THE CHANGING FACE OF WARFARE IN THE HI-TECH WORLD

Dr. Waseem Ahmad Qureshi*

War is an organic part of human nature and history, so it would be naive to imagine a future without wars. While the world is catching up with the current fourth-generation warfare, fifth-generation warfare, hybrid warfare, and cyberwarfare, this paper wants to expound upon the unexplored future of warfare in this world. The further we gaze into the future, the more opaque and vague it becomes; therefore, anything unexpected is plausible in the long-term, science-fiction future. Accordingly, this paper tends to be more inclined toward the short-term, conceivable technological progression in viewing and imagining the future of wars than toward the long-term, science-fiction possibilities of future warfare. This paper uses nonfiction and technological grounds as a tool to perceive future warfare, while discussing the possible ideas on which future wars will hinge. With this resolution, the paper will briefly discuss possible belligerents in future wars, including non-state actors, NGOs, and the media, before explaining the role of technology in the wars of the future. It involves a detailed discussion of the use of surveillance, cyber-currency, outer space, laser weapons, enhanced future soldiers, and autonomous weapons (including robot warriors and artificial intelligence) as the trappings of future warfare. Moreover, this paper explores the current uses of robot warriors and artificial intelligence in conflicts, while imagining their future use and giving precautionary measures against the dangers of their use. Afterwards, it will explain the requirements of the laws of war (international humanitarian law) in the use of artificial intelligence–based autonomous weapons during future wars. It will discuss the principles of distinction, proportionality, necessity, precaution, and *hors de combat* and accountability gaps with regard to the use of autonomous weapons in future warfare.

* Advocate for the Supreme Court of Pakistan

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INTRODUCTION

    War is an organic part of human nature and history, so it would be naive to imagine a future without wars.[1] While the world is catching up with the

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    1. Roland Kiss, *The Future of War, the Wars of the Future*, 145 CENT. J. HUNGARIAN DEFENCE FORCES 30, 30 (2017).

current fourth-generation warfare, fifth-generation warfare, hybrid warfare, and cyberwarfare, this paper aims to expound on the unexplored future of warfare in this world. The further we gaze into the future, the more opaque or vague it becomes; therefore, anything unexpected is plausible in the long-term, science-fiction future gaze.[2] So, this paper tends to be more inclined toward the short-term, conceivable technological progression in viewing and imagining the future of wars than toward the long-term, science-fiction possibilities of future warfare. With this resolution, the paper will briefly touch upon the possible belligerents of future wars, before explaining the role of technology in the wars of the future.

For these purposes, this paper is divided into five sections. Section I will examine the nonfictional and fictional predictions about future wars, including the use of nonfiction and technological grounds as tools to perceive future warfare, while discussing the possible ideas on which future wars will hinge. It will then briefly touch upon the fictional imagination of future wars, while referring to science-fiction movies in general. Afterwards, Section II will succinctly touch upon the possible belligerents of future wars, including non-state actors, NGOs, and the media.

Sections III and IV will discuss in detail the role of technology in future wars, including the possible use of surveillance, cyber-currency, outer space, laser weapons, and enhanced future soldiers as the tools of future warfare. Section IV will primarily discuss the use of artificial intelligence and autonomous weapons in future warfare. Section IV will also explore the current use of robot warriors and artificial intelligence, while imagining their future and giving precautionary measures against their dangers of use. Later, Section V will explain the requirements of the laws of war (international humanitarian law) in the use of artificial intelligence–based autonomous weapons during future wars. For this purpose, Section V will discuss the principles of distinction, proportionality, necessity, precaution, *hors de combat*, and accountability gaps with regard to the use of autonomous weapons in the future warfare.

I. IMAGINING THE FUTURE

"War is an organic part of human [nature and] history," so it would be naive to imagine a future without wars.[3] There are three kinds of future wars. The first is in the near future of the next few decades; the second is the mid-future of the end of this century; and the third is the long-term future of

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2. CHRISTOPHER COKER, FUTURE WAR 11 (2015) (ebook).

3. Kiss, *supra* note 1, at 30.

centuries after this time.[4]   The further we gaze into the future, the more opaque or vague it becomes; therefore, anything unexpected is plausible in the long-term future gaze.[5]   Future gazing can be done via analyzing technological progression, economic and scientific modeling, and science-fiction imagination.[6] Novelist Julianne Barnes says that fiction futurology is the best way to imagine the future.[7]   Therefore, to imagine the future of wars, writers use science fiction to allow them to push the boundaries of time and space, and to capture a picture of what the future of wars would look like.[8] On scientific modeling, author Patrick Tucker says that by 2035, humans will be able to make accurate predictions about the future due to technological advancements in data crunching.[9] He claims that the technology to predict the future is already here, but it is not being acknowledged yet.[10]   It is difficult, but not impossible, to give sound and certain predictions about what the future realities of wars are going to look like. Looking at the present tendencies of our societies provides a more certain and closer peek into our futures, and enables us to draw possibilities in future warfare.[11] That is why this paper tends to be more inclined toward short-term, conceivable progression in the first kind of future wars (over the next three to four decades) in viewing and imagining the future of warfare, rather than toward believing in the long-term, science-fiction possibilities of future warfare.

A. Nonfiction

Clausewitz defined war as "an act of force to compel our enemy to do our will."[12] Roland Kiss adds that, by "current standards, it would be better to say that war is an act of pure force and/or coercive and disrupting tools to achieve our goals against enemy's will."[13] István believes that in the future, powerful states will continue to force their will onto weaker states, in order

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4. *See* COKER, *supra* note 2, at 11.

5. *Id.*

6. *Id.*

7. *See* JULIAN BARNES, THROUGH THE WINDOW 13 (2012); COKER, *supra* note 2, at 11.

8. *See* COKER, *supra* note 2, at 6.

9. PATRICK TUCKER, THE NAKED FUTURE: WHAT HAPPENS IN THE WORLD THAT ANTICIPATES YOUR EVERY MOVE, at xiii (2014).

10. *Id.* at xii.

11. Kiss, *supra* note 1, at 30.

12. CARL VON CLAUSEWITZ, ON WAR 75 (Michael Howard & Peter Paret eds. & trans., Princeton Univ. Press 1989) (1832).

13. Kiss, *supra* note 1, at 31.

to satisfy their interests.[14] From Clausewitz's definition, substantial damage done by hackers, such as paralyzing governments by shutting down cybernetworks, can be referred to as war or cyberwar.[15] Within such wars, the media can also be used as a tool to change regimes, isolate states internationally and disrupt enemies' credibility and reputation by creating propaganda and negative international opinion.[16] Therefore, current tendencies suggest that in future wars to come, cyberspace and media have vital roles to play.

It is not far-fetched to note that the displacement of populations, cyber-currency, cyberspace, and resource competition (such as water conflicts) pose a threat of future warfare.[17] Similarly, current tendencies toward decreasing arable land (food conflicts), decreasing freshwater (water conflicts),[18] cyberwars, hybrid warfare, financial and economic warfare, wars over resources, counterinsurgencies, and revolutions/insurgencies are all possibilities for future warfare, alongside wars over culture, ethnicity, and religion.[19] Moreover, economist and social theorist Jacques Attali predicts that future wars will be dominated by hotbeds of revolution and big private corporations and organizations including mafias, mercenaries, terrorists, and non-state actors, rather than by state monopolies.[20] Moreover, Attali adds that terrorist movements will occupy more failing states and will continue to employ extreme violence, intellectuals, and financiers.[21]

In technological themes of future warfare, the current progression—in the fields of the use of Big Data, artificial intelligence, surveillance, robotics, drone technology, and the use of outer space and cyber-currency—lays the groundwork for how the wars of the future will be fought.[22] Future wars will use highly sophisticated weapon systems using information technology, robots, and laser weapons.[23] Moreover, "'in a world where geoeconomics

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14. Gocze István, *The War of Future—The Future of War: The Views of the United States on the Armed Conflicts of the 21st Century and the New Developments of Military Technology of the USA Part 1*, 5 HADMÉRNÖK 219, 221 (2010).

15. *See* Kiss, *supra* note 1, at 31.

16. Mark Galeotti, *The 'Gerasimov Doctrine' and Russian Non-Linear War*, IN MOSCOW'S SHADOWS (July 6, 2014), https://inmoscowsshadows.wordpress.com/2014/07/06/the-gerasimov-doctrine-and-russian-non-linear-war/; *see also* Kiss, *supra* note 1, at 31.

17. Randolph Kent, *The Future of Warfare: Are We Ready?* 97 INT'L REV. RED CROSS 1341, 1352-53 (2015); *see* István, *supra* note 14, at 221.

18. *See* István, *supra* note 14, at 221.

19. *Id.*

20. JACQUES ATTALI, A BRIEF HISTORY OF THE FUTURE 251 (Jeremy Leggatt trans., Arcade Publishing Inc. 2009) (2006).

21. *Id.* at 222.

22. *See* Kent, *supra* note 17, at 1353.

23. *See* István, *supra* note 14.

are as important as geopolitics and strategy, we need to worry about the spectrum of vulnerability. It is not just military assets that [weaponising] space is a problem for, but our entire societies.'"[24] This is because, in Ludendorff's concept of "total war," all of the resources of a country are involved in warfare for the sole purpose of winning a war.[25] In the near future, private-sector companies will target the resources of an enemy state to disable that state's functionality.[26] Such warfare is also known as "the violence of strangulation," where parties to a conflict try to strangle all of the resources of a targeted state; it is also relatable to "urbicide" or "infrastructural" warfare.[27] Such warfare "widens the traditional field of reflection on political violence towards a 'non-anthropocentric humanism' . . . that includes the material surroundings of community life and heterogeneity as part of targets of violence."[28]

Similarly, owing to the global surge in population, which is expected to reach more than 9.7 billion people on Earth by 2050, wars over scarce resources are also a possibility in the near future; in particular, future wars may target water as a scarce resource.[29] The present world situation reflects what is going to happen in the near future. The U.N. has foretold that waterbeds shared by countries will become a point of contention in the future, noting that the River Nile is shared among nine different countries.[30] Similarly, there are currently 215 international rivers sharing their waters with other countries, and there are more than 300 international river basins that share water with multiple countries, all of which are possible conflict zones for future water warfare, because shortages in resources will amplify conflicts.[31] Recently, the world has had a peek into the possibility of future water wars in the shape of military standoffs, contestations, and tensions over the construction of dams on shared river basins, such as the issues between India and China over the construction of dams on the Mekong and Brahmaputra Rivers.[32] Similarly, there are issues and rising tensions

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24. Sam Jones, *Satellite Wars*, FIN. TIMES (Nov. 20, 2015), https://www.ft.com/content/637bf054-8e34-11e5-8be4-3506bf20cc2b.

25*. See* Kent, *supra* note 17, at 1357.

26*. Id.*

27*. Id.*

28. Sara Fregonese, *Urbicide: The Politics of Urban Destruction by Martin Coward*, 1 GLOBAL DISCOURSE, no. 2, 2010, at 196 (book review).

29*. See* Kent, *supra* note 17, at 1362–63.

30. OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, U.N., OCCASIONAL POLICY BRIEF NO. 4, WATER SCARCITY AND HUMANITARIAN ACTION: KEY EMERGING TRENDS AND CHALLENGES 8 (2010); *see* Kent, *supra* note 17, at 1363.

