the relevant intent and knowledge of a particular perpetrator” who is not part of the armed forces.¹⁴⁹ Customary international law requires that the superior knew or “had reason to know” that the subordinate was about to commit or had committed a war crime.¹⁵⁰ The complexity of the software and hardware makes it challenging to impute even negligence to a particular individual involved in designing a LAWS.¹⁵¹ One possible counterargument, though, is that a programmer who knows he or she is unable to foresee the exact manner in which a LAWS will perform its mission because of the nature of the artificial intelligence software is reckless when he or she certifies that the system is suitable for carrying out missions involving autonomous application of lethal force.¹⁵² Since the mental element of the doctrine of command responsibility encompasses recklessness,¹⁵³ on the application of this approach the programmer would fulfill the mental element requirement of the doctrine of command responsibility. The same argument applies to corporate directors and defense officials.

Scholars propose various strategies for addressing the accountability gap. Alex Leveringhouse posits that an individual who takes excessive risks associated with ceding control to a LAWS or who fails to take into account the risks associated with employing a LAWS should bear responsibility.¹⁵⁴ Such responsibility stems from the fact that the individual could foresee that a LAWS could link two variables in an inappropriate manner and carry out an unlawful act.¹⁵⁵ On this basis, the operator would be accountable.¹⁵⁶ Leveringhouse’s approach mirrors the U.K. Joint Doctrine Note 2/11, which places responsibility on the

148. Delegation of Germany, *supra* note 53, at 2; Delegation of Italy, *supra* note 53, at 1; United Kingdom of Great Britain and Northern Ireland Statement to the Informal Meeting of Experts on Lethal Autonomous Weapons Systems, *supra* note 53, at 1.

149. LEWIS, BLUM & MODIRZADEH, *supra* note 53, at 77-78.

150. Čelebići Case, IT-96-21-A.A.Ch., Judgment, ¶ 239 (Feb. 20, 2001).

151. Brendan Gogarty & Meredith Hagger, *The Laws of Man over Vehicles Unmanned: The Legal Response to Robotic Revolution on Sea, Land and Air*, 19 J.L. INFO. & SCI. 73, 123 (2008).

152. James Brady argues that for the purpose of imputing recklessness persons who know of the risk but hope that it will not materialize are as blameworthy as individuals who know that there is a risk but who choose to disregard it. James B. Brady, *Recklessness, Negligence, Indifference and Awareness*, 43 MOD. L. REV. 381, 399 (1980).

153. Čelebići Case, IT-95-21-A.A.Ch., Judgment, ¶ 378(ii) (Feb. 20, 2001).

154. LEVERINGHAUS, *supra* note 114, at 82.

155. *Id.* at 80.

156. *Id.* at 82.

last person who issues commands associated with employing a LAWS for a military activity.¹⁵⁷

Although Leveringhouse's approach¹⁵⁸ merits consideration, it gives insufficient weight to the fact that operators play no role in devising regulatory frameworks regarding the operational restrictions placed on the employment of LAWSs and regarding the steps they should take in order to mitigate the risks associated with employing LAWSs. As a result, Leveringhouse¹⁵⁹ unduly restricts the range of individuals who are held accountable. The better approach is found in the U.K. Joint Doctrine 2/11,¹⁶⁰ which places accountability on relevant national military or civilian authorities who authorize the employment of LAWSs. However, the U.K. Joint Doctrine 2/11 does not go far enough, because it does not extend accountability to senior politicians.¹⁶¹ Heather Roff explains that policy elites and heads of state are the ones who truly make decisions to employ LAWSs.¹⁶² Because they possess full knowledge about such systems and decide the limitations for their use, they are morally and legally responsible for the outcomes brought about by LAWSs.¹⁶³ Roff concludes that current legal norms make it impossible to hold political elites responsible.¹⁶⁴

Thilo Marauhn maintains that Article 25(3)(c) of the Rome Statute of 1998 could be employed to attribute responsibility to developers and manufacturers of LAWSs.¹⁶⁵ This provision criminalizes aiding, abetting, and assisting the commission of an international crime for "the purpose of facilitating the commission of ... a crime."¹⁶⁶ However, Marauhn's proposal is unworkable. First, it requires that the aider and abettor is an accessory to a crime another individual perpetrated.¹⁶⁷ Developers and manufacturers cannot aid a LAWS to perpetrate a war crime, because a LAWS is not a natural person. Further, developers and

157. CHIEFS OF STAFF, MINISTRY OF DEF, JOINT DOCTRINE NOTE 2/11: THE U.K. APPROACH TO UNMANNED AIRCRAFT SYSTEMS § 5-5 (2011).

158. LEVERINGHAUS, *supra* note 114, at 82.

159. *Id.*

160. CHIEFS OF STAFF, *supra* note 157.

161. *Id.*

162. Roff, *supra* note 42, at 358-59.

163. *Id.*

164. *Id.* at 359.

165. THILO MARAUHN, AN ANALYSIS OF THE POTENTIAL IMPACT OF LETHAL AUTONOMOUS WEAPONS SYSTEMS ON RESPONSIBILITY AND ACCOUNTABILITY FOR VIOLATIONS OF INTERNATIONAL LAW 4 (2014).

166. Rome Statute, *supra* note 92, at art 28(a).

167. Prosecutor v. Tadić, IT-94-I-A A.Ch., Judgment, ¶ 229 (July 15, 1999), <http://www.icty.org/x/cases/tadic/acjug/en/tad-aj990715e.pdf>.

manufacturers are unlikely to fulfill the *actus reus* requirement of carrying out acts “specifically directed to assist, encourage or lend moral support” to the perpetration of a certain specific crime with such support having a “substantial effect upon the perpetration of the crime.”¹⁶⁸ Corporations operate to earn a profit. Corporate directors and managers know that bodies, such as the Department of Defense, will not buy a weapon system where it is clear that the system is designed to bring about war crimes.¹⁶⁹ Given that states formulated the doctrine of command responsibility with human relationships and human perpetrators in mind,¹⁷⁰ the better course of action is to formulate a legal framework to address the context of LAWSs. This position is in line with the proposals of many scholars, such as Gwendelynn Bills, who argue that states should adopt a new treaty to regulate LAWSs.¹⁷¹

III. ENVISAGING LAWSs AS RELATIONAL ENTITIES

There are indications that states may endow artificial intelligence with legal personhood. Saudi Arabia granted citizenship to the artificial intelligence system Sophia in 2017.¹⁷² A number of experts recommended to the EU that it should consider recognizing autonomous robots as having a legal status of “electronic persons.”¹⁷³ While it may be desirable to grant legal status to robotic systems, care should be taken not to conflate the nature of the legal status of human beings with that of artificial intelligence systems. A group of computer scientists explains that “[r]obots are simply not people.”¹⁷⁴ It is undesirable to apply existing categories, such as moral agency, to robotic systems, because they do not capture the nature of such systems.¹⁷⁵ Rather, we

168. *Id.*

169. Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I) art. 36, Jun. 8, 1977, 1125 U.N.T.S. 3 [hereinafter API]; INT’L COMM. 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*, 88 INT’L REV. OF THE RED CROSS 864, 931, 933 (2006).

170. Liu, *supra* note 131.

171. Gwendelynn Bills, Note, *LAWS unto Themselves: Controlling the Development and Use of Lethal Autonomous Weapons Systems*, 83 GEO. WASH. L. REV. 176, 197 (2015).

172. Zara Stone, *Everything you Need to Know about Sophia, the World’s First Robot Citizen*, FORBES (Nov. 7, 2017, 12:22 PM), <https://www.forbes.com/sites/zarastone/2017/11/07/everything-you-need-to-know-about-sophia-the-worlds-first-robot-citizen/#4533dc0546fa>.

173. *Report with Recommendations to the Commission on Civil Law Rules on Robotics*, at 18, A8-0005/2017 (Jan. 1, 2017), http://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.pdf.

174. Rather, artificial intelligence systems are products. Margaret Boden et al., *Principles of Robotics: Regulating Robots in the Real World*, 29 CONNECTION SCI. 124, 126 (2017).

175. Hew, *supra* note 41, at 204.

should develop a separate category for understanding the nature of LAWSs. Luciano Floridi and J.W. Sanders propose that the current definition of moral agency is anthropocentric and that a new definition of a moral agent should be developed to include artificial intelligence systems.¹⁷⁶ Traditionally, many legal philosophers associate moral agency with: (1) an ability to intend an action, (2) a capacity to autonomously choose the intended action, and (3) a capability to perform an action.¹⁷⁷ In order to be able to intend an action and to autonomously elect an action, an individual needs to possess a capacity to reflect on what beliefs to hold.¹⁷⁸

The current state of LAWSs technology fulfills only the third prong of the test, a capability to perform particular tasks. Floridi and Sanders obviate this difficulty by proposing a new test for moral agency for artificial intelligence systems.¹⁷⁹ Under this test, a system possesses moral agency provided that the system: (1) can act on the environment and incorporate feedback from the environment, (2) can perform internal transitions to change its state, and (3) can change its internal rules in order to adapt to the environment.¹⁸⁰ The essence of this conception of moral agency is that the system is dynamic and can modify the principles on which it operates in order to function more optimally in the environment.

The problem with this definition of moral agency is that it does not address the causes behind why a LAWS performed in a suboptimal manner when it carried out a war crime. A LAWS cannot execute a war crime unless a developer creates a software that operates in such a manner as to result in the LAWS triggering a war crime. Viewing LAWSs as moral agents detracts from the fact that human beings decide how LAWSs are designed, how they interact with their environment, and what outcomes they bring into effect. The position of Floridi and Sanders is arguably incompatible with how individuals intuitively attribute blameworthiness and accountability. Josh Green suggests that the innate evolutionary processes in the brain¹⁸¹ will result in many people adopting the moral stance that when a driverless car kills a person, the act in question is a premeditated, expected, “mechanical” death

176. Floridi & Sanders, *supra* note 41, at 350-51.

177. DAVID RÖNNEGARD, THE FALLACY OF CORPORATE MORAL AGENCY 11 (2015).

178. *Id.* at 12.

179. Floridi & Sanders, *supra* note 41, at 351.

180. *Id.* at 357-58.

181. *Driverless Dilemma*, RADIOLAB, 12:25-14:50 (Sep. 26, 2017), <https://www.wnycstudios.org/story/driverless-dilemma>.

perpetrated by the programmer.¹⁸² This stems from the fact that the individuals perceive such deaths as having been “engineered” rather than as a product of an accident.¹⁸³

A counterargument may be levied to the position that human beings should bear accountability rather than LAWS. One could maintain that the ascription of criminal accountability on the basis of satisfaction of a narrow test for moral agency reproduces a particular cultural lens for understanding agency. On this approach, the barrier to ascribing accountability to a LAWS is cultural since there is nothing natural about attributing moral agency only to human beings. William Ewald posits that the trials of animals during the Middle Ages illustrate how culture influences our philosophical thinking, legal doctrine, and processes.¹⁸⁴ He argues that conceptual schemes give shape to moral theories, and culture determines the conceptual schemes.¹⁸⁵ He provides an account of courts conducting criminal trials as retribution against domestic animals including cows, dogs, and chickens during the Middle Ages; the sentences included imprisonment and death penalty.¹⁸⁶ Ewald argues that these trials can be explained by reference to the fact that individuals during the Middle Ages in Europe perceived crime, guilt, pain, justice, and trial differently than individuals in contemporary times.¹⁸⁷ Individuals justified punishing animals by reference to the fact that God created them.¹⁸⁸ Society did not view animals as possessing rational thought.¹⁸⁹ Courts tried animals and human beings on an equal footing because the Bible portrayed both as being capable of doing good and evil.¹⁹⁰ Ewald concludes that animal trials show the limits of abstract moral judgment and that moral ideas are grounded in history.¹⁹¹

While it is true that our values, culture, and state of scientific of knowledge shape how we perceive animals and robots, we also need coherency in how we attribute criminal accountability in the legal regimes of criminal law and international criminal law. There is a

182. *Id.* at 36:00-38:23.

183. *Id.*

184. William Ewald, *Comparative Jurisprudence (I): What Was it Like to Try a Rat?*, 143 UNIV. PENN. L. REV. 1889, 1934-35 (1995).

185. *Id.* at 1932.

186. *Id.* at 1903-05.

187. *Id.* at 1905.

188. *Id.* at 1916.

189. *Id.* at 1909.

190. *Id.* at 1916.

191. *Id.* at 1935.

difference between recognizing a LAWS as having legal personality, rights, and responsibilities,¹⁹² and prosecuting a highly sophisticated entity that human beings created to perform particular tasks. One of the differences between the context of human beings and LAWSs is that human beings pre-design LAWS; the architecture of LAWS determines what properties may emerge. On the other hand, parents do not engineer their children through selecting genes.¹⁹³ Societies expect individuals to develop their own values systems on which to base decisions. This fact can be inferred from the Universal Declaration of Human Rights of 1948.¹⁹⁴ The Preamble to the Universal Declaration of Human Rights lists freedom, dignity, and the worth of human beings as important values.¹⁹⁵ Since developers determine what value system to encode into the LAWSs and since LAWSs do not select their values, developers should bear accountability for the consequences stemming from the operation of LAWSs.