31. Kent, *supra* note 17, at 1363.

32. STEPHEN EDWARDS ET AL., THE WATERS OF THE THIRD POLE: SOURCES OF THREAT, SOURCES OF SURVIVAL 5 (2010), https://www.humanitarianfutures.org/wp-content/uploads/2013

between India and Pakistan over India's construction works on the shared Indus River Basin, despite a functional Indus Waters Treaty between India and Pakistan.[33] Yet, a variety of sources are firm in their belief that there will be no imminent water wars between India and China.[34] But in the future, the scarcity of resources is bound to be a prominent feature of wars.[35]

B. Fiction

The fiction of the past has proven cases of expected future and technologies. For instance, the *Star Trek* franchise imagined smartphones, handheld memory sticks, video calls, and voice commands to computers in the 1960s, decades before these were developed.[36] This phenomenon, where sci-fi prediction of technology is created in real life, is referred to as the "Star Trek Effect."[37] Dazzled by the technological advancement in science fiction, younger generations fight too hard to develop the fictional technology in reality, creating a "self-fulfilling prophecy" and making sci-fi writers the shapers of our reality.[38] Moreover, the U.S. Navy's real electro-gun weapon can fire a projectile at a speed far faster than the speed of a missile, destroying the target by its impact rather than by an explosion.[39] This latest development in catapult technology by energy thrust was imagined and patented by a French scientist approximately a century before it was first tested.[40] On the other hand, there are technologies displayed in science fiction where science has progressed little or not at all over the decades. A case in point is the imagination of nanotechnology to be used in future weaponry.[41] For this reason, Gary Stix calls scientific research in nanotechnology a "'sub-genre

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/06/Waters-of-the-Third-Pole-Sources-of-Threat.pdf; *see* Jon Fasman, *The Mekong: Requiem for a River*, THE ECONOMIST (Feb. 13, 2016), https://www.economist.com/news/essays/21689225-can-one-world-s-great-waterways-survive-its-development; *see also* Kent, *supra* note 17, at 1363.

33. Waseem Ahmad Qureshi, *Water as a Human Right: A Case Study of the Pakistan-India Water Conflict*, 5 PENN ST. J.L. & INT'L AFF. 374, 378–80 (2017).

34. Sudha Ramachandran, *Water Wars: China, India and the Great Dam Rush*, THE DIPLOMAT (Apr. 3, 2015), https://thediplomat.com/2015/04/water-wars-china-india-and-the-great-dam-rush/; *see* Joel Wuthnow, *Water War: This River Could Sink China-India Relations*, NAT'L INTEREST (Apr. 19, 2016), https://nationalinterest.org/feature/water-war-river-could-sink-china-india-relations-15829; *see also* Kent, *supra* note 17, at 1363.

35. *See* Kent, *supra* note 17, at 1364.

36. *See* COKER, *supra* note 2, at 29.

37. *Id.*

38. *Id.*

39. *Id.* at 17.

40. Tom Coghlan, *US Unveils a 5,400 MPH Electro Gun*, TIMES (London) (Apr. 10, 2014, 1:01 AM), https://www.thetimes.co.uk/article/us-unveils-a-5400-mph-electro-gun-wsng38ghf26.

41. *See* K. ERIC DREXLER, ENGINES OF CREATION: THE COMING ERA OF NANOTECHNOLOGY 173-74 (1990).

of science fiction.'"[42] Likewise, Colin Milburn adds that nanotechnology is a field where science fiction and reality combine.[43] The point of contention here is not whether science fiction is a possibility in reality—whether the molecular manipulation of quantum physics is scientifically possible or not—but instead that the writings and research on nanotechnology have been artificially overhyped.[44]

1. Movies

Stephen Grosz writes that the future is not somewhere we will be but somewhere that we have imagined to be, because our thoughts and ideas of the present in the shape of fiction and fantasy mold and shape the very physics, technology, and very reality of the future.[45] Haldeman adds that science fiction is a first draft of the future; therefore, it can be revised or it can be entirely rewritten.[46] Some science-fiction movies depict the future of humanity and wars mainly in a utopian way, where thinkers imagined a cleaner, healthier, and technologically advanced portion of the world. For instance, see movies such as *Things to Come* (1936), *Terminator 2* (1991), *Gattaca* (1997), *The Matrix* (1999), *Equilibrium* (2002), *Minority Report* (2002), *Aeon Flux* (2005), *Wall-E* (2008), *In Time* (2011), *Cloud Atlas* (2012), *Elysium* (2013), *Tomorrowland* (2015), *Alita: Battle Angel* (2019), and the *Star Wars*, *Star Trek*, and *Avengers* movie series. In these utopian movies, even when the world is cleaner and technologically advanced, it is still marred by technologically advanced or planetary wars. It is plagued by technology, where humans are consciously enslaved by robots and AI technology, unable to think or live independently. Or, in some cases, the world is uninhabitable due to pollution and violence. Humanity has created a separate utopian city to live in—a clean and technologically advanced environment, where some of the population is divided into two groups—a group of small, entitled humans in the cleaner cities, and a large group of subjugated, enslaved humans, not worthy of entering into the manmade utopia. And then there are dystopian movies that may predict the future of this world. For instance, see movies such as *Escape from L.A.* (1996), *Mad Max* (1979, 1981, and 2015), and *Waterworld* (1995). These dystopian movies predicted that in a postapocalyptic world, after nuclear or world wars,

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42. *See* COKER, *supra* note 2, at 18.

43. *Id.*; *see* Colin Milburn, *Nanotechnology in the Age of Post-Human Engineering: Science Fiction as Science*, 10 CONFIGURATIONS 261, 263, 268 (2002).

44. COKER, *supra* note 2, at 18.

45. STEPHEN GROSZ, THE EXAMINED LIFE: HOW WE LOSE AND FIND OURSELVES 157 (2013).

46. *See* COKER, *supra* note 2, at 20 (noting that Haldeman's work of science fiction, THE FOREVER WAR (1999), is the first draft of future; which certainly needs to be revised or re-written).

humanity will lose all of its technology, population, infrastructure, and everything we know. The civilization of humankind will start again from scratch and it will fight for its very survival. So, it is possible that the "present may persist longer than we think and the future may be more familiar than we expect."[47]

II. FUTURE BELLIGERENTS

The belligerents of future warfare can be identified by looking at the current tendencies of belligerents. This includes non-state actors (mercenaries, rebels, guerrillas, insurgents, and terrorists), NGOs, the media, companies,[48] individuals,[49] criminal organizations (mafias and drug traffickers),[50] and "[f]inancial speculants and businessmen."[51]

A. Non-State Actors (NSAs)

Attali suggests that future wars will be dominated by nests of revolution and big private corporations and organizations including mafias, mercenaries, terrorists, and non-state actors, rather than by state monopolies.[52] Moreover, Attali adds that terrorist movements will continue to occupy failing states and employ intellectuals and financiers, where daily violence will be so extreme that only army responses instead of policing will be required to pacify the situation.[53] In future wars, guerrillas, insurgents, and partisans will continue to fight domestic governments for political and

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47. *See* COKER, *supra* note 2, at 10.

48. See STUART REID, ARMIES OF THE EAST INDIA COMPANY 1750–1850, at 3–13 (Martin Windrow ed., 2009) to see the East India Company with armies greater than armies of European countries at that time. See also an example of South African executives employing PMCs to secure diamond mines in Frank Westenfelder, *War for Diamonds: Executive Outcomes in Sierra Leone*, SOLDIERS OF MISFORTUNE: THE HISTORY OF MERCENARIES, http://www.soldiers-of-misfortune.com/history/eo-sierra-leone.htm (last visited Mar. 3, 2020).

49. *See* Jon Grevatt, *The As-Pac Cyber Challenge*, IHS JANE'S DEFENCE WKLY., Feb. 11, 2015, at 26; *see also* Alexander Gamero-Garrido, *Cyber Conflicts in International Relations: Framework and Case Studie*s 9, 19-20, 36, 43 (Mar. 2014) (unpublished manuscript) (MIT – Harvard Univ. Project on Expls. in Cyber Int'l Relations, Working Paper), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2427993. To see examples of hackers, see Kiss, *supra* note 1, at 31.

50. For example, approximately 60,000 people died in the Mexican drug wars during a six-year span from 2006 to 2012. Jeremy Bender, *Mexico's Drug War Is Getting Even Worse*, BUS. INSIDER (May 14, 2015, 2:32 PM), https://www.businessinsider.com/mexicos-drug-war-is-taking-worse-turn-2015-5.

51. Kiss, *supra* note 1, at 37.

52. *See* ATTALI, *supra* note 20, at 251.

53. *See id.* at 222.

social agendas of liberation, occupation, autonomy, and independence, using conventional and unconventional means, asymmetric tactics, violence, protests, and propaganda to fight their cause.[54] Sometimes, it is difficult to differentiate between terrorist groups, rebel groups, mercenaries, and guerrillas.[55] Sometimes, these contractors even collude with terrorists, such as Malhama Tactical did in Syria.[56] In particular, terrorist organizations have irregular goals, and they execute indiscriminate attacks. But they also employ financial branches, political wings, media, humanitarian organizations, and propaganda.[57] Therefore, for the purposes of this paper, non-state actors (NSAs) include mercenaries, rebels, guerrillas, insurgents, and terrorists. Currently, non-state actors and terrorist organizations are already occupying several failing states. Therefore, this domination also seems conceivable in the near future too, because the wars of the last two decades were primarily dominated by non-state actors, terrorist organizations, and mercenaries, serving the political and financial interests of other states, and the future of wars continues to move in the same direction without any major obstacles.

1. Mercenaries

Mercenaries/private military companies (PMCs)[58] are comprised of non-state actors, providing private military services and combat operations to anyone who is willing to pay, including governments, multinational companies, warlords, and dictators.[59] The U.S. Department of Defense found that about 224,000 mercenaries in Afghanistan and Iraq worked for CENTCOM in 2010.[60] By 2015, more than 7,000 mercenaries had been killed in Iraq and Afghanistan (the number of mercenary deaths are underreported for business purposes).[61] In 2004, the value of the mercenary

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54. *See* Kiss, *supra* note 1, at 32.

55. *See id.*

56. SEAN MCFATE, THE NEW RULES OF WAR: VICTORY IN THE AGE OF DURABLE DISORDER 135 (2019).

57. *See* Kiss, *supra* note 1, at 33.

58. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I) art. 47, June 8, 1977, 1125 U.N.T.S. 25 [hereinafter Protocol I].

59. P.W. Singer, *Outsourcing War*, 84 FOREIGN AFFAIRS 119, 120, 124 (Mar./Apr. 2005).

60. "Contractor Support of U.S. Operations in the USCENTCOM Area of Responsibility, Iraq and Afghanistan." Kiss, *supra* note 1, at 33.

61. Anila Daulatzai et al., *US & Allied Killed and Wounded*, BROWN UNIV.: WATSON INST. INT'L & PUB. AFFAIRS | COSTS OF WAR, https://watson.brown.edu/costsofwar/costs/human/military (last updated Jan. 2020); *see* Kiss, *supra* note 1, at 33.

industry was estimated to be above $100 billion.[62] Astonishingly, to help the use of mercenaries, the U.S. granted them immunity from domestic prosecution warzones in 2004.[63] Currently, more than fifty percent of U.S. forces in Afghanistan and Iraq are mercenaries.[64] The U.S. alone spent more than $250 billion on mercenaries in the ten-year period from 2007 to 2017.[65] It is predicted that in future wars, mercenaries and PMCs will have access to more sophisticated weapons, such as ballistic missile defense systems, antisatellite weapons systems, and naval and air force capabilities, and more countries will employ them, because hiring PMCs in times of need is cheaper than keeping armies at all times.[66]

2. No Man's Lands

Analysts have predicted that in the near future, around 700 million more people will become refugees, migrants, and displaced persons due to unemployment alone.[67] Many more will be affected by wars around the world. As a result, refugees, migrants, and displaced persons will create and fuel "slumscapes" and "no man's lands" around the world.[68] No man's lands will be places in countries filled with settled masses of people, where the state will either have no will or no capacity to control the area.[69] These places will have no employment, no water resources, and no potential food resources. In the future, these places will become hotbeds for conflicts and violence owing to the efforts of control and survival,[70] as predicted in polarized utopian movies. In future warfare, the victims of wars will also change drastically. The collateral damage of future wars will be against civilians, diminishing the distinction between combatants and

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62. Edwin Lane, *The Rise of the UK's Private Security Companies*, BBC NEWS (Nov. 2, 2010), https://www.bbc.com/news/business-11521579.

63. *See* JEREMY SCAHILL, BLACKWATER: THE RISE OF THE WORLD'S MOST POWERFUL MERCENARY ARMY 14 (2007).

64. MCFATE, *supra* note 56, at 128–31.

65. Brian Wang, *US Spent $250 Billion on Contractors from 2007–2017 and May Adopt Blackwater 2.0 Plan*, NEXTBIGFUTURE (July 17, 2017), https://www.nextbigfuture.com/2017/07/us-spent-250-billion-on-contractors-from-2007-2017-andmay-adopt-blackwater-2-0-plan.html.

66. *See* Kiss, *supra* note 1, at 33.

67. SECRETARIAT OF THE UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION, DESERTIFICATION: THE INVISIBLE FRONTLINE 4 (2d ed. 2014), https://www.unccd.int/sites/default/files/documents/12112014_Invisible%20frontline_ENG.pdf; *see also,* Kent, *supra* note 17, at 1345-46.

68. *See* Kent, *supra* note 17, at 1358.

69. *See id.*

70. *See id.* at 1359.

noncombatants.[71] Even today, most of the victims of warfare are civilians[72] trapped in warzones or war-torn countries.

B. *NGOs*

Certain NGOs can be considered belligerents in future wars. There are countless numbers of NGOs in the world today, many of which take positive action and do useful work, while many others are problematic because they undertake harmful actions for governments and support fights in other countries, while not respecting domestic rules nor cooperating with governments.[73] Resperger argues that many NGOs have the tendency to sabotage governmental measures and manipulate international opinion.[74] Kiss adds that NGOs are a perfect tool "to organise demonstrations, collect and redistribute funds, provide shelter, develop and organise insurgency, provide supplies, run an intelligence circle or spread propaganda."[75] NGOs work hand in hand with the support of political parties, the international media, and organizations to cover up problems under the guise of human rights and political correctness.[76] For instance, Western countries used NGOs to oust the pro-Russian government in Ukraine.[77] Therefore, it is possible that powerful countries will continue to employ disguised and belligerent NGOs to further their cause and interests in host countries.

C. *The Media*[78]

The largest media firms are owned by big companies that need to secure their economic and political interests. The media work to propagate and secure the interests of governments, political parties, lobby groups, companies, and NGOs.[79] The media are not per se belligerents in physical form, but they provide a support role, i.e., psychological operations (PSYOPS).[80] For these purposes, the media often use fake news, biased

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71. *See id.* at 1356.

72. *Civilians*, INT'L COMM. OF THE RED CROSS, https://www.icrc.org/en/war-and-law/ protected-persons/civilians (last visited Jan. 12, 2019).

73. Kiss, *supra* note 1, at 34.

74. *Id.*

75. *Id.*

76. *Id.*

77. *Id.*

78. This paragraph is not written against diligent and honest journalists and media channels that work honestly to put forward truth to people. Instead it is written to highlight the dangers posed by biased, fake, and propaganda-based news on current and future wars.

79. Kiss, *supra* note 1, at 34-35.

80. *See id.* at 35.

reports, misinterpretation, and half-truths to compromise credibility and manipulate opinions about certain targets.[81] "Therefore, underestimating the role of the media in war is one of the greatest mistakes the commanders and politicians can make."[82]

III. FUTURE TECHNOLOGICAL ENGAGEMENTS

This section will explore the possible uses of technology in future weaponry and wars. For instance, in future wars, chemical weapons will be able to kill leaders undetected, bacteriological weapons will create pandemics targeting certain ethnic groups, and nanotechnology will enable nanorobots/gray jelly (as small as dust particles) to be able to attack or conduct surveillance of the targeted enemy.[83] Similarly, the technology of self-guided bullets is under consideration, which will be able to pursue moving targets.[84] In the future, it is possible that virtual reality technology will be used to torture prisoners during wars.[85] According to some estimates, within the next twenty years, military technology, cyber security, and robotics will intensify in the areas of developing more advanced and sophisticated sensors (to gather data), computing/processing technology (to process data), and weapons technology regarding its performance and type, using "'internet of things' networking, quantum computing, and artificial intelligence and big data."[86] The scope of this paper does not allow us to go into the details of all possible areas of advancement in future military technology. Therefore, to elaborate more on the use of technology in future wars, four subsequent subsections will discuss the notions of surveillance, cyber-currency, outer space, laser weapons, and enhanced future soldiers as the tools of future warfare. Later, Section IV will discuss the uses of robot warriors and artificial intelligence (autonomous weapons) within the realm of the future uses of military technology.

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81. *See id.*

82. *Id.*

83. ATTALI, *supra* note 20, at 235.

84. Thomas Macaulay & Tamlin Magee, *The Future of Technology in Warfare: From Drone Swarms to VR Torture*, TECH WORLD (Apr. 18, 2018), https://www.techworld.com/security/future-of-technology-in-warfare-3652885/.

85. *Id.*

86. MICHAEL O'HANLON, FOREIGN POLICY, BROOKINGS, FORECASTING CHANGE IN MILITARY TECHNOLOGY, 2020-2040, at 4 (2018), https://www.brookings.edu/wp-content/uploads/2018/09/FP_20181218_defense_advances_pt2.pdf.

A. Surveillance

Jacques Attali gives a gruesome portrayal of future wars in his book, *A Brief History of the Future*, where the world will have robot soldiers, massive surveillance systems processing Big Data, modeled/simulated battlefields, and intelligent body armor for human soldiers modifying and monitoring moods and thoughts.[87] He adds that in a scientific strive for more accuracy and the miniaturization of weaponry, the future of war will possess advanced biological, chemical, bacteriological, electronic, and nanotechnological weapons.[88] As of today, mass surveillance is possible, and is well under action. Already, smart textiles and biometric materials are capable of monitoring a person's temperature, heart rate, location, and mood[89] (such as sexual desires).[90] We wear and carry smart devices that can pinpoint our location, state of mind, likes and dislikes, political orientation, religious beliefs, lifestyles, bank details, family structure, and browser history.[91] These devices are smart enough to record our voices at any point in time, and even make our videos without our knowledge or consent.[92] Currently, the U.S. is considering to develop gray jelly[93] and bird- and insect-like[94] surveillance devices to carry back data from battlefields.[95] By 2040, *sousveillance* and *surveillance* will enable "all to know everything about

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87. ATTALI, *supra* note 20, at 235; *see also* COKER, *supra* note 2, at 41.

88*. See* ATTALI, *supra* note 20, at 235.

89*. See* Amy Frearson, *Intimacy 2.0 by Studio Roosegaarde*, DEZEEN (Apr. 3 2012), https://www.dezeen.com/2012/04/03/intimacy-2-0-by-studio-roosegaardeand-anouk-wipprecht/.

90*. See* COKER, *supra* note 2, at 2.

91*. See id.* at 7; *see also* Carole Cadwalladr & Emma Graham-Harrison, *Zuckerberg Set Up Fraudulent Scheme to 'Weaponise' Data, Court Case Alleges*, GUARDIAN (May 24, 2018, 8:01 AM), https://www.theguardian.com/technology/2018/may/24/mark-zuckerberg-set-up-fraudulent-scheme-weaponise-data-facebook-court-case-alleges; Carole Cadwalladr & Emma Graham-Harrison, *Facebook Accused of Conducting Mass Surveillance Through Its Apps*, GUARDIAN (May 24, 2018, 8:01 AM), https://www.theguardian.com/technology/2018/may/24/facebook-accused-of-conducting-mass-surveillance-through-its-apps; *Facebook Reveals Mark Zuckerberg's US Congress Testimony*, BBC NEWS (Apr. 9, 2018), https://www.bbc.com/news/technology-43698739. See full statement at, Facebook Inc., *Answers to House Energy and Commerce For the Record* (June 29, 2018), https://docs.house.gov/meetings/IF/IF00/20180411/108090/HHRG-115-IF00-Wstate-ZuckerbergM-20180411.pdf.

92. See works of Edward Snowden especially regarding contracts of smartphone applications and surveillance by NSA/government in Dylan Curran, Opinion, *Are Your Phone Camera and Microphone Spying on You?* GUARDIAN (Apr. 6, 2018, 9:11 AM), https://www.theguardian.com/commentisfree/2018/apr/06/phone-camera-microphone-spying.

93. *See* ATTALI, *supra* note 20, at 235.

94. To see swarm of robots, see Macaulay & Magee, *supra* note 84.

95. JOHN EDWARDS, THE GEEKS OF WAR: THE SECRETIVE LABS AND BRILLIANT MINDS BEHIND TOMORROW'S WARFARE TECHNOLOGIES 50 (2005).

everyone" globally,[96] through the help of Big Data crunching and artificial intelligence.[97]   A combination of outer space technology, artificial intelligence, Big Data crunching and drone technology will create all-knowing surveillance systems for future wars, capable of noticing enemy moves and of spying on any civilian as well.[98]

B. Cyber-Currency

Recently, there has been a surge in the development of cyber-currencies, known as blockchain-based cryptocurrencies, most notably Bitcoin. As a matter of fact, transactions dealt in cyber-currency are untraceable.[99] For this reason, terrorists have been seen calling for financial aid in the form of crypto-currencies.[100] Moreover, most of the black market in drugs, human trafficking, and weapons dealing through the dark web uses crypto-currencies for payments.[101]   All illicit businesses thrive under the use of cryptocurrencies.[102] Sure, cryptocurrencies have their benefits as well, such as greater ease in transactions. But its traceability makes it convenient for illicit activities, such as for the purposes of money laundering and financing non-state actors.[103] Besides illicit businesses, cryptocurrencies also present

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96.   See interview of Professor Murray Shanahan in Kent, *supra* note 17, at 1343.

97.   See interviews of Mischa Dohler & Stuart Armstrong in Kent, *supra* note 17, at 1343.

98*.   See* Kent, *supra* note 17, at 1355.

99.   Tyler G. Newby & Ana Razmazma, *An Untraceable Currency? Bitcoin Privacy Concerns*, FINTECH WEEKLY (Apr. 7, 2018), https://www.fintechweekly.com/magazine/articles/an-untraceable-currency-bitcoin-privacy-concerns; Lucho Poletti, *Protect Your Privacy Using Anonymous Coins with Untraceable Transactions*, MEDIUM (Apr. 10, 2018), https://medium.com/datadriveninvestor/protect-your-privacy-using-anonymous-coins-with-untraceable-transactions-f7a1e13a18c.