Rebecca Crootoff argues that LAWSs are unique, because they differ from existing categories, such as weapons, combatants, child soldiers, and animals.¹⁹⁶ Arguably, one of the distinguishing features of LAWSs is that programmers take the knowledge about biological processes in the human body,¹⁹⁷ build simplified models of how such processes work, and use the models as a foundation for creating programming tools.¹⁹⁸ Since programmers use knowledge about biological processes as a foundation for creating artificial intelligence programming techniques, there is a superficial similarity between a human being, an animal, and a LAWS. For instance, the range of experiences individuals have, and the activities they undertake, shape their development

192. Rapporteur of Committee on Legal Affairs Mady Delvaux, Rapporteur of Committee on Transport and Tourism Georg Mayer and Rapporteur of the Committee on Civil Liberties, Justice and Home Affairs Michal Boni proposed that the European Parliament should vote to recognize autonomous robots as having a legal status of “electronic persons.” Rep. with Recommendations to the Comm’n on Civil Law Rules on Robotics, U.N. Doc. A8-0005/2017 at 18 (2017).

193. Paul Berg & David Baltimore, *Let’s Hit ‘Pause’ before Altering Humankind*, WALL ST. J. (April 8, 2015), <https://www.wsj.com/articles/lets-hit-pause-before-altering-humankind-1428536400>.

194. The Preamble to the Universal Declaration of Human Rights lists freedom, dignity and worth of human beings as important values. G.A. Res. 217 (III) A, pmbll., Universal Declaration of Human Rights (Dec. 10, 1948).

195. *Id.*

196. Crootof, *supra* note 42, at 24-25.

197. Annie Jacoben, *Inside the Pentagon’s Effort to Build a Killer Robot*, TIME (Oct. 27, 2015), <http://time.com/4078877/darpa-the-pentagons-brain>.

198. DANIEL GRAUPE, PRINCIPLES OF ARTIFICIAL NEURAL NETWORKS 1-2 § 7 (World Scientific 3rd ed. 2013).

through altering the structure of the neural network in their brains.¹⁹⁹ A LAWS operating on a neural network resembles a human being, because the system changes the weight between the neural connections as it incorporates new information.²⁰⁰ On the other hand, LAWSs differ from traditional weapons, because one of their tasks will be to process different types of inputs in order to arrive at a characterization of the object. Current models of “fire and forget weapons” detect a military objective based on its signature or pre-programmed target characteristics.²⁰¹ They do not analyze multiple sources of data in order to determine the character of the object.²⁰² In contrast, depending on how states decide to regulate LAWSs, these systems could autonomously select and engage targets with human operators merely exercising oversight over the performance of the system.²⁰³

Gianni proposes that “LAWS are not best understood through their physical properties, but rather through their relational use with humans.”²⁰⁴ The term “relational” denotes that the LAWS, the programmer, and the operator adapt to each other. In doing so, both the human and the machine make a shared contribution to the functioning of the LAWS.²⁰⁵ He bases this proposition on the fact that a programmer adjusts the LAWS at the testing stage if the LAWS does not perform according to expectations.²⁰⁶ It is necessary to refine Gianni’s argument, because he does not capture the fact that programmers design a LAWS to acquire its architecture through interaction with human beings and the environment. Given the characteristics of LAWSs and how they function, LAWSs should be perceived as relational entities to their environment and individuals.

Two sets of arguments supporting this contention will now be examined in turn. The micro-level arguments relate to the type of programming tools computer scientists use to create artificial intelligence systems, such as LAWSs. The macro-level arguments derive from the

199. NAT’L RESEARCH COUNCIL, *HOW PEOPLE LEARN: BRAIN, MIND, EXPERIENCE, AND SCHOOL* (2000).

200. GRAUPE, *supra* note 198, at 9.

201. *Operational limitations of Fire-and-Forget Missiles*, DEFENSE UPDATE (June 27, 2019), http://defense-update.com/features/du-2-07/helicopters_3gen_missiles.htm.

202. Jack M. Beard, *Autonomous Weapons and Human Responsibilities*, 45 GEO. J. INT’L L. 617-81, 629 (2014).

203. Rep. of the 2018 Sess. of the Grp. of Gov’t Experts on Emerging Tech. in the Area of Lethal Autonomous Weapons Sys., 6-7, U.N. Doc. CCW/GGE.1/2018/3 (Aug. 31, 2018).

204. Gianni, *supra* note 43, at 15.

205. *Id.* at 16.

206. *Id.* at 15-16.

claim that all technologies, and therefore LAWSs, are embedded in social structures.²⁰⁷ In order to understand why artificial intelligence systems are by their nature relational to their environment and creators, one needs to know how they operate. Although there are different learning algorithms,²⁰⁸ all artificial intelligence techniques entail that the machine determines suitable responses to particular scenarios based on taking data from the environment and detecting correlations in the data.²⁰⁹

The artificial intelligence technique of a neural network involves imitating how the brain operates.²¹⁰ The focus is on emulating human cognition, perception, memory, imagery, thought, consciousness, and learning.²¹¹ The network consists of units that imitate how brain cells, or neurons, operate.²¹² When an individual is exposed to a particular type of stimuli, such as a peach, the receptors on the tongue produce a particular activation pattern among the neurons in the brain.²¹³ The neurons pass the activation pattern to each other throughout the brain.²¹⁴ If an individual is exposed to a particular experience repeatedly, the activation pattern corresponding to a particular stimulus, such as the taste of a peach, is stored in the memory.²¹⁵

Many programmers use vectors in space, a mathematical concept, to code the correspondence between particular stimuli, such as objects, and the activation pattern those stimuli produce among neurons.²¹⁶ The vector represents the excitation levels the neurons in the neural network have when the LAWS is exposed to particular stimuli,²¹⁷ such as the emission of heat and the color of a military uniform. The programmer adjusts the weight between connections of the synthetic neurons so that particular types of inputs create a specific activation

207. Sheila Jasanoff, *Future Imperfect: Science, Technology and the Imaginations of Modernity*, in DREAMSCAPES OF MODERNITY: SOCIOTECHNICAL IMAGINARIES AND THE FABRICATION OF POWER 2, (Sheila Jasanoff & Sang-Hyun Kim eds., 2015).

208. ZHONGZHI SHI, *ADVANCED ARTIFICIAL INTELLIGENCE* 560 (2011).

209. Arend Hintze, *Understanding the Four Types of AI, from Reactive Robots to Self-Aware Beings*, CONVERSATION (Nov. 14, 2016), <http://theconversation.com/understanding-the-four-types-of-ai-from-reactive-robots-to-self-aware-beings-67616>.

210. ZHONGZHI SHI, *supra* note 208, at 10 ¶ 1.

211. *Id.*

212. JOHN JOHNSTON, *THE ALLURE OF MACHINIC LIFE: CYBERNETICS, ARTIFICIAL LIFE, AND THE NEW A.I.* 312 (2008).

213. *Id.*

214. *Id.*

215. *Id.*

216. *Id.*

217. *Id.*

pattern in the neural network.²¹⁸ In order for a particular input to trigger a particular output, the input has to produce a particular weight inside a single neuron and in the web of the activated neurons.²¹⁹ Programmers adjust neural weights among neurons and expose the system to real-life scenarios until a point is reached where a particular input generates a particular output.²²⁰ The result is that a system operating on a neural network can recognize a particular input pattern, such as a tank.²²¹

The neural network does not exist in the abstract. Rather, it should be thought of as being relational in nature to its environment. Phenomena that exist in the world, including military objectives and civilian objects, are mapped on a mathematical object in a neural network, namely the vector.²²² The nature of objects is translated into another form as the input from the LAWS's sensors is being inscribed in the neural network. Because the LAWS operating on a neural network maps real-life phenomena onto vectors using mathematical equations and translates them into a particular excitation pattern among neurons,²²³ objects in the environment form an integral part of the neural network. In this manner, the environment sculpts the architecture of the neural network, and the neural network is in a dynamic relationship with the environment. As the LAWS is exposed to different scenarios, it registers points on the vectors corresponding to its environment.²²⁴ Moreover, a neural network cannot be operational in the absence of a surrounding environment because stimuli in the environment are needed to activate its operation.²²⁵ Since programmers took inspiration from how a human body functions when developing a neural network,²²⁶ and since human beings are relational to their environment, LAWSs operating on a neural network too are relational in nature to their environment. John Johnson's description illustrates the manner in which human beings are relational in respect of their environment. Johnston explains that "[h]uman behavior entails a fluid linking of body, brain, and environment, with all three constantly

218. *Id.* at 304.

219. *Id.*

220. *Id.* at 305, 312.

221. *Id.*

222. *Id.* at 312.

223. *Id.*

224. *Id.*

225. *Id.*

226. Jacoben, *supra* note 197.

changing over time and many of these changes feeding and being fed by complex interactive loops.”²²⁷

In addition to being relational to its environment, the neural network is relational in respect to the programmer. Joelle Pineau describes the neural network as a simplified mathematical model of the environment.²²⁸ The programmer makes numerous inputs into the neural network.²²⁹ Specifically, the programmer exposes the neural network to real life events, adjusts the neural weights to more accurately capture different types of stimuli, and creates the mathematical model corresponding to real life occurrences.²³⁰ The programmer acts as the mediator between the environment and the neural network in shaping and supervising how phenomena get translated onto a mathematical model. The relational nature of the neural network to its environment and the programmer calls for an investigation into the precise nature of the interaction between the programmer and the LAWS. In turn, the fact that the LAWS is relational in respect to the programmer raises the question whether the criminal responsibility should be assigned to the programmer.

It will now be shown that other artificial intelligence tools are relational in respect to their environment. The genetic algorithm is used as a case study to illustrate the validity of the argument. The presence of an overarching theme of LAWS being relational to individuals and the environment stems from the fact that programmers use biological systems as the basis on which they create artificial intelligence programming techniques.²³¹ To illustrate, the U.S.-based company Psibernetix, Inc. used the programming technique of a genetic fuzzy tree to create a system Alpha; the system navigates aircraft in a hostile environment and has the capability to attack enemy aircraft from a long distance.²³²

The system Alpha uses a decision-making tree with branches to represent parameters, such as enemy tactics and the danger posed to the aircraft.²³³ The system uses the branches as a guide to evaluate the suitability of a decision.²³⁴ The component of a genetic algorithm

227. JOHNSTON, *supra* note 212, at 278.

228. Interview with Joelle Pineau, *supra* note 23.

229. *Id.*

230. *Id.*

231. Jacoben, *supra* note 197.

232. M.B. Reilly, *Beyond Video Games: New Artificial Intelligence Beats Tactical Experts in Combat Simulation*, UNIV. CIN. MAG. (June 27, 2016), http://magazine.uc.edu/editors_picks/recent_features/alpha.html.

233. *Id.*

234. *Id.*

employs mathematical models to simulate the behavior of life bodies.²³⁵ Genetic algorithms achieve learning through generating different permutations of a sequence of symbols and by selecting those sequences that are best suited for a particular purpose.²³⁶ In the case of Alpha, the programmers used the genetic algorithm to generate and select permutations relating to the position of own and enemy aircraft that yielded the best tactical advantage.²³⁷ The fuzzy component of the Alpha software was language-based and contained rules on how the system should perform whenever a particular combination of variables existed.²³⁸ Because genetic algorithms select and modify sequences of symbols corresponding to a decision based on input from the environment,²³⁹ they are in constant interaction with the environment.²⁴⁰ In other words, LAWSs utilizing genetic algorithms are relational to their environment. Through selecting the types of variables that the system uses to construct permutations of solutions, the programmer creates a relational linkage between himself or herself and the system.

LAWSs are additionally in a relational position to senior politicians who promulgate legislation to enable the defense department to purchase LAWSs for the armed forces.²⁴¹ States created IHL in order to mitigate the effect of armed conflict by prohibiting a set of practices.²⁴² Under treaty²⁴³ and customary international law, states are legally obligated to assess whether the use of a weapon by the armed forces is in compliance with IHL prior to fielding the new weapon system.²⁴⁴ Consequently, a programmer will embed an elaborate set of IHL rules,

235. SHI, *supra* note 208, at 565.

236. *Id.* at 19.

237. Nicholas Ernest et al., *Genetic Fuzzy based Artificial Intelligence for Unmanned Combat Aerial Vehicle Control in Simulated Air Combat Missions*, 6 J. DEF. MGMT 1, 1, 6 (2016).

238. Reilly, *supra* note 232.

239. Wolfgang Golubski, *Genetic Programming: A Parallel Approach*, in *SOFTWARE 2002: COMPUTING IN AN IMPERFECT WORLD* 167, 167-68 (David Bustard et al. eds., 2002).

240. Naoki Mori et al., *Adaptation to a Changing Environment by Means of the Feedback Thermodynamical Genetic Algorithm*, in *LECTURE NOTES IN COMPUTER SCIENCE* (A.E. Eiben et al. eds., 2006).

241. U.S. CONST. art. I, § 8.

242. *What is International Humanitarian Law?*, INT'L COMM. OF THE RED CROSS (Dec. 31, 2014), <https://www.icrc.org/en/document/what-international-humanitarian-law>.

243. API, *supra* note 169, art. 36.

244. PROGRAM ON HUMANITARIAN POLICY & CONFLICT RESEARCH AT HARV. UNIV., *MANUAL ON INTERNATIONAL LAW APPLICABLE TO AIR AND MISSILE WARFARE* Rule 9 (2009); *Rule 139: Respect for International Humanitarian Law*, INT'L COMM. OF THE RED CROSS, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule139 (last visited Feb. 19, 2019).

such as the prohibition of targeting incapacitated combatants,²⁴⁵ into a LAWS to guide how it classifies objects and individuals. One of the tasks a programmer needs to confront is to enable the LAWS to distinguish between civilians and civilian objects on the one hand, and combatants and military objectives on the other.²⁴⁶ To achieve this, a LAWS operating on a neural network will deconstruct a combatant into a set of variables, such as the color of a military uniform, country's flag, presence of a weapon, and presence of blood.²⁴⁷ The LAWS will assess to what extent the characteristics an individual exhibits map on its vector containing indicia of a lawful target.²⁴⁸ Since programmers develop the LAWS's architecture in such a way as to enable the machine to operate in compliance with IHL,²⁴⁹ state regulations that require observance of IHL form an integral part of the robot's mathematical model. As a result, when exposed to a particular battlefield scenario, the LAWS should not be regarded as simply mapping characteristics of objects and individuals onto categories of a lawful or unlawful target. Rather, the LAWS should be treated as incorporating the governmental enactments pertaining to IHL into its decision-making model. On this account, a LAWS can be described as relational to the state's laws and hence to the state. The dual relational nature of a LAWS to the programmer and to the state calls for a new conceptualization of a LAWS. A LAWS should be defined by reference to the set of individuals with which it has relations and by the nature of relations it has with each individual. A "relational entity" is a suitable term that captures these dynamics.

LAWs should be regarded as relational entities in respect to operators and commanders. States envisage that operators will exercise "meaningful" oversight over LAWs.²⁵⁰ The U.S. Department of Defense Directive 3000.09 illustrates why, in order to give effect to this aspiration, states will need to place LAWs in relation to operators.²⁵¹ The Directive states that "[a]utonomous and semi-autonomous weapon systems shall be designed to allow commanders and operators to exercise

245. Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field, *supra* note 38, art. 3(1), at 36.

246. API, *supra* note 169, art. 48; Legality of the Threat or Use of Nuclear Weapons, 1996, Advisory Opinion, ICJ Rep 226, 35 ¶¶ 78-79 (Jul. 8, 1996); JOHNSTON, *supra* note 212.

247. JOHNSTON, *supra* note 212, at 304.

248. *Id.*

249. API, *supra* note 169, art. 36.

250. *See* note 53 (collecting sources); U.S. DEP'T OF DEF., *supra* note 18, ¶ 4(a).

251. U.S. DEP'T OF DEF., *supra* note 18.

appropriate levels of human judgment over the use of force.”²⁵² The LAWSs should have machine-user interfaces to enable operators to understand the status of the system and the displayed information.²⁵³ The references to the machine-user interface²⁵⁴ and to the oversight over the operation of a LAWS²⁵⁵ suggest that the Department of Defense envisions creating a particular configuration where LAWSs are embedded in the military unit in relation to the operators.

Tim McFarland’s reformulation of the notion of autonomy further supports the assertion that instead of regarding LAWSs as individual entities, one should perceive them as being in a relation to the user.²⁵⁶ McFarland questions the traditional definitions of autonomy which fall into two categories.²⁵⁷ In discussing autonomy, scholars either focus on the fact that the system can operate “without any form of external control” or on the fact that the system has the capacity to select courses of action.²⁵⁸ McFarland observes that whether a system is autonomous should be thought of in terms of the relationship between a LAWS and the operator.²⁵⁹ Various systems will perform their functions with less interaction with the operator due to the system’s controller “stepping into the shoes” of the operator.²⁶⁰

Different system components will function with varying degrees of independence from the user, and the user’s degree of input will vary depending on the task.²⁶¹ The operators will shift between supervising and collaborating with a LAWS depending on the task, and circumstances will determine whether a LAWS has control over the performance of a task.²⁶² For instance, the LAWS could select and engage targets with the operator intervening only if there is notice that LAWS will not

252. *Id.* ¶ 4(a).

253. *Id.* ¶ 4(a)(3).

254. *Id.*

255. *Id.* ¶ 4(a).

256. See Tim McFarland, *Factors shaping the legal implications of increasingly autonomous military systems*, 97 INT’L REV. RED CROSS 1313, 1324 (2015).

257. *Id.* at 1317.

258. *Id.*; GEORGE A. BEKEY, AUTONOMOUS ROBOTS: FROM BIOLOGICAL INSPIRATION TO IMPLEMENTATION AND CONTROL 1 (2005); Michael A. Goodrich & Alan C. Schultz, *Human-Robot Interaction: A Survey, Foundations and Trends in Human-Computer Interaction*, 1 BYU SCHOLARS ARCHIVE 203, 217 (2007).

259. McFarland, *supra* note 256, at 1324.

260. *Id.*

261. *Id.* at 1319.

262. *Id.* at 1321.

appropriately perform the desired task.²⁶³ Or the LAWS and the operator could work as a team with each contributing a particular skill (for instance, the recognition of lawful targets by a LAWS and the decision whether to engage the target by the operator).²⁶⁴ For these reasons, autonomy should be defined by reference to the relationship between the operator and the LAWS.²⁶⁵ When an operator supervises a LAWS or when a LAWS assists the operator to carry out a task, the system is in a relational position to the user.²⁶⁶ The LAWS should therefore be characterized as a relational entity.

There may come a day when officials will authorize combatants to deploy LAWSs on missions without human supervision. For example, U.S. officials may approve deviations from the U.S. Department of Defense Directive 3000.09.²⁶⁷ As a result, the officials can remove, if they decide to, the requirement that operators exercise human judgment in deciding when LAWS deploys lethal force.²⁶⁸ If states indeed adopt such an approach, then a LAWS should not be regarded as an autonomous entity that assesses the situation on the battlefield and establishes what tactics to pursue in order to fulfill a particular mission. As Vermaas and his colleagues explain, in order for technical artifacts, such as airplanes, to operate, they need to have a degree of interaction with other artifacts and systems.²⁶⁹ In the context of LAWSs, the system is relational to the commander, because the commander's statement regarding what objectives the military unit should attain determines in what geographical area the operator deploys a LAWS and what tasks the operators allocate to a LAWS.

Once one views a LAWS as necessarily relational to individuals,²⁷⁰ it becomes possible to analyze how the decisions of particular individuals create enabling conditions for a LAWS to carry out a war crime. Additionally, one can trace how various individuals interact²⁷¹ and how their role in the LAWS triggering a war crime varies depending on the circumstances. This way of thinking challenges existing understandings

263. Jean Scholtz, *Theory and Evaluation of Human Robot Interactions*, 36 ANN. HAW. INT'L CONF. ON SYS. SCI.S 6-9 (Jan. 2003).

264. *Id.* at 7-8.

265. McFarland, *supra* note 256, at 1324.

266. Gianni, *supra* note 43, at 15-16.

267. U.S. DEP'T OF DEF., *supra* note 18, Enclosure 4 ¶ 4(3)I(3).

268. *Id.* Enclosure 3 ¶ 1(a)(1).

269. VERMAAS ET AL., *supra* note 47.

270. Gianni, *supra* note 43 at 15-16.

271. Sartor & Omicini, *supra* note 47, at 55-56.

in international criminal law.²⁷² Frédéric Mégret mentions in the context of discussing international criminal law that blame is a finite resource.²⁷³ Therefore, when everyone is to blame, no one can be blamed.²⁷⁴ The relational nature of LAWSs in respect to numerous individuals in different organizations calls for reevaluating how we think of blameworthiness. The discussion that will follow provides additional evidence for the assertion that numerous individuals in different organizations create enabling conditions for machine-triggered war crimes. A crucial question is: what kind of relationship between an individual and a LAWS gives rise to criminal accountability? In order to explore this issue further, it is first necessary to understand the nature of linkages that exist between a LAWS and particular categories of individuals.

IV. LAWS AS EMBEDDED IN A MATRIX OF RELATIONS

Sartor and Omicini maintain that LAWSs are autonomous agents which are in an ensemble with other autonomous agents, such as operators.²⁷⁵ Each agent has its own goals but interacts with other agents to achieve an overarching goal.²⁷⁶ The level of abstraction one adopts shapes whether the group of agents constitutes a single agent or whether agency is located at the level of a single agent.²⁷⁷ Sartor and Omicini rely on this conception to conclude—in regard to LAWSs—that “a recursive approach to the identification of functional responsibilities, blameworthiness and legal liability is required.”²⁷⁸ This means looking at how misconduct of one individual or institution leads to the unlawful conduct appearing at another level.²⁷⁹ Failure to devise appropriate policy regulations for embedding LAWSs into the armed forces and the flawed design of a LAWS may each result in a LAWS triggering

272. International criminal law focuses on the blameworthiness of each individual. While international criminal law wishes to capture how individuals enabled the criminal machinery to operate, it avoids focusing on the collective entities. IRYNA MARCHUK, *THE FUNDAMENTAL CONCEPT OF CRIME IN INTERNATIONAL CRIMINAL LAW: A COMPARATIVE LAW ANALYSIS* 160 (2014). The doctrine of joint criminal enterprise aims to capture the collective dimension of crimes. Some scholars criticize the doctrine for being insufficiently nuanced to capture the principle of culpability and how organizations operate. David Ohlin, *Three conceptual problems with the doctrine of joint criminal enterprise*, 5 J. INT’L CRIM. JUST. 69 (2007).

273. Frédéric Mégret, *What Sort of Global Justice Is ‘International Criminal Justice’?*, 13 J. INT’L CRIM. JUST. 77, 84 (2015).

274. *Id.*

275. Sartor & Omicini, *supra* note 47, at 55.

276. *Id.*

277. *Id.* at 56.

278. *Id.* at 65.

279. *Id.*

a war crime.²⁸⁰ Furthermore, it is necessary to look at how the actions of particular individuals or institutions function in an integrated manner.²⁸¹ Sartor and Omicini conclude that liability should be imposed on multiple actors including the operator, the commander,²⁸² and the system designer.²⁸³

Gianni's scholarship supports the proposition that numerous individuals should bear accountability when a LAWS triggers war crimes.²⁸⁴ Gianni draws on Bruno Latour's actor-network theory to show that heterogeneous actors are in a network with a LAWS; individuals distribute responsibilities to other individuals who can achieve the delegated task only through a LAWS.²⁸⁵ The actor-network theory illuminates that a LAWS is embedded in a matrix of relations with the operator, commander, programmer, corporate leaders, senior defense official, and senior politician (such as the head of state or a Minister). The actor-network theory postulates that things are actors when they make a difference to another agent's action through modifying a state of affairs.²⁸⁶ The theory challenges the traditional sociological view of objects as not being part of or participants in social relations.²⁸⁷ Things enable humans to undertake actions through allowing, forbidding, and facilitating particular conduct.²⁸⁸ The scholars do not claim that there is a "symmetry between humans and non-humans."²⁸⁹ Rather, all entities are considered to be actors as long as they act or as long as others grant to them an activity.²⁹⁰ Actors are in a network with each other.²⁹¹ The actors are not fixed entities but rather flow and circulate.²⁹² The network describes the properties an actor has, rather than its identity.²⁹³ The implication is that instead of viewing individuals as interacting with each other, one should view individual action as being distributed and

280. *Id.*

281. *Id.*

282. *Id.* at 72.

283. *Id.* at 63.

284. *Id.* at 55.

285. Gianni, *supra* note 43, at 13-14.

286. LATOUR, *supra* note 47, at 71.

287. *Id.*

288. *Id.* at 72.

289. *Id.* at 76.

290. Bruno Latour, *On actor-network theory: A few clarifications*, 47 *SOZIALE WELT* 369, 373 (1996).

291. BRUNO LATOUR, *NETWORKS, SOCIETIES, SPHERES: REFLECTIONS OF AN ACTOR-NETWORK THEORIST* 3-5 (2010).

292. Latour, *supra* note 290, at 374.

293. LATOUR, *supra* note 291, at 4, 6.

as the outcome of the operation of the network of actors.²⁹⁴ On the application of this analysis, a LAWS is in a network with individuals who determine its regulation, design, and operation.