100*.   See* Matthew Beedham, *An American Woman Has Been Funding ISIS with Bitcoin*, TNW: HARD FORK (Nov. 27, 2018, 10:12 AM), https://thenextweb.com/hardfork/2018/11/27/american-funding-isis-bitcoin/; *see also* David Canellis, *Europol: Criminals Are Still Using Bitcoin, but ISIS Loves Zcash*, THE NEXT WEB (Sept. 19, 2018, 3:21 PM), https://thenextweb.com/hardfork/2018/09/19/europol-cryptocurrency-cybercrime/; Matt Levine, Opinion, *Don't Send Your Bitcoins to ISIS*, BLOOMBERG (Nov. 27, 2018, 8:34 AM), https://www.bloomberg.com/opinion/articles/2018-11-27/don-t-send-your-bitcoins-to-isis.

101*.   See* Tristan Greene, *Study: 44% of Bitcoin Transactions Are for Illegal Activities*, THE NEXT WEB (Feb. 7, 2018), https://thenextweb.com/cryptocurrency/2018/02/07/study-44-of-bitcoin-transactions-are-for-illegal-activities/; Jacob Kleinman, *What to Know About Monero, the Black Market Cryptocurrency That's Going Mainstream*, LIFE HACKER (Jan. 30, 2018, 3:15 PM), https://lifehacker.com/what-to-know-about-monero-the-black-market-cryptocurre-1822558727; Token Meister, *What Is the Black Market Worth—And How Much of It Is Crypto*, MEDIUM (Nov. 27, 2018), https://medium.com/@tokenmeister.social/what-is-the-black-market-worth-and-how-much-of-it-is-crypto-daf46e420d8d.

102*.   See* Greene, *supra* note 101; *see also* Kleinman, *supra* note 101; Token Meister, *supra* note 101.

103.   Beedham, *supra* note 100.

a threat to the monopoly of state authority[104] because cyber-currency leaves states with negligible control over its main instrument of economic engagement—its currency.[105] This in turn will reduce the state's control over the private sector and diminish its monopoly of power.[106] It is probable that several countries will legalize the use of cryptocurrencies by mistaking the private sector and promoting cyber-currency, as allies supporting government mandates.[107] However, other countries will be able to reflect on the state's *raison d'etre* and recognize cyber-currency as a threat to state authority.[108]

C. Outer Space

Moreover, Attali also believes that in the future there will be planetary wars and terrorist movements occupying failing states and employing intellectuals and financiers, where daily violence will be so extreme that only army responses instead of policing will be required to pacify the situation.[109] Currently, non-state actors and terrorist organizations are already occupying several failing states. But planetary wars seem far-fetched for the near future: today, science is struggling to even reach and explore other planets. Elon Musk has plans to inhabit Mars with a human colony.[110] But technology so advanced to be able to cover planetary distances in short times and invade completely uninhabited planets is not achievable for at least several centuries to come. Not only do we need such advanced technologies to achieve all of this, just as we require an unlimited energy source; we also first need to colonize other planets with sufficient populations.

However, it is plausible that almost all future wars will pursue space technology, employing satellites and using space weapons. The First Committee to the United Nations acknowledged that the space environment is becoming highly competitive and contested.[111] Currently, there is not "a single G7 nation that isn't now looking at space security as one of its highest

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104. *See* Kent, *supra* note 17, at 1350.

105. *Id.*; *see also* JAMIE BARTLETT, THE DARK NET: INSIDE THE DIGITAL UNDERWORLD 74 (2015).

106. Kent, *supra* note 17, at 1350; *see also* BARTLETT, *supra* note 105.

107. Kent, *supra* note 17, at 1356.

108. EDWARDS ET AL., *supra* note 32, at 51.

109. *See* ATTALI, *supra* note 20, at 252.

110. Rob Coppinger, *Elon Musk Outlines Mars Colony Vision*, BBC (Sept. 27, 2016), https://www.bbc.com/news/science-environment-37486372.

111. Press Release, 68th General Assembly, 1st Comm., Outer Space Increasingly 'Congested, Contested and Competitive,' First Committee Told, as Speakers Urge Legally Binding Document to Prevent Its Militarization, U.N. Press Release GA/DIS/3487 (Oct. 25, 2013).

military priorities and areas of strategic concern."[112] These space weapons include military technologies capable of destroying satellites, disabling the cybernetworks of the targeted nation. "The Rods from God" is another example of a spaceborne weapon, a highly sophisticated weapon that projects tungsten rods using powerful kinetic energy to destroy targets on Earth, deployable within minutes, with "almost guaranteed first strike capability; effectively placing every nation on earth within the targeting scope."[113] In the near future, space power (mostly cybertechnology and military weaponry) will determine global powers in the world.[114] There are almost 1,300 satellites or space debris in space, of which 549 are American, 131 are Russian, 142 are Chinese, 40 are British, and 33 are Indian.[115] Some people believe that the progression in this direction means that space debris will likely increase exponentially,[116] though others believe that it is unlikely that this debris would increase in the future.[117] However, the increase in space technology, and the race to acquire advance satellite systems in space among countries, foretells that space debris would definitely be bound to increase in the near future.[118] Therefore, it is plausible that some states—to retain their global power—will resist satellite deployment by other states, and that this contestation will create future conflicts over space debris or future wars in the race toward space weaponry technology.[119] For instance, "ghost satellites" such as Kosmos 2499 have the will and capacity to identify space pollution/debris satellites and destroy them.[120] This sort of technology can also be used to disable the satellites of targeted states to compromise cybernetworks on Earth, and diminish their military capability to be able to function or communicate effectively.[121] Similarly, the "Rods from God" is also a space weapon capable of targeting underground enemy bases on Earth,

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112. Jones, *supra* note 24.

113. *Id.* (quoting Matthew Beard, *Militarising Space: Weapons in Orbit*, *in* COMMERCIAL SPACE EXPLORATION: ETHICS, POLICY AND GOVERNANCE 197 (Jai Galliott ed., 2015)).

114. *See* Garrett M. Graff, *The New Arms Race Threatening to Explode in Space*, WIRED (Jun. 26, 2018, 6:00 AM), https://www.wired.com/story/new-arms-race-threatening-to-explode-in-space/.

115. *See* Jones, *supra* note 24.

116. *See* David Wright, Bejing Orbit Debris Mitigation Workshop, The Current Space Debris Situation, SECURE WORLD FOUNDATION (2010), https://swfound.org/media/99971/wright-space-debris_situation.pdf (presentation slides).

117. *See* Jones, *supra* note 24.

118. *See* Wright, *supra* note 116.

119. *See* Kent, *supra* note 17, at 1361.

120. *Id.*

121. *Id.*

such as underground nuclear development facilities.[122]   Thus, as a consequence of using space weapons technologies, it is possible that a large number of innocent civilians would be affected, and the use of space wars would eat up the Earth's biosphere.[123]

D. Laser Weapons

There are prototype laser weapons already developed,[124] and blueprint versions of advanced future laser weapons have been commissioned— capable of burning through planes,[125] blasting holes in tanks, and destroying missiles. Laser weapons work at the speed of light, and have the potential to become the future of defense systems.[126] The U.S. Air Force has conducted experiments mounting laser weapons on a Boeing 747,[127] which can detect and destroy missiles before they can hit any target.[128] Within the next two decades, Air Force fighter jets will be able to carry laser attack-defense systems, with endless rounds charged by their jet engines.[129] Moreover, the Lockheed Martin Company has signed contracts with the U.S. to deliver laser weapons as soon as 2020.[130]

E. Enhanced Future Soldiers

In Haldeman's science fiction novel, he envisions that the soldiers of the future will be connected to cybernetic systems, which will be able to read and shape human emotions and thoughts.[131] He adds that cybernetic systems will fuse men and machinery by planting pseudo-memories and by exploiting Clausewitz's moral human forces of courage and hatred to enhance future soldiers' capabilities.[132] The use of super soldiers in future wars has long been a dream of scientists. Two years before the introduction of *Iron Man* in Marvel Comics in 1963, the Pentagon had already proposed developing

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122.   John Arquilla, Opinion, *Rods from God: Imagine a Bundle of Telephone Poles Hurtling Through Space at 7,000 MPH*, SF GATE (Mar. 12, 2006, 4:00 AM), https://www.sfgate.com/opinion/article/RODS-FROM-GOD-Imagine-a-bundle-of-telephone-2539690.php.

123.   Nick Bostrom, *Existential Risks: Analyzing Human Extinction Scenarios and Related Hazards*, 9 J. EVOLUTION & TECH. ¶ 4.1 (2002).

124*.   See* István, *supra* note 14, at 229.

125.   Macaulay & Magee, *supra* note 84.

126.   István, *supra* note 14, at 229.

127*.   Id*. at 230.

128*.   Id.*

129*.   Id.* at 230–31.

130.   Macaulay & Magee, *supra* note 84.

131*.   See* JOE HALDEMAN, THE FOREVER WAR 155-57 (1999).

132*.   See id.*

servo-soldiers for combat purposes.[133]   But at that time, the technology to process all the data required and energy to power the man-suit did not exist.[134] Times have changed: a Japanese company has developed a man-suit, Cyberdyme-HAL-5, which can move its limbs by reading the human brain activity, without requiring actual muscle movements by an operator.[135] Moreover, fluid armors (Magneto-heliological "MR") developed by the U.S. army and intended to be operational by 2030, harden in a matter of milliseconds by electric impulse, creating an impenetrable shield that returns to a liquid state once the charge is removed.[136]

V. AUTONOMOUS WEAPONS

This section will primarily discuss the use of artificial intelligence and autonomous weapons in future wars. It will also explore the current uses of robot warriors and artificial intelligence, while imagining their future and giving precautionary measures against the dangers of their use.

A. Robot Warriors

In robotics, there are already robots capable of carrying injured soldiers and heavy weights in difficult terrains during conflict on the battlefield.[137] The TALON military robot is another example of a remote-controlled robot that can identify and defuse bombs;[138] there are also robots such as MAARS, RVM/CART,[139] and EOD developed by NRTC[140] that have mounted cameras, heavy machine guns, and grenade launchers, capable of fighting ground battles.[141]   SGR-A1 is a current working prototype killer robot developed by Samsung and Korea for military defense purposes, capable of

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133. COKER, *supra* note 2, at 25.

134*. Id.*

135*. Id.*

136. Kevin Bonsor, *How the Future Force Warrior Will Work*, HOWSTUFFWORKS (July 2, 2005), https://science.howstuffworks.com/ffw.htm.

137. Kent, *supra* note 17, at 1354.

138. István, *supra* note 14, at 226 n.11.

139. Paul Szoldra, *The Marines Are Testing This Crazy Machine Gun-Wielding Death Robot*, BUS. INSIDER (July 20, 2016, 6:34 AM), https://www.businessinsider.com/marines-testing-robot-2016-7#besides-being-an-awesome-death-dealing-robot-it-can-also-drag-wounded-marines-off-the-battlefield-if-they-are-injured-4.

140. Trending Team, *Pakistan Army Is Testing This Crazy Rocket, Grenade, and Machine Gun Firing Robot*, # TRENDING.PK (Dec. 17, 2018), https://trending.pk/2018/12/pakistan-army-is-testing-this-crazy-rocket-grenade-and-machine-gun-firing-robot/.