The work of Vermaas and his colleagues substantiates the actor-network theory and enables one to build a more complex picture of how human and non-human actors interact in a network.²⁹⁵ The discussion of Vermaas's theory demonstrates how LAWSs are embedded in a network and why accountability should be attributed to numerous individuals. Vermaas and his colleagues posit that technical objects, individuals, institutions, and rules are interconnected.²⁹⁶ These components enable the individuals and the organization in which the individuals operate to achieve particular outcomes. Thus, systems, such as the civil aviation system, should be understood as "sociotechnical systems."²⁹⁷ This is the case because the civil aviation system has multiple components including individuals, objects, organizations, institutions, and rules that are needed to enable the system to be operational.²⁹⁸ These components are linked to each other in a particular way.²⁹⁹ For instance, the actions of numerous individuals, such as pilots and border control agents,³⁰⁰ are needed to enable the airport system to function.³⁰¹ Technical objects, ranging from aircraft to baggage trolleys, are required to enable the flights to operate.³⁰²

The fact that both technical objects and individuals play an equal role in enabling aviation companies to transport passengers supports the actor-network theory's claim that objects and individuals act as agents through creating conditions for an activity to take place. Passengers activate the working of the sociotechnical system of aviation by buying a ticket.³⁰³ The working of the system necessitates coordinated behavior between many individuals who rely on rules, habits, and agreements to coordinate their behavior.³⁰⁴ Separate sets of rules may govern the behavior of each component of the system, but the rules

294. *Id.* at 11.

295. *See* VERMAAS ET AL., *supra* note 47, at 68-69.

296. *Id.*

297. *Id.*

298. *Id.*

299. *Id.* at 68.

300. *Id.* at 71.

301. *Id.* at 70.

302. *Id.* at 67.

303. *Id.* at 71.

304. *Id.* at 72.

governing various components are “attuned to each other.”³⁰⁵ To illustrate, international treaties make it possible for aircraft to cross airspace zones.³⁰⁶ The norms of behavior and behavior dispositions inculcated into individuals, such as pilots, through training resemble computer programs being uploaded onto a computer; however, such programs do not entirely determine how an individual will act.³⁰⁷

According to Vermaas and his colleagues, there is no designer who creates the system; the linkages between components emerge and are modified as the system operates over time.³⁰⁸ The significance of the aviation system being a sociotechnical system is that an accident is usually caused by a chain of causal events across the components rather than by a single component.³⁰⁹ For instance, a Russian and an American aircraft collided in European airspace in 2002, because the aircraft controller gave different instructions to the pilots than the computers on board the respective aircrafts.³¹⁰ There were no rules telling the pilots which instructions to follow in a case of conflict.³¹¹ The fact that the conduct of the air controller, existing aviation rules, and aircraft computers interacted to produce the accident points to the fact that the culpability of an individual in an organizational context should be established by reference to both the conduct of the individual and the organizational context in which that individual operates. An understanding of how the network operates as an aggregate entity in contributing to a particular outcome is crucial. This knowledge allows one to propose by what criteria one should attribute accountability to an individual and why numerous individuals should be held accountable when a LAWS carries out an unlawful killing.

LAWSs are actors as envisaged by the actor-network theory, because they play a pivotal role in enabling the armed forces to engage a target. The commander and the operator are actors in a network with LAWSs, because they grant an opportunity to LAWSs to operate on the battlefield and to bring about particular outcomes, such as the killing of combatants and the destruction of military objectives. In particular, “the engagement of the target is the outcome of a double choice: the human choice to deploy the weapon ... and the weapon choice to

305. *Id.* at 75.

306. *Id.* at 68.

307. *Id.* at 73-74.

308. *Id.* at 77.

309. *Id.* at 76.

310. *Id.*

311. *Id.* at 77.

select and engage a particular object.”³¹² In turn, a commander creates conditions under which a LAWS is an actor as a result of selecting a mission for which to use a LAWS and as a result of applying the defense department policies relating to how to exercise oversight over its operation. The operator is in a network with a LAWS due to activating the LAWS. The LAWS is in a network with the senior defense official, because the policies that the official promulgates delimit how operators employ LAWSs and under what circumstances. Because defense department policies guide what types of missions a commander can entrust to a LAWS and what degree of oversight the operator exercises over a LAWS, they channel the decision-making of the operator and the commander.

The term “matrix” is more suited than the term “network” to describe the nature of relations between a LAWS and individuals, and among the individuals in question. The imagery of a matrix captures the fact that individuals create parameters for the conduct of a LAWS and that there is a degree of interdependency between a LAWS and the conduct of individuals. It will emerge in the discussion below that the relationships between the LAWS, operator, commander, programmer, corporate directors, defense official, and senior politician are interconnected and interwoven. Furthermore, the term “matrix” better captures the fact that the decision of one person creates the parameters within which other individuals reach decisions and the fact that there are intersections between the decisions of individuals. The term “network,” on the other hand, is more suitable for discussing relations where the interactions are weaker and do not determine the parameters within which each actor acts. Section V will consider how, within this matrix: (1) a LAWS interacts with other actors and (2) human actors interact with each other. Elucidating the nature of the interactions between a LAWS and various individuals is a first step to theorizing how one should attribute criminal accountability in a context where the conduct of multiple individuals across organizations plays a pivotal role in enabling a LAWS to bring about a war crime.

V. MAPPING THE INTERACTIONS IN A MATRIX

Amy Prichett and her colleagues argue that, “In a team of multiple agents working together, the responsibility for the outcome of a function must be considered relative to the authority to perform it.”³¹³

312. Sartor & Omicini, *supra* note 47, at 60.

313. Amy R. Prichett et al., *Measuring Human-Automation Function Allocation*, 8 J. COGNITIVE ENGINEERING & DECISION MAKING 52, 59 (2014).

International criminal law imputes accountability to superiors based on whether they exercise a particular type of authority recognized by law.³¹⁴ This Article will demonstrate that there are alternative definitions of authority that capture the nature of interactions among a LAWS, operator, commander, programmer, corporate directors, senior defense official, and senior politician. Accountability should be imputed to all these individuals on the basis that they exercise authority over a LAWS.

The literature in the field of sociology provides a fruitful lens through which to examine the nature of interactions between a LAWS and candidates for accountability, as well as among the candidates for accountability. This analysis makes it possible to establish how various individuals exercise authority over a LAWS and over other individuals. Given the fact that a LAWS is situated in a set of interwoven and interdependent relationships between various actors, these multiple interactions among actors are necessarily layered and should be understood in conjunction. For simplicity, the mapping process will commence with considering the context of an operator and a LAWS. The mapping of this interaction will make it possible to create a snapshot of the interactions between a LAWS and other actors in the matrix.

A. *The LAWS-Operator Assemblage*

The LAWS and its operator should be regarded as an assemblage. Deleuze and Guattari use the metaphor of an assemblage to study social phenomena.³¹⁵ The advantage of relying on metaphors as a lens of analysis is that the metaphors can be applied to many contexts. According to Deleuze and Guattari, technological tools exist in relation to interminglings that make their use possible.³¹⁶ Technological tools therefore should not be considered in isolation but rather as a part of an assemblage.³¹⁷ The scholars use the invention of a stirrup to illustrate the fact that technologies give rise to new entities and to complex human-machine relationships.³¹⁸ They submit that the invention of a stirrup allowed for a type of assemblage, which they call a “man-horse

314. René Provost, *Authority, Responsibility and Witchcraft: from Tintin to the S.C.S.L.*, in *THE SIERRA LEONE SPECIAL COURT AND ITS LEGACY: THE IMPACT FOR AFRICA AND INTERNATIONAL CRIMINAL LAW* 159 (Charles Chernor Jalloh ed. 2014).

315. DELEUZE & GUATTARI, *supra* note 47, at 4.

316. *Id.* at 90.

317. *Id.*

318. *Id.*

symbiosis,” to emerge.³¹⁹ An assemblage is an arrangement of interactions and flows between unlike entities.³²⁰ It may be comprised of individuals, machines, particular functions, or meaning-making systems.³²¹

The work of cyberneticists illustrates why it is desirable to view the LAWS and its operator as two entities that have complex interactions between them. However, contrary to cyberneticists, the LAWS and the operator should be regarded as being coupled together rather than as a single entity. Modern technologies challenge the traditional divide between a human and a machine, mind, and body.³²² Cyberneticists formulated a new way for envisioning the boundaries of the human subject.³²³ Gregory Bateson proposes that a computer, the human user, and the environment should be seen as a single system.³²⁴ The flow of information defines this system.³²⁵ Bateson regards information in terms of differences being transmitted and undergoing transformation.³²⁶ The rationale for treating the user and the computer as a single system stems from the fact that the user and the environment are needed to create inputs into the computer.³²⁷ The nature of neural networks is such that when operators use LAWSs as tools to aid them in decision-making, the LAWSs take inputs from the environment, manipulate them using a particular pathway, and display the outputs.³²⁸ The operators both use system-generated outputs in decision-making and feed information to the LAWSs by instructing the systems to carry out particular courses of action. Because the LAWSs cannot accomplish their missions without two sets of inputs, namely the data from the sensors and the operator’s instruction, the operator and the LAWS could be viewed as a single system on the application of Bateson’s reasoning.

Contrary to Bateson, however, a LAWS and its operator are separate entities that are coupled together. This is due to the fact that a LAWS and an operator have separate domains over the performance of tasks

319. *Id.*

320. *Id.* at 4.

321. *Id.* at 36.

322. Dianne Currier, *Feminist Technological Futures: Deleuze and Body/Technology Assemblages*, 4 FEMINIST THEORY 321, 322 (2003).

323. KATHERINE HAYLES, HOW WE BECAME POSTHUMAN: VIRTUAL BODIES IN CYBERNETICS, LITERATURE AND INFORMATICS 84 (1999).

324. Gregory Bateson, *Bateson: The Cybernetics of “Self”: A Theory of Alcoholism*, 34 PSYCHIATRY 1, 6 (1971).

325. *Id.*

326. *Id.* at 6-7.

327. *Id.* at 6.

328. Interview with Joelle Pineau, *supra* note 23.

related to accomplishing engaging a target. The role of the system may include tasks ranging from classifying the character of objects to planning how to best accomplish targeting a military objective. The operator activates the LAWS and inputs an instruction, thereby creating a situation where the LAWS and the operator function as a single system. Accordingly, the robot and the human being should be seen as a hybrid system.³²⁹

The processes that occur when a LAWS is operating on the battlefield will be examined to investigate the nature of the LAWS-operator assemblage and its relation to other possible assemblages. For Deleuze and Guattari, an assemblage has two dimensions: it links bodies or units but also modes of communication.³³⁰ The regimes of bodies and signs in an assemblage are in a reciprocal relationship.³³¹ An assemblage acts on the flows of signs, material objects, and social practices.³³² There is no longer division between reality, how it is represented in a medium, and the subjective perception of the individual.³³³ The assemblage incorporates the segments of content, expression, and regimes of language usage; it determines how content and expression relate to one another.³³⁴ The organization of parts in an assemblage is linear rather than hierarchical.³³⁵ Various parts relate to one another in a particular way and there are no definite points where the parts connect.³³⁶ The key issues are what particles or intensities circulate through the assemblage, how parts in an assemblage function in connection with other parts in intersecting assemblages, and how parts are transformed when they operate as part of an assemblage.³³⁷

B. *The Programmer as the Creator of an Operator-LAWS Assemblage*

The commander activates the LAWS-operator assemblage by instructing the operator to employ a LAWS to achieve a particular mission.³³⁸ The mission could be to attack all lawful targets in a segment of an urban area. When a LAWS is on the battlefield, it uses sensors, such as a

329. Ronald Leenes & Federica Lucivero, *Laws on Robots, Laws by Robots, Laws in Robots: Regulating Robot Behaviour by Design*, 6 LAW, INNOVATION & TECH. 193, 215 (2014).

330. DELEUZE & GUATTARI, *supra* note 47, at 88.

331. *Id.* at 108.

332. *Id.* at 22-23.

333. *Id.* at 23.

334. *Id.* at 67-68.

335. *Id.* at 8.

336. *Id.* at 7-8.

337. *Id.* at 4.

338. U.S. DEP'T OF DEF., *supra* note 18, at Enclosure 4 ¶ 10(d), 9.

camera and infrared equipment detecting the emission of heat, to receive inputs.³³⁹ At this stage, a LAWS breaks down the object in front of it into a set of indicators.³⁴⁰ These could be the shape, color, acoustic pattern of the noise the vehicle emits, or any other number of indicators.³⁴¹ Subsequently, a LAWS maps the data onto its vectors to establish whether the object corresponds to a pre-programmed template containing military objectives. The vectors encompass the multitude of training scenarios to which a LAWS had been exposed during the production and testing phases. Contrary to Deleuze and Guattari, what occurs at this stage is more than a flow of information. The programmer chooses what indicators the LAWS treats as relevant, selects the vector as the mode of expression for mapping inputs, decides what models the system uses for classifying inputs, and determines how inputs get translated into outputs to the user.³⁴² Additionally, he or she chooses the system of signification a LAWS employs for displaying the outputs to the user.³⁴³ To illustrate, the LAWS could provide a three-dimensional representation of objects to the user or display dots with names indicating the character of the objects. In creating software components which the LAWS utilizes in order to display a solution, the programmer creates a regime of signs and enacts procedures the LAWS relies on to convert content into expression. In translating IHL norms to principles that a neural network can utilize in order to carry out particular tasks, a programmer creates a system of symbols and processes that a LAWS uses to manipulate those symbols. As Ronald Leenes and Federica Lucivero explain, rules and facts are symbolic information in the context of robots.³⁴⁴ In effect, the programmer creates the communication aspect of the LAWS-operator assemblage. Consequently, the programmer exercises a degree of control over a LAWS when it is operating on the battlefield, even though the programmer designs a LAWS at a much earlier point in time.

The regime of signs and procedures the programmer employs when designing the system will determine to what extent the LAWS-operator

339. Sharkey, *supra* note 20.

340. Will Knight, *The Dark Secret at the Heart of AI*, MIT TECH. REV. (Apr. 11, 2017), <https://www.technologyreview.com/s/604087/the-dark-secret-at-the-heart-of-ai/>.

341. Wagner, *supra* note 24, at 161.

342. Interview with Joelle Pineau, *supra* note 23.

343. Computer scientists are currently developing tools to enable artificial intelligence systems to display and to provide explanations for their decisions. *Id.*

344. Leenes & Lucivero, *supra* note 329, at 196.

assemblage erases the division between reality and virtual reality³⁴⁵ for the operator. James Young, Ehud Sharlin, and Takeo Igarashi maintain that robots are “mixed reality entities.”³⁴⁶ The robots are virtual, because they use data in different formats and process the data.³⁴⁷ The robots are real, because they sense inputs, physically manipulate inputs, and produce outputs.³⁴⁸ Similarly, the user is simultaneously in the physical and virtual realms.³⁴⁹ The robot and the operator produce mixed reality through their interaction.³⁵⁰ The operator is exposed to mixed reality when interacting with a LAWS. This is the case because the LAWS transforms the military objective as it uses its program to disassemble the military objective into characteristics, maps the characteristics onto a mathematical model, finds a match between the characteristics and an object in its database of lawful targets, and displays the result.³⁵¹ The following example illustrates that the LAWS will transform the actual object in front of it.³⁵² Google researchers found that an algorithm treated the human hand as part of a dumbbell, because it had concluded that the arm was part of the dumbbell.³⁵³

The screen of a LAWS is a mirror of the battlefield, because a LAWS modifies the military objective as it classifies the military objective. Although artificial intelligence can perform with high accuracy due to having been exposed to many sets of data,³⁵⁴ the fact that a LAWS operating on an artificial intelligence software uses a mathematical model to classify objects³⁵⁵ arguably leads it to display a reimagined snapshot of the military objective and the battlefield. In particular, the military objective is disembodied, reassembled, and reimagined in the course of

345. Jaron Lanier coined the term virtual reality. Henry E. Lowood, *Virtual Reality*, ENCYC. BRITANNICA, <https://www.britannica.com/technology/virtual-reality> (last visited Apr. 17, 2019).

346. James Young et al., *What Is Mixed Reality, Anyway? Considering the Boundaries of Mixed Reality in the Context of Robots*, in MIXED REALITY AND HUMAN-ROBOT INTERACTION 9 (Xiangyu Wang ed. 2011).

347. *Id.*

348. *Id.*

349. HIROSHI ISHII & BRYGG ULLMER, TANGIBLE BITS: TOWARDS SEAMLESS INTERFACES BETWEEN PEOPLE, BITS AND ATOMS 234 (1997).

350. Young et al., *supra* note 346, at 8.

351. Interview with Joelle Pineau, *supra* note 23.

352. Knight, *supra* note 340.

353. *Id.*

354. Siddhartha Mukherjee, *A.I. Versus M.D.: What Happens when Diagnosis is Automated?*, NEW YORKER (Mar. 3, 2017), <http://www.newyorker.com/magazine/2017/04/03/ai-versus-md>.

355. Knight, *supra* note 340.

the software mapping the characteristics of the military objective onto vectors.³⁵⁶

The design choices relating to the architecture of the software channel how the operator makes a decision relating to targeting. In turn, the current state of knowledge in computer science shapes how the programmer will design the architecture of a LAWS. Although rules guide how neurons interact in a neural network, the process of processing information in a neural network “shows the characteristics of chaos.”³⁵⁷ The interplay between certainty and randomness means that the LAWS updates its model as it is exposed to each scenario,³⁵⁸ but that also means there is a possibility for error or unpredictable behavior.³⁵⁹ The programmer will embed a value choice into a LAWS as to whether to classify an object as a military objective or a civilian object where there is a degree of uncertainty regarding the character of the object.³⁶⁰ In such cases through channeling how the operator interprets the situation and what decision the operator takes,³⁶¹ a LAWS influences the conduct of the operator in a significant manner. The programmer determines the accuracy of the LAWS’s classifications of the objects on the battlefield. The operator will base his or her decision on the information the LAWS displays.

1. The Programmer’s Authority Over the Operator

The programmer exercises authority over the operator as the operator engages in interpreting the events on the battlefield. There are various definitions of the term “authority” in philosophy.³⁶² What lies at the heart of various conceptions of authority in philosophy is that there is a reciprocal relationship between the holder of authority and the subject. In order for there to be authority, the subject has to perceive an individual as having authority and obey that individual for reasons going beyond the fact that the individual with authority can threaten to

356. JOHNSTON, *supra* note 212, at 312.

357. SHI, *supra* note 208, at 564-65.

358. WENDEL WALLACH, INST. FOR ETHICS & EMERGING TECH., PREDICTABILITY AND LETHAL AUTONOMOUS WEAPONS SYSTEMS (LAWS) (2016), <https://ieet.org/index.php/IEET2/more/Wallach20160416>.

359. Interview with Joelle Pineau, *supra* note 23.

360. Sorelle A. Friedler, Carlos Scheidegger and Suresh Venkatasubramanian. Sorelle A. Friedler, Carlos Scheidegger & Suresh Venkatasubramanian, *On the (Im)possibility of Fairness*, ARXIV 2 (Sept. 23, 2016), <https://arxiv.org/pdf/1609.07236.pdf> (discussing the many value-based and subjective choices programmers make in creating an artificial intelligence system).

361. RONALD LEENES & FEDERICA LUCIVERO, *LAW, INNOVATION AND TECHNOLOGY* 204 (2014).

362. John T. Sanders, *Political authority*, 66 *MONIST* 545, 546 (1983).

impose sanctions for failure to obey.³⁶³ An example of an individual with non-legal authority is an expert.³⁶⁴ Heidi Hurd posits that the advice an expert gives provides a reason for belief but not a reason for action.³⁶⁵ The individual uses the expert's advice to evaluate what weight to give to existing reasons for action in light of the received information.³⁶⁶

The programmer exercises authority over the operator akin to an expert by influencing how the operator weighs his or her reasons for action in light of the information the LAWS displays. Although the operator may not regard the programmer as having authority over him or her this is immaterial. Because the operator has no technical knowledge of neural networks and expects the displayed information to be reliable, he or she has no choice but to rely on the information the LAWS displays. The programmer should therefore be legally responsible in cases when a LAWS carries out a war crime as a result of the communication element of the LAWS-operator assemblage not functioning properly. The responsibility stems from creating the context in which the decision-maker (in this case, the operator) reaches a decision.³⁶⁷ Since the role of the programmer is confined to creating the communication aspect of the assemblage rather than to how the bodies of the LAWS and the operator are configured together in the assemblage, the responsibility of the programmer should be confined to this domain. For instance, a programmer is accountable if a LAWS erroneously classifies a civilian as a combatant and the operator either instructs the machine to carry out the strike or does not intervene to abort the mission. Similarly, a programmer is responsible where he or she failed to appropriately incorporate IHL norms into the neural network and where the user interface did not enable the operator to detect that the machine either incorrectly applied IHL or was about to violate an IHL norm. However, the programmer is not accountable where a LAWS carries out a war crime as a result of the operator's actions. An example is when an operator exercises an insufficient degree of oversight over the performance of a LAWS. To illustrate, this would occur where the LAWS displayed an error message and the operator did not abort the mission.

363. Gary Young, *Authority*, 3 CAN. J. PHIL. 563, 574-75 (1974).

364. *Id.* at 563.

365. Heidi M. Hurd, *Challenging Authority*, 100 YALE L.J. 1611, 1615 (1991).

366. *Id.*

367. RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH AND HAPPINESS* 3 (2008).

2. The Programmer's Authority Over a LAWS

While Naz K. Modirzadeh, Gabriella Blum, and Dustin A. Lewis posit that the programmer exercises authority over a LAWS,³⁶⁸ the better view is that the programmer exercises aspects of authority over a LAWS. A parallel may be drawn between how a LAWS operates and how an individual deliberates after receiving advice or command from a person with authority. Of course, this is not to say that LAWSs engage in the same kind of deliberation as human beings or that a programmer exercises the same kind of authority over a LAWS as individuals exercise over one another. Unlike persons, LAWSs lack the capability to view individuals as possessing authority. Individuals with authority include officeholders who are in a hierarchical position to other individuals by virtue of their office.³⁶⁹ The difference between the authority of experts and officeholders stems from the fact that the advice of an expert has a lower evidentiary weight for the decision-maker than the command of an individual in office.³⁷⁰

The nature of authority the programmer exercises over a LAWS is akin to how philosophers conceptualize the authority an officeholder has over a citizen. The programmer is in a hierarchical position to a LAWS by virtue of creating its architecture and guiding how a LAWS balances evidence against decision-making criteria. Specifically, a LAWS refers to a range of parameters and compares the set of the parameters in front of it with a database containing optimal decisions in previously-encountered scenarios in order to make an assessment.³⁷¹ The LAWS estimates the appropriateness of a particular solution by using scenarios it has encountered in the past to estimate the likely outcome different actions will produce.³⁷² The process of sifting through previously-encountered scenarios and optimal solutions to those situations in order to generate a strategy for achieving a mission or to evaluate the suitability of a strategy has parallels with how an individual determines what weight to attach to a particular reason for action. In deciding what weight to give to a particular reason for action, an individual contemplates the likely impact of attaching particular weight to that reason of action and whether placing particular weight to that reason of action is consistent with a set of criteria that the individual uses

368. LEWIS, BLUM & MODIRZADEH, *supra* note 53.

369. Young, *supra* note 363, at 564.

370. Hurd, *supra* note 365, at 1642-43.

371. Chaslot et al., *supra* note 31, at 216-17.

372. *Id.* at 217.

to assess the appropriateness of a decision.³⁷³ In both instances, a LAWS and an individual make predictions about the impact of a particular course of action on the environment, determine the likelihood of particular events if they make a particular move, and evaluate the suitability of a move in light of the decision-making criteria. Since the programmer creates decision-making criteria against which a LAWS evaluates courses of action and the process through which a LAWS attaches evidentiary weight to information, the programmer is in a position of authority to a LAWS.

According to Roger Brownsword, technological artifacts can have the effect of enforcing legal norms if appropriately designed.³⁷⁴ When the programmer fails to translate the IHL norms into appropriate algorithms and reasoning systems,³⁷⁵ the programmer should bear responsibility when a LAWS incorrectly applies the legal principles to a factual scenario due to failing to exercise authority over the LAWS appropriately. This discussion demonstrates that the programmer should be held accountable when a LAWS carries out a war crime due to designing its architecture. The operator is responsible when the way in which he or she directed the flow of information to the LAWS through inputting instructions resulted in a LAWS bringing about a war crime. This could, for instance, occur where the operator ordered a LAWS to carry out a war crime,³⁷⁶ or where the operator gave misleading instructions to a LAWS “with the awareness of the substantial likelihood that a crime will be committed in the execution of that order.”³⁷⁷ Under customary international law, individuals can commit war crimes either by acting with intent or recklessness.³⁷⁸ Requiring the programmer to act with intent or recklessness in order to impute accountability to him or her is consistent with the current legal position. A case can be made for a lower *mens rea* requirement, such as gross negligence or negligence.

373. Hurd, *supra* note 365, at 1629-30.

374. Roger Brownsword, *What the World Needs Now: Techno-Regulation, Human Rights and Human Dignity*, in GLOBAL GOVERNANCE AND THE QUEST FOR JUSTICE 227-28 (2004).