141. *See* István, *supra* note 14, at 227-28.

killing humans autonomously without human-made decisions.[142] With some expectation, in the future, autonomous killer robots will be used for defensive as well as aggressive purposes, using face recognition technology.[143] According to a U.S. three-star general:

> Where we're headed very soon is tens of thousands of robots operating in our conflicts, and these numbers matter, because we're not just talking about tens of thousands of today's robots, but tens of thousands of these prototypes and tomorrow's robots, because of course, one of the things that's operating in technology is Moore's Law, that you can pack in more and more computing power into those robots, and so flash forward around 25 years, if Moore's Law holds true, those robots will be close to a billion times more powerful in their computing than today.[144]

B. *Artificial Intelligence (AI) Today*

Today, AI is used for defensive, logistical, supportive, and strategic purposes by governments, organizations, and companies around the world. In cyberspace, for instance, companies like Google[145] and Gurucul[146] use AI for cybersecurity, and Distil Networks uses machine learning in processing Big Data.[147] DARPA demonstrates another example of correcting software security by using artificial intelligence,[148] using AI for air defense and targeting purposes, where pilots use it to identify targets using current radar,

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142. *Future Tech? Autonomous Killer Robots Are Already Here*, NBC NEWS (May 15, 2014, 5:27 PM), https://www.nbcnews.com/tech/security/future-tech-autonomous-killer-robots-are-already-here-n105656) [hereinafter *Future Tech*].

143.   Macaulay & Magee, *supra* note 84.

144.   Kent, *supra* note 17, at 1354 (quoting P.W. Singer, *Military Robots and the Future of War*, https://www.ted.com/talks/p_w_singer_military_robots_and_the_future_of_war/transcript?langua ge=en (last visited Feb. 27, 2020)).

145.   Cade Metz, *Google's Training Its AI to Be Android's Security Guard*, WIRED (June 2, 2016, 7:00 AM), https://www.wired.com/2016/06/googles-android-security-team-turns-machine-learning/.

146.   Mark Cox, *Machine-Learning Based Risk Analytics Vendor Gurucul Launches First Channel Program*, CHANNELBUZZ.CA (June 1, 2016), https://channelbuzz.ca/2016/06/machine-learning-based-risk-analytics-vendor-gurucul-launches-first-channel-program-17747/.

147.   Conner Forrest, *How Distil Networks Uses Machine Learning to Hunt Down 'Bad Bots,'* TECHREPUBLIC (Aug. 3, 2016, 6:48 AM), https://www.techrepublic.com/article/how-distil-networks-uses-machine-learning-to-hunts-down-bad-bots/.

148.   DARPA, "Mayhem" Declared Preliminary Winner of Historic Cyber Grand Challenge, DARPA (Aug. 4, 2016), https://www.darpa.mil/news-events/2016-08-04 [hereinafter Cyber Grand Challenge, DARPA]; *see also* Devin Coldewey, *Carnegie Mellon's Mayhem AI Takes Home $2 Million From DARPA's Cyber Grand Challenge*, TECHCRUNCH (Aug. 5, 2016, 4:34 PM), https://techcrunch.com/2016/08/05/carnegie-mellons-mayhem-ai-takes-home-2-million-from-darpas-cyber-grand-challenge/.

surveillance, and tactical capabilities.[149] DARPA's AI use is more efficient in finding and locking targets than humans are, because humans require fighter jets to be close, within a vulnerable range, to find and lock on targets, while DARPA's AI system does the same at a safer distance without putting the pilot's life and the security of the aircraft at risk, with improved learning capabilities.[150] AI is also used by the Air Force to run diagnostics of the electrical systems of jet fighters.[151] More astoundingly, in 2016, Psibermetrix's AI pilot, Alpha, defeated a well decorated U.S. Air Force pilot, Col. Gene Lee, in a series of simulated airborne dogfights.[152] Alpha was able to process and anticipate combat moves at a speed 250 times faster than the blink of an eye, only using the computing power of a Raspberry Pi, which costs $29.[153] Lee admitted that this dogfight was "the most aggressive, responsive, dynamic, and credible AI [he] ha[d] seen to date."[154]

AI is also used to prevent and anticipate enemy actions, using "reports, documents, newsfeed, and the forms of unstructured information."[155] For instance, a paper in 2015 used 2,200 military reports on ISIS and concluded that ISIS used bombings "as diversions to draw Iraqi forces away from potential targets."[156] Similarly, in 2016, the CIA claimed "'to anticipate the

149. STEPHAN DE SPIEGELEIRE ET AL., ARTIFICIAL INTELLIGENCE AND THE FUTURE OF DEFENSE: STRATEGIC IMPLICATIONS FOR SMALL AND MEDIUM-SIZED FORCE PROVIDERS 88 (2017),https://hcss.nl/sites/default/files/files/reports/Artificial% 20Intelligence%20and%20the%20Future%20of%20Defense.pdf.

150. John Keller, *DARPA TRACE Program Using Advanced Algorithms, Embedded Computing for Radar Target Recognition*, MILITARY & AEROSPACE ELECTRONICS (July 24, 2015), https://www.militaryaerospace.com/computers/article/16714226/darpa-trace-program-using-advanced-algorithms-embedded-computing-for-radar-target-recognition.

151. Alan Lesgold et al., *SHERLOCK: A Coached Practice Environment for an Electronics Troubleshooting Job*, in COMPUTER-ASSISTED INSTRUCTION AND INTELLIGENT TUTORING SYSTEMS: SHARED GOALS AND COMPLEMENTARY APPROACHES 201, 203-04 (J. Larkin et al. eds., 1992); *see also* DE SPIEGELEIRE ET AL., *supra* note 149, at 93.

152. 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 (2016), https: //www.longdom.org/open-access/genetic-fuzzy-based-artificial-intelligence-for-unmanned-combat-aerialvehicle-control-in-simulated-air-combat-missions-2167-0374-1000144.pdf;   Coby McDonald, *A.I. Downs Expert Human Fighter Pilot in Dogfight Simulation*, POPULAR SCIENCE (June 27, 2016), https://www.popsci.com/ai-pilot-beats-air-combat-expert-in-dogfight/.

153. Ernest et al., *supra* note 152; McDonald, *supra* note 152.

154. M.B. Reilly, *Beyond Video Games: New Artificial Intelligence Beats Tactical Experts in Combat   Simulation*,   UC   MAGAZINE   (June   27,   2016), https://magazine.uc.edu/editors_picks/recent_features/alpha.html.

155. DE SPIEGELEIRE ET AL., *supra* note 149, at 92.

156. Andrew Stanton et al., *Mining for Causal Relationships: A Data-Driven Study of the Islamic State*, ARXIV.ORG (Aug. 5, 2015), https://arxiv.org/pdf/1508.01192.pdf; *see also* DE SPIEGELEIRE ET AL., *supra* note 149, at 92; Alex Lockie, *This Algorithm Could Help Predict ISIS' Future Moves*, BUS. INSIDER (Sept. 28, 2015, 7:40 PM), https://www.businessinsider.in/This-algorithm-could-help-predict-ISIS-future-moves/articleshow/49141515.cms.

rise of social unrest and societal instability up to three to five days in advance.'"[157] Likewise, Google initiated a Jigsaw/Google Ideas advertising campaign to dissuade possible ISIS recruits from being brainwashed by ISIS propaganda, using artificial intelligence.[158] Regardless of its claims, it is likely that this program or such programs can be used for surveillance, defense, and aggressive purposes by the intelligence agencies for instilling their agendas and points of interest in the minds of the general public.

> Google has built a half-trillion-dollar business out of divining what people want based on a few words they type into a search field. In the process, it's stumbled on a powerful tool for getting inside the minds of some of the least understood and most dangerous people on the Internet: potential ISIS recruits. Now one subsidiary of Google is trying not just to understand those would-be jihadis' intentions, but to change them.

> Jigsaw, the Google-owned tech incubator and think tank—until recently known as Google Ideas—has been working over the past year to develop a new program it hopes can use a combination of Google's search advertising algorithms and YouTube's video platform to target aspiring ISIS recruits and ultimately dissuade them from joining the group's cult of apocalyptic violence. The program, which Jigsaw calls the Redirect Method and plans to launch in a new phase this month, places advertising alongside results for any keywords and phrases that Jigsaw has determined people attracted to ISIS commonly search for. Those ads link to Arabic- and English-language YouTube channels that pull together preexisting videos Jigsaw believes can effectively undo ISIS's brainwashing—clips like testimonials from former extremists, imams denouncing ISIS's corruption of Islam, and surreptitiously filmed clips inside the group's dysfunctional caliphate in Northern Syria and Iraq.

> This came out of an observation that there's a lot of online demand for ISIS material, but there are also a lot of credible organic voices online debunking their narratives," says Yasmin Green, Jigsaw's head of research and development. The Redirect Method is at its heart a targeted advertising campaign: Let's take these individuals who are vulnerable to ISIS' recruitment messaging and instead show them information that refutes it.

> The results, in a pilot project Jigsaw ran early this year, were surprisingly effective: Over the course of about two months, more than 300,000 people were drawn to the anti-ISIS YouTube channels. Searchers actually clicked

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   157. Frank R. Konkel, *The CIA Says It Can Predict Social Unrest as Early as 3 to 5 Days Out*, DEFENSE ONE (Oct. 5, 2016), https://www.defenseone.com/technology/2016/10/cia-says-it-can-predict-social-unrest-early-3-5-days-out/132121/; *see also* DE SPIEGELEIRE ET AL., *supra* note 149, at 93.

   158. Andy Greenberg, *Google's Clever Plan to Stop Aspiring ISIS Recruits*, WIRED (Sept. 7, 2016, 7:00 AM), https://www.wired.com/2016/09/googles-clever-plan-stop-aspiring-isis-recruits/; *see also* DE SPIEGELEIRE ET AL., *supra* note 149, at 95–97.

on Jigsaw's three or four times more often than a typical ad campaign. Those who clicked spent more than twice as long viewing the most effective playlists than the best estimates of how long people view YouTube as a whole. And this month, along with the London based startup Moonshot Countering Violent Extremism and the US-based Gen Next Foundation, Jigsaw plans to relaunch the program in a second phase that will focus its method on North American extremists, applying the method to both potential ISIS recruits and violent white supremacists . . . .[159]

But Green says that the Redirect Method, beyond guiding ISIS admirers to its videos, doesn't seek to track them further or identify them, and isn't designed to lead to arrests or surveillance, so much as education. These are people making decisions based on partial, bad information, says Green. We can affect the problem of foreign fighters joining the Islamic State by arming individuals with more and better information. She describes the campaign's work as a kind of extension of Google's core mission to make the world's information accessible and useful. Perhaps one of world's most dangerous problems of ignorance and indoctrination can be solved in part by doing what Google does best: Helping people find what they most need to see.

C. The Future of AI

If we analyze technological progression in the world, it is clear that humans will interact with machines and technology more in the near future. Eric Schmidt and Jared Cohen believe that future of the world is going in the direction of more connectivity.[160] Currently, there is a rise in machine-to-machine communication and the "Internet of Things." For instance, out of all web traffic on the internet, sixty-one percent of traffic is nonhuman by web robots, search engines, and data scrapers.[161] Therefore, it is plausible that with the rise of artificial intelligence many of the decisions of humankind will be left to machines to make.[162] Today, computers are getting smarter. They can already calculate the odds of survival and success in a war.[163] Likewise, they can model behavioral patterns and make forecasts by using complex algorithms.[164] So, it is plausible that they will be used to make

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159. DE SPIEGELEIRE ET AL., *supra* note 149, at 96–97.

160. ERIC SCHMIDT & JARED COHEN, THE NEW DIGITAL AGE: RESHAPING THE FUTURE OF PEOPLE, NATIONS AND BUSINESSES 14-15 (2013).

161. Robert Plant, *Life Is About to Get a Lot Smarter*, WORLD TODAY, Oct.-Nov. 2014, at 23-24.

162. COKER, *supra* note 2, at 7.

163. *Id.* at 22.