375. LEENES & LUCIVERO, *supra* note 361, at 210.

376. United Kingdom of Great Britain and Northern Ireland Statement to the Informal Meeting of Experts on Lethal Autonomous Weapons Systems, *supra* note 53, at 1.

377. For the *mens rea* for the crime of ordering an international crime, see Prosecutor v. Pauline Nyiramasuhuko, Arsène Shalom Ntahobali, Sylvain Nsabimana, Alphonse Nteziryayo, Joseph Kanyabashi, and Élie Ndayambaje, ICTR-98-42-T, Judgment and Sentence, ¶ 5593 (June 24, 2011), <http://unictr.irmct.org/sites/unictr.org/files/case-documents/ict-98-42/trial-judgements/en/110624.pdf>.

378. Prosecutor v. Delalić et. al., IT-96-21-T T. Ch. II, Judgment, ¶¶ 437, 439 (Nov. 16, 1998), http://www.icty.org/x/cases/mucic/tjug/en/981116_judg_en.pdf.

The rationale is that the programmer makes decisions in peacetime while states formulated IHL with the context of an armed conflict in mind. The current *mens rea* requirement for the commission of war crimes, such as the killing of a civilian, reflects the fact that soldiers reach decisions in a chaotic environment.³⁷⁹ They have incomplete information when deliberating and may be overwhelmed by factors, such as noise from exploding ordnance.³⁸⁰ Because programmers reach decisions in conditions where they have ample time to deliberate, and because death is a serious outcome, programmers should be accountable when they act with gross negligence or negligence in developing software for LAWSs.

C. *The Politician's Authority over the LAWS-Operator Assemblage*

The senior politician who articulates the state's position on LAWSs exercises authority as an officeholder in proposing or enacting legislation which configures the way in which an operator and a LAWS are physically coupled in an assemblage. This is because the politician promulgates legislation regarding with what degree of autonomy the LAWSs may operate and what degree of oversight the armed forces should exercise over a LAWS. In turn, how the LAWS and the operator are coupled in the assemblage determines the nature of information flows between these two actors. For instance, when a LAWS functions in a fully autonomous mode, there is a flow of information from an operator to the LAWS in the form of switching on a LAWS and inputting instructions to carry out a specific mission. The flows of information relating to selecting a strategy for how to carry out the mission, identifying lawful targets, and assessing compliance of the attack with the law take place inside a LAWS. On the other hand, there is a greater exchange of flows of information between the operator and the LAWS when the operator exercises a degree of oversight over the LAWS.

The senior politician who signs and thereby effectuates a statute allowing the armed forces to operate LAWSs without the armed forces exercising a sufficient degree of supervision over these systems ought to bear responsibility from a normative standpoint for enacting a statute that insufficiently strictly regulates how the LAWS-operator assemblage is coupled. Any statutes granting immunity to public officials should

379. KARL VON CLAUSEWITZ, PRINCIPLES OF WAR 51 (1943).

380. See Laurie R. Blank, *Operational Law Experts Roundtable on the Gotovina Judgment: Military Operations, Battlefield Reality and the Judgment's Impact on Effective Implementation and Enforcement of International Humanitarian Law*, 12 (186) EMORY UNIV. SCH. L. PUB. L. & LEGAL THEORY RES. PAPER SERIES 1212-13 (2011).

not extend to a situation where insufficiently strict regulations create enabling conditions for LAWSs to trigger war crimes. The basis of the accountability is that the politician incorporated inappropriate values into the statute. The politician could prioritize reducing expenses for maintenance of the armed forces over civilian immunity by enacting a statute that authorized the deployment of LAWSs in a fully autonomous mode, even though the immature state of artificial intelligence technology made it foreseeable that LAWSs may carry out war crimes in the course of their operation.

D. *The Politician's Authority over the Defense Officials*

It is proposed that the senior politician exercises his or her authority over the defense officials and members of the armed forces through shaping how these stakeholders balance various reasons relating to how to embed the LAWSs into the armed forces and how to employ this technology. The fact that failure to enact sufficient regulations constitutes an omission is not a bar to liability. Customary international law holds that individuals can commit war crimes by an omission if they have a legal obligation to carry out an act.³⁸¹ Customary international law obligates individuals to distinguish civilians from combatants and individuals taking a direct part in hostilities during armed conflict.³⁸² Where the conduct during peacetime is sufficiently linked to events that transpire during an armed conflict, individuals should be held accountable under international criminal law for the conduct that commenced before the commencement of an armed conflict.

Further support for the proposition that the senior politician should be held accountable is found in the work of Eliav Liebllich and Eyal Benvenisti. The two authors argue that the employment of LAWSs by the armed forces constitutes “an exercise of state power against individuals through a computerized proxy.”³⁸³ Support for their position is found in the fact that the armed forces are state organs that initiate the taking of lives through inputting a mission or an instruction to perform a task into a LAWS. International criminal law recognizes that certain individuals are in a position to commit particular crimes as a result of possessing a sufficient degree of authority or occupying a particular

381. Prosecutor v. Delalić et. al., IT-96-21-T TT. Ch. II, Judgment, ¶ 543 (Nov. 16, 1998).

382. API, *supra* note 169, art. 48; JEAN-MARIE HENCKAERTS & LOUISE DOSWALD-BECK, CUSTOMARY INTERNATIONAL HUMANITARIAN LAW 3-4 § 2 (2005).

383. Eliav Liebllich & Eyal Benvenisti, *The obligation to exercise discretion in warfare: why autonomous weapons systems are unlawful*, in AUTONOMOUS WEAPONS SYSTEMS: LAW, ETHICS, POLICY 247 (Nehal Bhuta ed. 2016).

office. For instance, Article 8 bis of the Rome Statute of 1998 defines the “crime of aggression” as:

the planning, preparation, initiation or execution, by a person in a position effectively to exercise control over or to direct the political or military action of a State, of an act of aggression which, by its character, gravity and scale, constitutes a manifest violation of the Charter of the United Nations.³⁸⁴

Examples of the commission of the crime of aggression include invading the territory of another state, temporary military occupation of another state, and annexation by the use of force of a part of the territory of another state.³⁸⁵

Since LAWSs are able to carry out war crimes as a result of the state allowing the defense department to embed LAWSs into the armed forces in a particular manner, the senior politician proposing or bringing the relevant law into force should bear accountability for war crimes occurring through the performance of LAWSs. The accountability stems from the fact that the senior politician occupied a position that enabled him or her to exercise control over or to direct the political action of a state relating to equipping the armed forces. This proposed basis of accountability is consistent with the rationale behind the crime of aggression. The operators should not bear accountability where the war crime occurs as a result of the manner in which the statute configured the LAWS-operator assemblage. In such cases, the war crime occurs due to the way in which the LAWS-operator assemblage was coupled rather than due to the manner in which the operator directed the flows of inputs to a LAWS within an assemblage. Lieblich and Benvenisti explain that because LAWSs do not follow rigid rules, it will be difficult for commanders (and operators) to have sufficient degree of foresight about how the LAWSs will perform to be able to take “constant care” to spare civilians.³⁸⁶ Additionally, because commanders (and operators) will assume that the LAWSs operate correctly and appropriately exercise discretion related to the initiation of lethal force, they will err on the side of not intervening.³⁸⁷

To ensure coherency with the current international criminal law regime in determining what degree of danger of a LAWS carrying out a

384. Rome Statute, *supra* note 92, art 28(a).

385. *Id.*

386. Eliav Lieblich & Eyal Benvenisti, *supra* note 383, at 247.

387. *Id.* at 277.

war crime gives rise to criminal responsibility of the senior politician, one should take into account both the seriousness of imposing a criminal sanction and the grave nature of war crimes. Customary international law requires that for liability to arise the individual should have had the intent to commit a war crime or that the individual acted with recklessness.³⁸⁸ If the politician knows that there is a real possibility that artificial intelligence technologies may trigger war crimes through performing unpredictably or unreliably yet proceeds to authorize their employment without embedding sufficient oversight procedures or safeguards, then arguably he or she would be acting recklessly. Of course, there are other thresholds of danger which would fit with the recklessness prong of the mental element.³⁸⁹ There is a normative case to be made for applying a gross negligence or a negligence standard to the political officials. Such individuals make decisions during peacetime, and alternative courses for how to regulate emerging technologies are available to them. The criminal law legislation of some countries follows the suggested approach of applying lower *mens rea* standards to public officials. Slovakia's criminal code provides for punishing public officials for negligence,³⁹⁰ while Sweden requires gross negligence.³⁹¹ States will determine exactly how to formulate the mental element standard and what degree of foresight to require on behalf of the politician regarding the fact that an insufficiently robust regulation would cause the operation of LAWSs to result in unlawful killings.

The present discussion will demonstrate that the notion of authority should be used to determine how to apportion accountability to the senior politician and the senior defense official on the basis of exercising authority over either: (1) another individual or (2) the social practices, norms, and values guiding the decision-making. The first approach is in line with the logic the doctrine of command responsibility uses to

388. Prosecutor v. Delalić et. al., IT-96-21-T TT. Ch. II, Judgment, ¶¶ 437, 439 (Nov. 16, 1998).

389. For instance, in clarifying what mental element is required for there to be liability for participating in the joint criminal enterprise the ICTY stated, "It should be noted that more than negligence is required. What is required is a state of mind in which a person, although he did not intend to bring about a certain result, was aware that the actions of the group were most likely to lead to that result but nevertheless willingly that risk. In other words, the so-called *dolus eventualis* is required (also called 'advertent recklessness' in some national legal systems)." Prosecutor v. Tadić, IT-94-I-A A. Ch. Judgment, ¶ 220 (Jul. 15, 1999).

390. Act 300/2005 CRIM. CODE art. 327(1) ("A public official who, in the execution of his powers, fails to fulfil an important task by negligence shall be liable to a term of imprisonment of up to two years.").

391. RIKSDAGSORDNINGEN [CONSTITUTION] 12:33 (Swed.).

attribute accountability to superiors.³⁹² The second approach reflects the fact that the organizational structures and norms of behavior determine how individuals reach decisions.³⁹³ The Canadian Commission of Inquiry on Somalia investigated the incident of Canadian peacekeepers beating a teenager to death and shooting an intruder.³⁹⁴ It examined both the conduct of particular individuals as well as how the Canadian Forces and the Department of National Defence were organized and managed.³⁹⁵ The Commission commented that some individuals failed to establish an appropriate chain of command³⁹⁶ and to exercise proper oversight over those under their chain of command,³⁹⁷ as required by the doctrine of command responsibility.³⁹⁸ The Commission moreover found that government officials failed to appropriately oversee the Canadian Forces and the Department of National Defence.³⁹⁹ Finally, the Commission noted that the inculcation of appropriate values into members of the armed forces plays a key role in ensuring that individuals act in accordance with the law.⁴⁰⁰ The Commission's emphasis on the creation of an appropriate organizational framework and inculcation of values into the members of the organization illustrates the importance of creating legal frameworks that address the role that institutional structures have in facilitating the commission of crimes. The Commission's approach should be seen within a wider trend of how organizations ensure that employees conduct themselves appropriately. Business schools incorporate ethics courses into the curriculum to enable professionals to appropriately discharge their duties.⁴⁰¹ Companies create ethics frameworks to enable employees to identify moral dimensions of situations, to pose correct questions, and to guide them to reaching right conclusions.⁴⁰²

392. One of the bases of accountability of the superiors is that they were in a superior-subordinate relationship with the perpetrator, meaning that they exercised material ability to prevent or to punish the war crimes. *In re. Yamashita*, 327 U.S. 1, 14-15 (1946).

393. MARY DOUGLAS, *HOW INSTITUTIONS THINK* 48, 112 (1986); JOAO OLIVEIRA & STEWART CLEGG, *ORGANIZATIONAL CONTROL AND CIRCUITS OF POWER* (2014).

394. COMM'N OF INQUIRY, *SOMALIA, 1995-1997: EXECUTIVE SUMMARY*, COMM. OF THE PRIVY COUNCIL, CAN. ES-2 (1997).

395. *Id.* at ES-6.

396. *Id.* at ES-18.

397. *Id.* at ES-22.

398. *Id.* at ES-34.

399. *Id.* at ES-15.

400. *Id.* at ES-45.

401. Liz Fisher, *Ethics in the Frame*, *ACCT. & BUS.* 20 (2017).

402. *Id.* at 21.

The senior politician who instructs the defense department on how to regulate LAWS and how to embed this technology into the armed forces is in an assemblage with a senior defense official. The defense official generates flows of input to the senior politician by telling the politician about the technological requirements of the armed forces to repel possible attacks from adversaries and for operational effectiveness on the battlefield.⁴⁰³ Meanwhile, the politician communicates to the defense official the country's security policy and the criteria guiding the decision as to how particular technologies should be regulated. There is arguably a flow of information as the two parties engage in dialogue. The communication element involves a flow of social practices and rules as to how to express particular values or decision-making criteria.⁴⁰⁴

The nature of the relationship between the senior politician and the senior defense official is a determinant of how to attribute accountability for the promulgation of legislation and regulations governing LAWSs. This is because, for the purpose of allocating accountability, it is significant what role each individual has in creating the conditions under which LAWSs enable crimes. Neil Fligstein and Doug McAdam's scholarship provides insight into how individuals from the government and defense department interact in an assemblage. According to Fligstein and McAdam, individuals belong to a group.⁴⁰⁵ The group has a particular position in relation to other groups.⁴⁰⁶ The groups are at once interdependent and in a hierarchical relationship to one another.⁴⁰⁷ In the present case, the politician and the defense official belong to different groups and formulate overlapping policies. Individuals form groups with shared meanings and membership; this allows the individuals to engage in a strategic action with other groups.⁴⁰⁸ Individuals use shared meanings, collective identities, and collective ends to mobilize social action.⁴⁰⁹ Each group to which an individual belongs has particular resources available to it and circumscribed opportunities to change the situation.⁴¹⁰ The groups can use

403. This discussion is inspired by the work of Deleuze and Guattari on the concept of an assemblage. See DELEUZE & GUATTARI, *supra* note 47, at 4.

404. *Id.* at 22-23.

405. NEIL FLIGSTEIN & DOUG MCADAM, A THEORY OF FIELDS 48 (2012).

406. *Id.*

407. *Id.* at 19.

408. *Id.* at 46.

409. *Id.* at 47-48.

410. *Id.* at 48.

their skills to change their position in respect to other groups.⁴¹¹ To foster cooperation with other groups, actors appeal to the beliefs and interests of the other group.⁴¹²

Fligstein's and McAdam's theory of how social actors interact⁴¹³ suggests that the defense official and the politician have their own particular understandings regarding the roles of their respective organizations, what steps the organization should take to assure national security, and what criteria should guide the decision-making process. For instance, the armed forces prefer more permissive regulatory frameworks that are conducive to freedom of action on the battlefield.⁴¹⁴ In contrast, the politician may be preoccupied by considerations ranging from how the country can obtain more influence on the international arena⁴¹⁵ and how to fulfill the expectations of the electorate,⁴¹⁶ to how to act as a steward for future generations.⁴¹⁷ The politician and the defense official are in an asymmetric relationship.⁴¹⁸ The government decides what resources to allocate to the defense department⁴¹⁹ and is thus in a hierarchical position in respect to the defense department. In some countries, the head of state is officially the chief of the armed forces. For instance, the U.S. Constitution specifies that the President is the Commander-in-Chief of the Army and the Navy.⁴²⁰ More broadly, Fligstein and McAdam elucidate that the government prescribes norms and the manner of strategic interactions between the units of the system.⁴²¹

411. *Id.*

412. *Id.* at 50-51.

413. *Id.* at 48.

414. STEVEN FREELAND, CRIMES AGAINST THE ENVIRONMENT UNDER INTERNATIONAL CRIMINAL LAW (2016).

415. See the realist theory of international relations. Jonathan Cristol, *Realism*, OXFORD BIBLIOGRAPHIES (June 27, 2017), <http://www.oxfordbibliographies.com/view/document/obo-9780199743292/obo-9780199743292-0042.xml>.

416. Politicians use the rhetoric of being devoted to the people. It is beyond the scope of this Paper to consider all motivations by which the politicians may be guided. See Klaas J. Beniers & Robert Dur, *Politicians' Motivation, Political Culture, and Electoral Competition*, 14 INT'L TAX & PUB. FIN. 29, 29 (2007).

417. See, for instance, the movement for sustainable development. *The 2030 Agenda for Sustainable Development*, U.N. DEV. PROGRAMME, <http://www.undp.org/content/undp/en/home/sustainable-development.html> (last visited Feb. 16, 2019).

418. ROBERT M. GATES, DUTY: MEMOIRS OF A SECRETARY AT WAR 72, 522 (2015).

419. U.S. CONST. art. I, § 8.

420. U.S. CONST. art. II, § 2.

421. FLIGSTEIN & MCADAM, *supra* note 405, at 65.

The defense officials and the politicians will identify a common values system reflecting the interests of both organizations in order to arrive at a common position on LAWSs. The politician is in a position of authority in respect to the defense official due to his or her position in the field of interactions. Because the politician represents the population as an elected member⁴²² and the defense official does not, and because in the case of the United States, the Constitution places the responsibility to enact rules to govern the armed forces with Congress,⁴²³ the politician will influence what weight the defense official will put on particular reasons for action. This dynamic can additionally be seen from the fact that politicians promulgate general policies and legal frameworks. For instance, politicians could authorize the employment of LAWSs and specify in general language what degree of oversight the armed forces should exercise over such systems.⁴²⁴ The defense department produces detailed guidelines to implement the general position of the government and of the military alliances to which the state is a party.⁴²⁵ The politician should bear accountability for choosing an inappropriate value system to guide the discussion with the defense officials regarding whether to employ LAWSs and how to regulate this technology. In addition, there should be accountability where the politician fails to create an appropriate framework that enables the legislature and the defense officials to adopt legal instruments that foster adherence to international law.

Similarly, the senior defense official responsible for promulgating policies regarding what types of LAWSs the armed forces can procure, how LAWSs will be embedded into the armed forces, and what degree of oversight the operators should retain over LAWSs should bear accountability for failing to promulgate appropriate policies. For instance, the defense department policy could specify what safeguards the LAWS should feature and what procedures should be available to the operators for intervening into the operation of a LAWS to prevent it from performing in undesirable manner. Accordingly, the senior defense official responsible for promulgating such policies should be held accountable in instances when the manner in which operators were instructed to interact with the LAWS created an opportunity for the system to carry out a war crime. In the United States, the Secretary

422. *Government Election Process and Political Parties*, *supra* note 76.

423. U.S. CONST. art. II, § 4.

424. Article 1 section 8 of the United States Constitution gives Congress the authority to “provide for organizing, arming, and disciplining” the armed forces. U.S. CONST. art. I, § 8.

425. *See, e.g.*, CHIEFS OF STAFF, *supra* note 157, at DD-1.

of Defense controls the Under Secretary of Defense for Acquisition, Technology, and Logistics, who in turn formulates policy regarding what technologies the armed forces employ.⁴²⁶ Under the proposed approach, the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology, and Logistics will both be held accountable when the regulation contains insufficiently robust reliability requirements for LAWSs and oversight procedures over LAWSs.

E. *The Authority of the Corporate Directors over the Programmers*

Turning to the manufacturer of LAWSs, the notion of an assemblage captures the relationship between the programmer and the senior officials, such as directors, in the corporation. By promulgating corporate documents, such as the strategic goals of the corporation and the specifications for the desired product, the directors create a flow of information. Through allocating funding and physical resources for the design and manufacture of LAWSs, the directors circulate material objects. As a result of instituting codes of conduct and procedures to sanction conduct deviating from the norm, the directors create a flow of signs. For instance, when developing new technologies, scientists choose between adopting a methodology that may result in them failing to notice evidence of the possibility of a particular adverse event or selecting an approach where they may incorrectly conclude that there is a possibility of an adverse event materializing.⁴²⁷ The company may have a cultural norm or an official policy⁴²⁸ relating to risk management, namely, whether to accept a possibility of failing to detect that the software design of a LAWS is deficient in some aspect. Furthermore, the guideline may specify what likelihood, expressed in quantitative or qualitative terms, the corporation is prepared to tolerate that the product design will result in a LAWS performing in an unforeseen or unreliable manner. In turn, the programmer creates a flow of information by sharing expertise, putting forward blueprints for possible designs of a LAWS, and in some cases by being consulted during the decision-making.

The directors are in a position of authority in relation to the programmer and will influence what weight the programmer puts on particular reasons for action relating to the design of a LAWS. This is due to directors being in a dominant position to shape the corporate culture, the norms of how employees conduct themselves, and the use of

426. 10 U.S.C § 133(b) (2012).

427. Dayna Nadine Scott, *Shifting the burden of proof: the precautionary principle and its potential for 'democratization' of risk*, in LAW AND RISK 61 (Law Comm'n of Canada ed. 2005).

428. *Id.* at 91.

sanctions to enforce compliance with the norms. Moreover, the directors shape the conduct of employees by deciding how to allocate resources and what hiring practices to adopt. The programmer can influence the decision-making of the directors to the extent he or she appeals to their interests and preferences. These criteria could be the target profit, the cost of designing and manufacturing a product, the time required to put the product on the market, product durability, product reliability, and environmental impact, among others. Therefore, the directors decide how the information, resources, and signs in the director-programmer assemblage flow.

A relevant issue is what significance the fact that directors may be required to reach decisions by consensus has for determining who exercises authority over the decision. For instance, this is the situation in the United States.⁴²⁹ The decision the directors make binds the company, provided that there is a quorum and the majority of the directors present vote in favor of the decision.⁴³⁰ Australia has the same position but allows the articles of association to alter this default rule.⁴³¹ There is a degree of overlap between the position of politicians and corporate directors. Both act in their own capacity and in conjunction with a collegiate body. According to the research of psychologists, the group reaches decisions on the basis of common values,⁴³² and group members narrow the array of options they regard as available so as to align their position towards the group norm.⁴³³ The awareness of the directors that they will be occupying a senior decision-making role and that they are expected to act as a collective on behalf of the company renders them akin to Jens Ohlin's conception of individuals wishing to take part in a group's activity and surrendering to the group the choice of criteria to be referenced in arriving at decisions.⁴³⁴ By Ohlin's reasoning, one can attribute the group decision to each of its members as long as a group member could make a choice as to whether to join the group, to commit to the values of a group,⁴³⁵ and "to turn over a

429. RESTATEMENT (SECOND) OF THE LAW OF AGENCY § 14(c) (AM. LAW INST. 1958).

430. DEL. CODE § 141(b) (1953).

431. *Corporation Act of 2001* (Cth) s 248(G) (Austl.).

432. GLYNIS M. BREAKWELL, *THE PSYCHOLOGY OF RISK* 102 (2007).

433. *Id.* at 104; John Turner, *Social Categorization and the Self-Concept: A Social Cognitive Theory of Group Behaviour*, in *ADVANCES IN GROUP PROCESSES: THEORY AND RESEARCH* 77 (Edward J. Lawler ed. 1985).

434. Jens David Ohlin, *Group Think: The Law of Conspiracy and Collective Reason*, 98 J. CRIM. L. & CRIMINOLOGY 147, 181-82 (2008).

435. *Id.* at 179-80.

segment of their reasons to the collective endeavor.⁴³⁶ Each director should be treated as having brought about the decision of the group unless the director does not vote in favor of a particular decision or abstains. The director's choice not to abstain from voting and not to resign in response to a repugnant decision evidences his or her desire to adhere to the values guiding the board's decision-making.

A potential criticism of attributing a decision to each director who voted in favor of it stems from the fact that each board of directors may have variable cultural norms of conduct. Stephen Bainbridge points out that, in practice, directors of large corporate boards build coalitions, selectively channel the information that is passed to directors in another coalition, and use the "divide and rule" tactic to influence the board's decision.⁴³⁷ The fact that corporations' boards of directors have varying internal dynamics points to the fact that context should influence how accountability is imposed on board members. According to scholars in organizational behavior Denise Rousseau and Robert Cooke, organizational cultures diverge.⁴³⁸ Some groups emphasize: (1) the creation of supportive interpersonal relationships where the individuals are expected to be open to other group members influencing them, while other groups construct an environment where (2) members try to outperform one another, work against their peers, and adopt a "win or lose framework."⁴³⁹ The Australian ASX Corporate Governance Council Corporate Governance Principles and Recommendations reflect the latter approach in recommending that one of the directors should be responsible for facilitating the effective contribution of all directors and for promoting "constructive and respectful relations between them."⁴⁴⁰ In contrast, on Bainbridge's account, group members compete for power and for the resource of a majority vote.

When the directors who sit on the same board form coalitions that compete, two sets of events take place. First, because there is no overarching body or individual who constrains the directors as to what group norms to institute to govern the expected conduct of the board members, the group as a whole, or the majority of the members, may be described as instituting a "divide and rule" mode of operation.

436. *Id.* at 182.

437. STEPHEN M. BAINBRIDGE, *CORPORATE LAW* 77 (2009).

438. Robert A. Cooke & Denise M. Rousseau, *Behavioral Norms and Expectations: A Quantitative Approach To the Assessment of Organizational Culture*, 13 *GROUP & ORG. MGMT* 245, 261 (1988).

439. *Id.* at 257-58.