164*. Id.*

decisions in future wars using quantum computing.[165] It would not be wrong to suggest that this machine age is heading toward the emergence of artificial intelligence connecting humanity via digital networks.[166] Autonomous weapons using artificial intelligence can choose to determine for themselves whether to engage a target and destroy it without human approval or human engagement.[167] In 2015, the UN debated the hackability, accuracy, and safety measures of autonomous weapons.[168] In the future, there will be autonomous unmanned ground and air vehicles that will be omnipresent with Big Data processing capabilities in less time.[169] SGR-A1 is a current working prototype killer robot developed by Samsung and Korea for military defense purposes, capable of killing humans autonomously without humanmade decisions.[170] After getting bad press for developing a killer autonomous robot, a human trigger control was added to SGR-A1:

> Other, more advanced robots are being tested right now. The U.S. Navy has successfully launched Northrop Grumman's X-47B, a stealth drone the size of a fighter jet, from its aircraft carriers. In the U.K., Taranis, a top-secret unmanned aircraft named after the Celtic god of thunder, can travel at supersonic speeds and could be used by the British military to carry out pre-programmed attacks. (BAE Systems said the aircraft is meant to be used under the "control of a human operator"). The Harpy, described by Israel Aerospace Industries as a "fire and forget" weapon, is essentially a powerful missile with a brain, programmed to cruise until it detects emissions from a hostile radar system.[171]

Huw Price and Jaan Talinn said that it seems a reasonable prediction that some time in this or the next century "intelligence [will escape from] the constraints of biology," and as the robot computers become smarter than humans, we could find ourselves at the mercy of machines that are not malicious, but machines whose interests do not include ours.[172] But the question is: Who would be controlling AI machines? Or would these machines even be controllable? James Barrat speculated in his book *Our Final Invention: Artificial Intelligence and the End of the Human Era*, that

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165. *See id.* at 22-23.

166. ERIK BRYNJOLFSSON & ANDREW MCAFEE, THE SECOND MACHINE AGE: WORK, PROGRESS AND PROPERTY IN THE AGE OF BRILLIANT TECHNOLOGIES 296 (2016) (ebook).

167. Kent, *supra* note 17, at 1353.

168. *Id.* at 1354 (citing *Who Pulls the Trigger*? NEW SCIENTIST, Jan. 16-22, 2016, at 5).

169. István, *supra* note 14, at 224.

170. *Future Tech, supra* note 142.

171. *Id.*

172. *Humanity's Last Invention and Our Uncertain Future*, UNIV. OF CAMBRIDGE RES. (Nov. 25, 2012), https://www.cam.ac.uk/research/news/humanitys-last-invention-and-our-uncertain-future.

in the future, the technological progression in artificial intelligence will render human beings useless, and humanity will be replaced by self-reproducing machines.[173] Other writers, such as William Gibson, predict that we will not be present in the future, because the present is so volatile and all we can do is carry out risk management.[174] Likewise, similar writers predict that humanity will wipe itself out by nuclear wars[175] and by making this planet uninhabitable from pollution.[176]

D. Precautionary Measures

Pinker foresees a future of what preventative and precautionary measures should be done to save this world.[177] That is why thinkers are worried about the side effects of technological progress.[178] Take for example, the devastation created by the production of plastic and advanced weapons waging wars. Humanity can still regulate novel technology, or prevent it at initial stages, before it becomes too late or too expensive.[179] It is easier to mold the evolution of technology when everyone desires technological advancement in weaponry.[180] But it becomes highly difficult to change the system once the progress is inculcated in the system of society.[181] For this reason, numerous thinkers have proposed banning killer robots before their existence poses any tangible threat to the existence of humanity.[182] The greatest minds and futurists of our time regarding technology, science, and artificial intelligence such as Elon Musk and Stephen Hawking have also signed a petition to ban the future killer robots,[183] and have warned humanity about the possible dangers of using autonomous

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173. *See* JAMES BARRAT, OUR FINAL INVENTION: ARTIFICIAL INTELLIGENCE AND THE END OF THE HUMAN ERA 85-86 (2013).

174. WILLIAM GIBSON, PATTERN RECOGNITION 57 (2003).

175. Dylan Mathews, *These Are the 12 Things Most Likely to Destroy the World*, VOX (Feb. 19, 2015, 2:00 PM), https://www.vox.com/2015/2/19/8069533/end-of-the-world.

176. Mark Townsend & Jason Burke, *Earth 'Will Expire by 2050,'* GUARDIAN (July 7, 2002, 5:17 AM), https://www.theguardian.com/uk/2002/jul/07/research.waste.

177. *See* Steven PINKER, THE STUFF OF THOUGHT: LANGUAGE AS A WINDOW INTO HUMAN NATURE 196 (2007).

178. *E.g.*, DAVID COLLINGRIDGE, THE SOCIAL CONTROL OF TECHNOLOGY 16 (1980).

179. *Id.* at 18-21; Evgeny Morozov, *The Collingridge Dilemma*, *in* EDGE FOUND., INC., THIS EXPLAINS EVERYTHING: DEEP, BEAUTIFUL AND ELEGANT THEORIES OF HOW THE WORLD WORKS 255 (John Brockman ed., 2013).

180. *See, e.g.*, Thomas P. Hughes, *Technological Momentum*, *in* MASS. INST. OF TECH., DOES TECHNOLOGY DRIVE HISTORY? THE DILEMMA OF TECHNOLOGICAL DETERMINISM 110–11 (Merritt Roe Smith & Leo Marx ed., 1994); *see also* MOROZOV, *supra* note 179, at 255.

181. *See* Hughes, *supra* note 180, at 112; *see also* MOROZOV, *supra* note 179, at 255.

182. *See* Macaulay & Magee, *supra* note 84.

183. *Id.*

killer robots, including the possibility of wiping humanity from the face of Earth.[184] But the future of war has to include technological change in the way of fighting a war.[185] Similarly, drone technology is an imperfect weapon designed to kill humans, which has resulted in the deaths of countless numbers of noncombatant, innocent civilians.[186] As of today, non-state actors already have access to such advanced weaponry. For instance, Hezbollah alone used three types of drones in its strikes against Israel, controlled easily through jihadist websites.[187] Therefore, it is advised to preemptively take safety measures against AI-based autonomous killer robots at its initial stages.

V. Laws of War in the Use of AI

International humanitarian law (IHL) is supposed to protect humans from the evils of war. The present framework of the Geneva Conventions[188] comprise of the principles of military necessity,[189] distinction,[190] and proportionality[191] in regulating military actions that resort to the use of force,

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184. Ryan Browne, *Elon Musk Warns A.I. Could Create an Immortal Dictator from Which We Can Never Escape*, CNBC (Apr. 6, 2018, 1:11 PM), https://www.cnbc.com/2018/04/06/elon-musk-warns-ai-could-create-immortal-dictator-in-documentary.html; Kelsey Piper, *Why Elon Musk Fears Artificial Intelligence*, VOX (Nov. 2, 2018, 12:10 PM), https://www.vox.com/future-perfect/2018/11/2/18053418/elon-musk-artificial-intelligence-google-deepmind-openai; Aatif Sulleyman, *AI Is Highly Likely to Destroy Humans, Elon Musk Warns*, INDEPENDENT (Nov. 24, 2017, 8:01 PM), https://www.independent.co.uk/life-style/gadgets-and-tech/news/elon-musk-artificial-intelligence-openai-neuralink-ai-warning-a8074821.html.

185*. See* COKER, *supra* note 2, at 8-9.

186. Martin Robbins, *Has a Rampaging AI Algorithm Really Killed Thousands in Pakistan?*, GUARDIAN (Feb. 18, 2016, 10:10 AM), https://www.theguardian.com/science/the-lay-scientist/2016/feb/18/has-a-rampaging-ai-algorithm-really-killed-thousands-in-pakistan.

187. P.W. Singer, *Military Robots and the Future of Warfare* in Kent, *supra* note 17, at 1354.

188*. See* Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field of 12 August 1949, Oct. 21, 1950, 75 U.N.T.S. 3; *see also* Protocol I, *supra* note 58; Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of Non-International Armed Conflicts, June 8, 1977, 1125 U.N.T.S. 609 [hereinafter Protocol II].

189*. See* Protocol I, *supra* note 58, at 28-29; Protocol II, *supra* note 188, at 611; Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Adoption of an Additional Distinctive Emblem, Dec. 8, 2005, 2404 U.N.T.S. 18 [hereinafter Protocol III]; *see also Rule 8. Definition of Military Objectives*, ICRC, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule8 (last visited Jan. 27, 2020) [hereinafter *Rule 8*].

190*. See* Protocol I, *supra* note 58, at 25-29; *see also, e.g.*, Rome Statute of the International Criminal Court art. 8(2)(b)(i), July 17, 1998, 2187 U.N.T.S. 90 [hereinafter Rome Statute].

191*. See* Protocol I, *supra* note 58, at 26-29; Protocol II, *supra* note 188, at 611; *see also* Rome Statute, *supra* note 190, at 4-7; *Rule 14. Proportionality in Attack,* ICRC, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule14 (last visited Jan. 27, 2020) [hereinafter *Rule 14*].

and are aided by the principles of necessity as a defense,[192] precaution,[193] and *hors de combat*[194] in customary international law. But does IHL have anything to say about the autonomous weapons of the future to be used in conflicts and wars? Not really, but the legal use of autonomous weapons in future wars and conflict will definitely require autonomous weapons to use force by meeting the criteria laid out by IHL. Steve Goose, Director of Human Rights Watch's Arms Division and a leading activist calling for the ban of autonomous weapons, believes that autonomous weapons are "'highly likely to be used in ways that violate international humanitarian laws.'"[195] He adds that these weapons:

> "[A]ren't able to distinguish combatants from civilians, that aren't able to tell who's hors de combat, that aren't able to tell who's surrendering, that are unable to do the proportionality assessment required under international humanitarian law for each and every individual attack, and that are unable to judge military necessity in the way that today's commanders can."[196]

Therefore, Goose predicts that in the future a lot of innocent civilians will die at the hands of autonomous weapons.[197] So, this paper will expound upon the difficulty, possibility, and requirement of making autonomous weapons compliant with present international humanitarian law.

A. Principle of Distinction

The principle of distinction requires autonomous weapons to be able to distinguish between civilian targets and military targets.[198] Autonomous weapons are also required to differentiate between lawful targets and other things or persons nearby. This is highly challenging, because the search signals of military radar can be easily confused by the urban clutter of Wi-Fi

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192. *See* MARCO SASSÒLI ET AL., INT'L COMMITTEE RED CROSS, HOW DOES LAW PROTECT IN WAR? CASES, DOCUMENTS AND TEACHING MATERIALS ON CONTEMPORARY PRACTICE IN INTERNATIONAL HUMANITARIAN LAW 648 (3d ed. 2011).

193. Protocol I, *supra* note 58, at 29; *see* Protocol II, *supra* note 188, at 615; *see also Practice Relating to Rule 15. The Principle of Precautions in Attack*, ICRC, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_rul_rule15 (last visited Jan. 27, 2020) [hereinafter *Rule 15*].

194. Protocol I, *supra* note 58, at 22; *see also* Rome Statute *supra* note 190, at 6; Hague Convention (IV) Respecting the Laws and Customs of War on Land and Its Annex: Regulations Concerning the Laws and Customs of War on Land, art 23, Oct. 18, 1907, https://www.refworld.org/docid/4374cae64.html [hereinafter Hague Convention]; *see also* Protocol II, *supra* note 188, art. 4; *Rule 47. Attacks Against Persons Hors de Combat*, ICRC (2005), https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule47 (last visited Jan. 28, 2020).

195. PAUL SCHARRE, ARMY OF NONE: AUTONOMOUS WEAPONS AND THE FUTURE OF WAR 252 (2018).

196. *Id.*

197. *Id.*

198. *See* Protocol I, *supra* note 58, at 25-29; Rome Statute, *supra* note 190, at 4-7.

signals, electromagnetic waves, mobile phone network towers, and radio signals, and it is even more challenging to identify camouflaged tanks and submerged submarines.[199] For instance, neutral networks are good at identifying objects but are vulnerable to manipulated images.[200] That is why it is highly dangerous to use neutral network–based autonomous weapons to identify military targets without keeping a human decision maker in the loop. However, DARPA's CODE fused with multiple sensors processing data from different angles can effectively distinguish military targets from civilian targets.[201] Yet, it would be difficult even for DARPA's autonomous weapon systems to be able to distinguish between friendly and lawful targets in the context,[202] whereas it would be even harder for the AI-based systems to distinguish among human targets, where tribal farmers routinely carry weapons for self-defense, and are similar in appearance to insurgents and terrorists.[203] A code to engage when fired upon can be programmed in the system to distinguish hostile targets from friendly targets, but it would still create friendly fire and confusion. Nevertheless, autonomous weapons only targeting military objects/vehicles such as tanks and fighter jets can be aligned with the principle of distinction.[204]

B. *Principle of Proportionality*

The principle of proportionality under the Geneva Convention requires collateral damage to civilians and civilian objects due to strikes of autonomous weapons not to exceed military necessity.[205]

> The "principle of military necessity" permits measures which are actually necessary to accomplish a legitimate military purpose and are not otherwise prohibited by international humanitarian law. In the case of an armed conflict the only legitimate military purpose is to weaken the military capacity of the other parties to the conflict.[206]

Currently, there is no formula to determine proportionality in an attack because it is the subjective judgment call of a reasonable commander under

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199. *See* SCHARRE, *supra* note 195, at 252–53.

200. *Id.* at 253.

201. *Id.*

202. *Id.*

203. *Id.*

204. *Id.* at 255.

205. *See* sources cited *supra* note 189.

206. *Military Necessity*, CASEBOOK.ICRC.ORG, https://casebook.icrc.org/glossary/military-necessity (last visited Feb. 25, 2020); *see* Protocol I, *supra* note 58, at 27; Protocol II, *supra* note 188, at 611; Protocol III, *supra* note 189, at 19; *see also Rule 8*, *supra* note 189.

the circumstances.[207]   In isolated targets/situations such as targeting submarines and satellites, autonomous weapons with concerns of friendly fire may not be required to make these judgment calls. But in populated areas it becomes more challenging to make these calls and weigh the collateral damage and number of people against military necessity. For instance, targeting a tank with a heavy missile in urban settings—where there are thousands of civilians—will easily violate IHL.[208]

However, it is possible to generate a program that tells the autonomous weapons a formula to count heads before engaging targets, where, for example, six uniformed men near a tank is a lawful target.[209]   But the application of these codes and formulae would need to be defined and debated by humans before execution. Yet, it would be highly challenging for autonomous weapons to be able to engage with targets residing in urban settings using human shields, and to differentiate combatants from noncombatants, which would require humanlike moral reasoning in autonomous weapons, which currently does not exist.[210]   Previously, autonomous weapons have been able to work aligned with the principle of proportionality in settings where military necessity is very high and the risk to collateral damage is minimal regarding the situation. For instance, operations targeting nuclear warheads that are to be used by an enemy against millions of civilians, which kill a small number of civilians in the collateral damage, is lawfully possible through the use of autonomous weapons.[211] Here, the military necessity outweighs the expected civilian damage.[212]

C. Principle of Necessity (as a Defense)

The principle of necessity under the Geneva Conventions prohibits unnecessary human suffering and requires that the recourse to use force should be the last resort after exhausting other means, such as using diplomatic and political measures to pacify the situation.[213]   Under this principle, any use of force by autonomous weapons would be required to be extremely necessary. But this judgment will require a human decision maker in the loop because current AI standards are not capable of deciding for themselves when to use force.[214] However, autonomous weapons can be

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207. *See* SCHARRE, *supra* note 195, at 255.
208. *Id.* at 256.
209. *Id.*
210. *Id.* at 256-57.
211. *Id.* at 257.
212. *Id.*
213. *See* SASSÒLI ET AL., *supra* note 192.
214. SCHARRE, *supra* note 195, at 256-57.

used for defensive purposes at borders, or they can be deployed for contextual operations where it is a military necessity to use force, but again, it requires human judgment to make these decisions on whether to initiate an attack.

D. Principle of Precaution

The principle of precaution under the customary international law of using force requires taking all feasible precautions to minimize human suffering.[215] Similar to the principles of proportionality, distinction, and necessity, autonomous weapons will require a human decision maker in the loop to contextualize and minimize human suffering in urban populated settings.[216] However, the surge in technological progression will determine which decision maker is more efficient in minimizing human suffering. For example, it is possible that a highly sophisticated artificial intelligence–based autonomous weapon is more efficient than human-controlled UAV/drone attacks.[217] So, the development of technology will determine who is more efficient and who would be allowed to push the trigger: men or machines.

E. Hors de Combat

Autonomous weapons are also required to respect the laws of *hors de combat*, where the Geneva Conventions require that soldiers who are incapacitated and cannot defend themselves, who are sick, unconscious, or wounded, or have surrendered, should not be targeted in wars or conflicts.[218] Therefore, autonomous weapons should be able to differentiate between incapacitated soldiers, such as prisoners of war, just as they should be prevented from targeting their own military personnel.[219] Professor Rob Sparrow is skeptical about autonomous weapons being able to identify the act or intention of surrendering.[220] If the weapon is too generous in accepting surrender it will be easily tricked by "perfidy," rendering it useless, and, if it is too skeptical, it will act illegally.[221] The same is the case with wounded, unconscious, and incapacitated soldiers; autonomous weapons will not be able to distinguish between motionless soldiers and those "playing possum"

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215. *See* Protocol I, *supra* note 58, at 29; Protocol II, *supra* note 188, at 615; *see also Rule 15*, *supra* note 193.
216. *See* SCHARRE, *supra* note 195, at 258.
217. *Id.*
218. *See* Protocol I, *supra* note 58, at 25-29; Rome Statute, *supra* note 190, at 6.
219. *See* SCHARRE, *supra* note 195, at 260.
220. *Id.* at 259.
221. *Id.*

to trick the system.[222]   John Canning therefore proposes that, instead of targeting human soldiers, autonomous weapons with ultra-precision should be only designed to target weapons in human hands.[223]   For instance, machines should only be targeting machines such as guns in the hands of soldiers to incapacitate them, without any human casualties. In this way, the autonomous weapons will be both legally compliant and highly effective.[224]

F. Accountability Gaps

Lecturer Bonnie Docherty from Harvard Law School argues that there is an accountability gap in using autonomous weapons of war. She asks, if the autonomous weapons commit war crimes, who is responsible?[225] Launchers of such a weapon are responsible only if the weapon carries out the operation expected according to their intentions, but there is an accountability gap in the unexpected execution of operations, because there is no intention and the military and defense contractors manufacturing these weapons are shielded against civil liability.[226]   Therefore, it is necessary to keep a human in the loop deciding whether to use such a weapon. Anyone using autonomous weapons is legally required to constrain that action in alignment with the laws of using force.[227]   In sum, a human can delegate their decisions for targeting purposes, but they cannot delegate the power of engaging a weapon to use force.

CONCLUSION

When imagining the near future of wars in the next three to four decades, it is impossible to not emphasize technological progression and its use in future warfare. This inclusion does not suggest that psychological, social, financial, economic, political, cultural, and religious aspects would have little or less effect. Instead, it only means that all of these aspects will also be affected by the progressive use of technology in future wars. The grim picture of future warfare in this paper is not at all an inevitable outcome of our international society. This paper suggests that certain precautionary work coupled with uncertainty can easily change the course of our destiny. Despite this, all of the transgressive potentials outlined above are clear possibilities in our near future of warfare. Therefore, it is up to policymakers,

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222. *Id.* at 260.
223. *Id.* at 261.
224. *Id.*
225. *Id.*
226. *Id.* at 261-62.
227. *Id.* at 269.

think tanks, and decision makers to anticipate these intricate possibilities to curb the possible evils in the future of wars.

Fiction in the past has proven cases of expected future in technologies. For instance, the *Star Trek* franchise imagined smartphones, handheld memory sticks, video calls, and voice commands to computers in the 1960s, decades before these were developed.[228]   This phenomenon, where sci-fi prediction of technology is created in real life, is referred to as the "Star Trek Effect."[229]   The future is not something where we will be, but it is something that we have imagined it to be, because our thoughts and ideas of the present from the lens of fiction and fantasy mold and shape the very physics, technology, and reality of the future.[230]   Haldeman says that science fiction is a first draft of the future; therefore, it can be revised or it can be entirely rewritten.[231]   So, it is possible that the present may persist a bit longer, and the future may be more familiar than we think it would be.[232]

It is difficult but not impossible to give sound and certain predictions about how the future realities of wars are going to look. But looking at the present tendencies of our societies provides a more certain and closer peek into our future veracities, and enables us to draw possibilities in future warfare.[233]   According to Clausewitz's definition,[234] the media can also be used as a war tool to change regimes, isolate states internationally, and disrupt enemies' credibility and reputation by creating propaganda and negative internal opinion.[235]

In reality, the displacement of populations, cyber-currency, cyberspace, and resource competition (such as water wars) pose a threat of future warfare.[236]   Similarly, current tendencies of warfare toward decreasing arable lands (food wars), decreasing freshwater (water wars), cyber wars, hybrid warfare, financial and economic warfare, wars over resources, counterinsurgencies, and revolutions or insurgencies are all possibilities for future warfare, alongside wars on culture, ethnicity, and religion.[237]   Moreover, Attali predicts that future wars will be dominated by nests of revolution and big private corporations and organizations, including mafias,

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228. *See* COKER, *supra* note 2, at 29.

229. *Id.*

230. *See* Grosz, *supra* note 45, at 157.

231. *See* Coker, *supra* note 2, at 21-22.

232. *E,g.*, *id.* at 10.

233. *See* Kiss, *supra* note 1, at 30.

234. *Id.* at 31 (defining war as "an act of force to compel our enemy to do our will").

235. *Id.*; *see also* Galeotti, *supra* note 16.

236. *See* Kent, *supra* note 17, at 1362-63.

237. István, *supra* note 14, at 221.

mercenaries, terrorists, and non-state actors, rather than by state monopolies.[238]

In technological themes of future warfare, the current progressions of use in the fields of Big Data, artificial intelligence, surveillance, robotics, drone technology, outer space, and cyber-currency lay the groundwork of how wars of the future will be fought.[239] Future wars will use highly sophisticated weapon systems using information technology, robots, and laser weapons.[240] In the near future, where scarce resources will be a prominent feature of wars,[241] private-sector companies will target the resources of an enemy state to disable the functionality of that state,[242] and future wars may target water as a scarce resource.[243]

Belligerents in future warfare will include non-state actors (mercenaries, rebels, guerrillas, insurgents, and terrorists), NGOs, the media, companies,[244] individuals,[245] criminal organizations (mafias and drug traffickers),[246] and "financial speculants and businessmen."[247] Sometimes, it is difficult to differentiate between terrorist groups, rebel groups, mercenaries, and guerrillas.[248] Often, these contractors even collude with terrorists, as Malhama Tactical did in Syria.[249] Mercenaries/private military companies (PMCs),[250] comprised of non-state actors, provide private military services and combat operations to anyone who is willing to pay, including governments, multinational companies, warlords and dictators.[251] The mercenary industry is estimated to be worth more than $100 billion.[252] Currently, more than fifty percent of U.S. forces in Afghanistan and Iraq are mercenaries.[253] The U.S. alone spent approximately $250 billion on

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238. *See* ATTALI, *supra* note 20, at 250-51.