440. ASX CORPORATE GOVERNANCE COUNCIL, *CORPORATE GOVERNANCE PRINCIPLES AND RECOMMENDATIONS* (2007).

Secondly, the fact that the directors splinter into coalitions suggests that each coalition may have its own subset of norms regarding how each member should conduct himself or herself and by which criteria the coalition's members should be guided. Rousseau and Cooke found that an organization may have many subcultures across its company levels and functions, especially where an organization has a weak culture.⁴⁴¹ The interaction between coalitions may be envisaged in terms of groups interacting with each other dynamically. A cluster of individuals enable or prevent an action.

If one of the coalitions in the board of directors circulated incomplete or erroneous information in order to lead other coalitions to vote in its favor, then the decision may not be imputed to members of the coalition who acted on the wrong information. This is because the individuals in that coalition exercised their agency under a mistaken understanding of the criteria that served as the basis on which they selected among the competing courses of action. This conclusion challenges the assumption Daniel Fischel and Alan Sykes make that the commission of a crime involves a single director who acts without the knowledge and consent of other directors.⁴⁴² It questions the second proposition Fischel and Sykes put forward that the basis for criminal liability should be that the directors failed to appropriately supervise the director who commits a crime.⁴⁴³ In cases where the director voted with accurate knowledge about the nature and consequences of the decision, he or she should be accountable.

Some jurisdictions employ models where the board of directors does not reach decisions independently. For instance, Germany has a juridical form "Gesellschaft mit Beschränkter Haftung" (or GmbH) for creating a corporation that is not allowed to trade shares on the stock exchange.⁴⁴⁴ In a GmbH, the shareholders are the principal decision-makers and give binding instructions to the managing director or directors, including how to manage the company on a day-to-day basis.⁴⁴⁵ The rules of procedure regulate the decision-making of directors, and the directors must obtain permission from the shareholders to make

441. Robert A. Cooke & Denise M. Rousseau, *supra* note 438, at 269-70 (1988).

442. Daniel R. Fischel & Alan O. Sykes, *Corporate Crime*, 25 J. LEGAL STUD. 319, 323 (1996).

443. *Id.*

444. MARTIN SCHULZ & OLIVER WASMEIER, *THE LAW OF BUSINESS ORGANIZATIONS: A CONCISE OVERVIEW OF GERMAN CORPORATE LAW* 80 (2012).

445. Gesetz betreffend die Gesellschaft mit beschränkter Haftung [GmbHG] [Limited Liability Companies Act], Apr. 20, 1892, REICHSGESETZBLATT [RGL.] at 477, last amended by Gesetz [G], July 17, 2017, GUNDESGESETZBLATT [BGBL] I at 2446, https://www.gesetze-im-internet.de/englisch_gmbhg/englisch_gmbhg.pdf.

certain kinds of decisions.⁴⁴⁶ The directors are responsible for representing the corporation and managing its affairs on a daily basis.⁴⁴⁷ The shareholders may appoint or dismiss a director by passing a resolution.⁴⁴⁸ The fact that the shareholders create the architecture for the parameters within which the directors make decisions and the expectation that the directors will follow these guidelines point to the fact that shareholders may have to bear accountability in addition to the directors. The basis of the liability of the director is that he or she did not resign and implemented a decision in circumstances where he or she either knew, was reckless, was grossly negligent, or was negligent in regard to the suitability of the product for the purpose of operating in a complex battlefield environment.

The discussion above sheds light on how to attribute accountability in cases where many programmers collaborate on creating a LAWS in a single organization or where programmers work at different organizations and contribute components for the operating system. In order for a programmer to exercise authority over the communication aspect of the LAWS-operator assemblage, he or she should have a sufficient degree of input into the architecture of the LAWS or its operating system.⁴⁴⁹ This will be the case where the programmer had a substantial or a similar degree of input.⁴⁵⁰ Where multiple programmers either supervise the work of a team in a single organization or oversee the work of a team in numerous organizations, they should be treated akin to corporate directors. Their liability stems from the fact that each programmer played a significant role either in designing a LAWS or in creating a component for a LAWS.

As Cathy O’Neil explains, the mathematical models programmers incorporate into the software are “opaque,” and this results in few computer scientists understanding how these models work.⁴⁵¹ The programmers know that the system will make mistakes, because every model is necessarily an oversimplification of the real world and because the world is too complex to be captured by a model.⁴⁵² Programmers should not abdicate their responsibility by pointing out that the

446. *Id.* § 46(6).

447. *Id.* § 35(1).

448. *Id.* § 46(5).

449. Tetyana Krupiy, *Unravelling Power Dynamics in Organisations: An Accountability Framework for Crimes Triggered by Lethal Autonomous Weapon Systems*, 15 LOY. UNIV. CHI. INT’L LA. REV. 1 (2017).

450. *Id.*

451. CATHY O’NEIL, *WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY* 12 (2016).

452. *Id.* at 26.

algorithm made the decision⁴⁵³ and that other individuals decided to use the system in a particular context.⁴⁵⁴ This stems from the fact that choices regarding what variables to include into the mathematical model of the system entail a moral dimension,⁴⁵⁵ and because individuals trust programmers with possessing sufficient expertise to create reliable systems.⁴⁵⁶ The cause of the LAWS carrying out a war crime will determine whether a particular programmer can be held accountable. For instance, if the system had an optimal design and performed in an undesirable manner due to the manufacturer having installed a defective component, then the accountability should lie with the manufacturer. Where an individual created a single component, he or she should be accountable if the war crime occurred due to the design of that component or due to the manner in which that component interacted with other components.

VI. CONCLUSION: THE FRAMEWORK

Katherine Hayles argues that as individuals use technology and create feedback loops through which information flows between the user and the system, the boundary between the individual and the machine becomes “up for grabs.”⁴⁵⁷ The distributed cognition takes place throughout the system in which the human and the technology are coupled.⁴⁵⁸ Human beings act within these systems with partial agency, since the systems determine the behavior of the individual as the individual “helps to configure the system.”⁴⁵⁹ As a result, the agency becomes “distributed.”⁴⁶⁰ The present discussion demonstrated that the robotic context calls for rethinking how accountability is assigned. However, contrary to Hayles, agency should not be thought of as being distributed between the LAWS and the user. Instead, multiple stakeholders, ranging from a senior politician to the operator, each act in order to either configure or enable the LAWS-operator assemblage to function. One should not see agency as being distributed in the robotic

453. *Downloading Decision: Could Machines Make Better Decisions for Us?*, 45:25-34, CBC RADIO (Feb. 23, 2017), <https://www.cbc.ca/radio/ideas/downloading-decision-could-machines-make-better-decisions-for-us-1.3995678>.

454. *Id.* at 46:10-35.

455. O’NEIL, *supra* note 451, at 189.

456. CBC RADIO, *supra* note 453.

457. HAYLES, *supra* note 323, at 2.

458. Katherine Hayles, *Desiring Agency: Limiting Metaphors and Enabling Constraints in Dawkins and Deleuze/Guattari*, 30 *SUBSTANCE* 144, 158 (2001).

459. *Id.*

460. *Id.* at 147.

context in the sense that no individual exercises full agency. Rather, the operator, commander, programmer, corporate directors, senior defense official, and senior politician each exercise their agency and authority either to bring the LAWS-operator assemblage into existence, to configure the assemblage, to enable the assemblage to operate, or all of these. The fact that multiple individuals enable the LAWS to carry out a war crime calls for imposing accountability on each of these actors when the actor exercises authority over either the LAWS-operator assemblage or another assemblage that enables the LAWS-operator assemblage to come into existence. The agency is distributed in a matrix in the sense that there are multiple sites or nodes where individuals exercise their moral agency.

The robotic context demonstrates that the doctrine of command responsibility is inadequate to govern situations where a technological artifact carries out a war crime. The doctrine is not suited to govern situations where individuals in different organizations act as enablers of LAWSs and where such individuals are not necessarily in a hierarchical relationship of subordination to each other. One of the reasons is that the doctrine of command responsibility assumes that the superior is in a hierarchical relationship to a subordinate within the same organization at the time that subordinate committed the crime.⁴⁶¹ In order to assign accountability for war crimes a computerized proxy brings about, a weaker notion of authority needs to be applied. For instance, the senior politician and the senior defense official have authority over a LAWS-operator assemblage. They determine what evidentiary weight a commander and an operator place on their reasons for action when operating within the assemblage. In doing so, the politician and the defense official create the parameters within which another individual acts. The sanctions for disobedience an individual with authority has do not necessarily involve punishment. The defense official has a soft form of power over the corporate directors through declining to purchase a product. While the corporate directors may not regard themselves under an official duty to obey the defense official, in practice the operation of their business is conditioned on complying with the defense department's policies.

The test for attributing accountability may be formulated in the following manner: an individual who exercises features of authority in relation either to a LAWS or to the LAWS-operator system is responsible for war crimes triggered by a LAWS when it operates in an unforeseen or unreliable manner. For accountability to arise, the individual

461. Krupiy, *supra* note 449.

exercising features of authority over a LAWS or over a LAWS-operator system should have acted or omitted to act either with intent, recklessness, gross negligence, or negligence. An individual possesses features of authority when:

- 1) An individual plays a significant role in organizing the development and manufacturing processes relating to a LAWS. An example would be a member of the board of directors of a corporation.
- 2) An individual plays a significant role in determining in part or entirety the design of the software (operating system) or a component part of the system.
- 3) An individual promulgates legally binding guidelines relating to the regulation of LAWSs or how the armed forces employ such systems.
- 4) An individual acted contrary to government policy relating to how to employ a LAWS and what degree of supervision to exercise over a LAWS.
- 5) An individual has oversight and control over a LAWS in the course of its operation and:
 - a) A LAWS contains system features enabling the individual to detect a possibility of the LAWS performing contrary to the mission objectives or to international humanitarian law norms.
 - b) The individual has sufficient training and knowledge to be able to take steps to abort the mission.

A potential criticism of the proposed approach is that holding multiple individuals accountable goes counter to the existing principles of international criminal law. A fundamental notion underpinning international criminal law is the principle of personal culpability.⁴⁶² According to this principle, “nobody may be held criminally responsible for acts or transactions in which he [or she] has not personally engaged or in some other way participated.”⁴⁶³ The fact that LAWSs are computerized proxies through which a war crime occurs⁴⁶⁴ calls for rethinking how we understand participation in a criminal act. Although the politician does not use

462. Prosecutor v. Tadić, IT-94-I-A A.Ch., Judgment, ¶ 186 (July 15, 1999).

463. *Id.*

464. Lieblich & Benvenisti, *supra* note 383, at 247.

the programmer instrumentally in order to commit a war crime through a LAWS, the politician nevertheless creates an opportunity for LAWSs to trigger war crimes by placing restrictions that are insufficiently stringent on how a programmer may design the weapon system and how the defense department may embed the system into the armed forces. The politician can foresee that programmers will be guided by legislation in designing LAWSs and that lax regulation may lead corporations to put on the market unreliable products. Furthermore, the politician knows that the national legislation guides the content of policies the senior defense official promulgates.

Imposing accountability for an omission should be uncontroversial given the fact that customary international law already recognizes that an individual can commit a war crime by an omission.⁴⁶⁵ Another advantage of “distributed” accountability is that it more accurately reflects the fact that multiple stakeholders enable LAWSs to trigger war crimes and that LAWSs are part of a sociotechnical system. Acknowledging the embeddedness of systems and individuals in a wider context is not new. Gerry Simpson explains that international criminal law “negotiates” between treating individuals as moral agents and recognizing that individuals are embedded in a collective context.⁴⁶⁶

According to Annelise Riles, legal doctrines are technologies for regulation.⁴⁶⁷ Their role is to frame political, social, and epistemological conflicts.⁴⁶⁸ The legal doctrines are fictions which come to be accepted as reality.⁴⁶⁹ Once accepted, they shape how we think.⁴⁷⁰ Riles’s observation points to the fact that the legal framework adopted for imputing accountability for war crimes LAWSs carry out creates a narrative within which judges and lawyers interpret and understand the conduct of the accused. Focusing on a single perpetrator, such as a programmer, mischaracterizes the context in which war crimes occur and the fact that the war crime could not have taken place without the contribution of other individuals, such as a senior politician, a senior defense official, or corporate directors. Basing the accountability framework on the concept of “distributed” accountability allows one to more accurately capture how war crimes are perpetrated through a computerized proxy.

465. Prosecutor v. Delalić et. al., IT-96-21-T TT. Ch. II, Judgment, ¶ 543 (Nov. 16, 1998).

466. GERRY J. SIMPSON, LAW, WAR AND CRIME: WAR CRIMES TRIALS AND THE REINVENTION OF INTERNATIONAL LAW 24 (2007).

467. ANNELISE RILES, COLLATERAL KNOWLEDGE: LEGAL REASONING IN THE GLOBAL FINANCIAL MARKETS 4 (2011).

468. *Id.* at 20.

469. *Id.* at 24.

470. *Id.* at 72.