239. Kent, *supra* note 17, at 1353.

240. *See* István, *supra* note 14, at 224-30.

241. Kent, *supra* note 17, at 1364.

242. *Id.* at 1357.

243. *Id.* at 1363.

244. *See* REID, *supra* note 48, at 3; *see also* Westenfelder, *supra* note 48.

245. *See* Grevatt, *supra* note 49, at 24; *see also* Gamero-Garrido, *supra* note 49, at 20. For examples of hackers, see Kiss, *supra* note 1, at 37.

246. For example, 60,000 people died in Mexican drug wars during a six-year span 2006–2012. Bender, *supra* note 50.

247. Kiss, *supra* note 1, at 37.

248. *Id.* at 32.

249. *See* MCFATE, *supra* note 56, at 135.

250. Protocol I, *supra* note 58, at 35.

251. Singer, *supra* note 59, at 121-23.

252. Lane, *supra* note 62.

253. MCFATE, *supra* note 56, at 128.

mercenaries in the ten-year period from 2007 to 2017.[254] More countries will employ them because hiring PMCs in times of need is cheaper than keeping armies at all times.[255] Similarly, NGOs as belligerents work hand in hand with the support of political parties, international media, and organizations, to cover up problems in the guise of human rights and political correctness.[256] For instance, Western countries used NGOs to oust the pro-Russian government in Ukraine.[257] Likewise, the media routinely uses fake news, biased reports, misinterpretation, and half-truths to compromise credibility and manipulate opinions about certain targets.[258] "Therefore, underestimating the role of the media in war is one of the greatest mistakes the commanders and politicians can make."[259]

Furthermore, the technology of future wars in the world will include robot soldiers, massive surveillance systems processing Big Data, modeled/simulated battlefields, and intelligent body armor for human soldiers modifying and monitoring moods and thoughts.[260] Future soldiers will have enhanced courage and hatred capabilities,[261] and servo-soldiers will be used for combat purposes during wars.[262] Future wars will possess advanced biological, chemical, bacteriological, electronic, and nanotechnological weapons.[263] Already, we wear smart devices that can pinpoint our locations, states of mind, likes and dislikes, political orientations, religious beliefs, lifestyles, bank details, family structures, and browser histories.[264] These devices are smart enough to record our voices at any point in time, and even make our videos without our knowledge.[265] Currently, the U.S. is considering developing bird- and insect-like surveillance devices to carry back data from battlefields.[266] By 2040, *sousveillance* and *surveillance* will enable "'all to know everything about everyone globally,'"[267] through the help of Big Data crunching and artificial

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254. Wang, *supra* note 65.

255. *See* Kiss, *supra* note 1, at 33.

256. *Id.* at 34-35.

257. *Id.* at 34.

258. *Id.* at 35.

259. *Id.*

260. ATTALI, *supra* note 20, at 235; *see also* COKER, *supra* note 2, at 24.

261. *See* COKER, *supra* note 2, at 21 (explaining that future soldiers will have enhanced courage and hatred capabilities).

262. *See id.* at 25.

263. ATTALI, *supra* note 20, at 235.

264. *See supra* note 91.

265. Curran, *supra* note 92.

266. *See* EDWARDS, *supra* note 95, at 50.

267. See interview of Professor Murray Shanahan in Kent, *supra* note 17, at 1343.

intelligence.[268]   A combination of outer space technology, artificial intelligence, Big Data crunching and drone technology will create all-knowing surveillance systems for future wars, capable of noticing enemy movement and spying on any civilian as well.[269]

Moreover, cyber-currency leaves states with negligible control over its main instrument of economic engagement: its currency.[270] This in turn will reduce the state's control over the private sector and diminish its monopoly of power.[271] Also, future wars will pursue space technology, employing satellites and using space weapons, including military technologies capable of destroying satellites and disabling the cybernetworks of the targeted nation, and the "rods from God."[272] Further, space debris will definitely increase in the future.[273] Future wars will race toward space technology.[274] Astonishingly, within a period of two decades from now, Air Force fighter jets will be able to carry laser attack-defense systems, with endless rounds charged by jet engines.[275]

In addition, MAARS, RVM/CART,[276] and NRTC.[277] with mounted cameras, heavy machine guns, and grenade launchers, capable of fighting ground battles,[278] and SGR-A1, capable of killing humans autonomously without human-made decisions,[279] are some examples of killer robots already developed for future wars. DARPA is developing another example of an autonomous weapon—a security software that uses artificial intelligence.[280] This is also used for air defense and targeting purposes, where pilots identify targets using current radar, surveillance, and tactical capabilities.[281] This is more efficient in finding and locking on to targets than humans.[282] AI is also used to prevent and anticipate enemy actions, using "reports, documents, newsfeed, and other forms of unstructured information."[283] Similarly, in

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268.   See interviews of Mischa Dohler and Stuart Armstrong in Kent, *supra* note 17, at 1343.

269*.   See* Kent, *supra* note 17, at 1355.

270*.   See id.* at 1350; *see also* BARTLETT, *supra* note 105.

271.   Kent, *supra* note 17, at 1350; *see also* BARTLETT, *supra* note 105.

272.   Kent, *supra* note 17, at 1361.

273*.   See* Wright, *supra* note 116.

274*.   See* Kent, *supra* note 17, at 1360-61.

275*.   See* István, *supra* note 14, at 230–31.

276.   Szoldra, *supra* note 139.

277.   Trending Team, *supra* note 140.

278*.   See* István, *supra* note 14, at 228.

279.   *Future Tech, supra* note 142.

280.   Cyber Grand Challenge, DARPA, *supra* note 148; Devin Coldewey, *supra* note 148; *see* DE SPIEGELEIRE ET AL., *supra* note 149, at 88.

281*.   See* DE SPIEGELEIRE ET AL., *supra* note 149, at 88.

282.   Keller, *supra* note 150.

283.   DE SPIEGELEIRE ET AL., *supra* note 149, at 92.

2016, the CIA claimed "to anticipate the rise of social unrest and societal instability up to three to five days in advance."[284]

If we analyze technological progression in the world, it is clear that humans will interact with machines and technology more in the near future. So, it is plausible that they will be used to make decisions in future wars using quantum computing.[285] Autonomous weapons using artificial intelligence can choose to determine for themselves whether to engage a target and destroy it without human approval or human engagement.[286] Artificial intelligence will render human beings useless, and humanity will be replaced by self-reproducing machines.[287] Therefore, thinkers are worried about the side effects of technological progression.[288] Humanity can still regulate novel technology, or prevent it at initial stages, before it becomes too late or too expensive.[289] Therefore, scholars are actively proposing banning killer robots before their existence poses any tangible threat to the existence of humanity, because autonomous weapons are "highly likely to be used in ways that violate international humanitarian law."[290] One activist adds that these weapons:

> "[A]ren't able to distinguish combatants from civilians, that aren't able to tell who's hors de combat, that aren't able to tell who's surrendering, that are unable to do the proportionality assessment required under international humanitarian law for each and every individual attack, and that are unable to judge military necessity in the way that today's commanders can."[291]

Therefore, he predicts that in the future many innocent civilians will die at the hands of autonomous weapons.[292]

The legal use of autonomous weapons of future wars must respect war/international humanitarian law. Lecturer Bonnie Docherty from Harvard Law School argues that there is an accountability gap in using autonomous weapons in wars. If the autonomous weapons commit war crimes, she asks, who is responsible for war crimes?[293] A launcher of such weapon is responsible only if the weapon carries out an expected operation according to the intentions, but there is an accountability gap in the unexpected execution of operations, because there is no intention and the

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284. *Id.* at 93.

285. *See* COKER, *supra* note 2, at 23–24.

286. *See* Kent, *supra* note 17, at 1353.

287. BARRAT, *supra* note 173, at 4-6.

288. *See, e.g.*, COLLINGRIDGE, *supra* note 178, at 19.

289. *Id.* at 19.

290. SCHARRE, *supra* note 195, at 252.

291. *Id.*

292. *Id.*

293. *Id.* at 261–62.

military and defense contractors manufacturing these weapons are shielded against civil liability.[294] Therefore, it is necessary to keep a human in the loop of deciding to use such a weapon. Anyone using autonomous weapons is legally required to constrain that action in alignment with the laws of using force. In sum, a human can delegate "specific targeting decision to the weapon," but they cannot delegate the power of engaging a weapon to use force.[295]

Under IHL, the principle of distinction requires autonomous weapons to be able to distinguish between civilian targets and military targets.[296] Autonomous weapons with operations of only targeting military objects/vehicles such as tanks can be aligned with the principle of distinction.[297]   The principle of proportionality under the Geneva Conventions requires that collateral damage to civilians and civilian objects due to strikes by autonomous weapons not exceed that of military necessity.[298] Autonomous weapons can work in alignment with the principle of proportionality in settings where the military necessity is very high and the risk to collateral damage is minimal.[299] The principle of necessity under the Geneva Conventions prohibits unnecessary human suffering and requires that the recourse to use of force should be the last resort after exhausting other means, such as using diplomatic and political measures to pacify the situation.[300] But AI standards are not capable of deciding for themselves when to initiate an operation of using force. The principle of precaution under customary international law of using force requires taking all precautions to minimize human suffering.[301] Autonomous weapons will require a human decision maker in the loop to contextualize and minimize human suffering in urban populated settings.[302] Autonomous weapons are also required to respect the laws of *hors de combat*, where the Geneva Conventions require that soldiers who are incapacitated, sick, unconscious, or wounded or who have surrendered should not be targeted in wars or conflicts.[303] Scholars suggest that autonomous weapons will be easily tricked

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294. *See id.*

295. *Id.* at 269.

296. Protocol I, *supra* note 58, at 25-26; *see also* Rome Statute, *supra* note 190, at 5.

297. *See* SCHARRE, *supra* note 195, at 252–55.

298. *See* Protocol I, *supra* note 58; Protocol II, *supra* note 188; *see also* Rome Statute, *supra* note 190; *Rule 14*, *supra* note 191.

299. *See* SCHARRE, *supra* note 195, at 255, 257.

300. SASSÒLI ET AL., *supra* note 192, at 652-53.

301. *See* Protocol I, *supra* note 58, at 29; Protocol II, *supra* note 188, at 615; *see also Practice Relating to Rule 15*, *supra* note 193.

302. *See* SCHARRE, *supra* note 195, at 260.

303. *See* sources *supra* note 194.

by "perfidy," rendering them useless, and, if they are too skeptical, they will act illegally.[304] They will also not be able to distinguish between a motionless soldier and one "playing possum" to trick the system.[305] John Canning therefore proposes that, instead of targeting human soldiers, autonomous weapons with ultra-precision should be only designed to target weapons in human hands.[306] In this way, the autonomous weapons will be both legally compliant and highly effective.

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304. SCHARRE, *supra* note 195, at 258.
305. *Id.* at 260.
306. *Id.*