CHALLENGES IN REGULATING LETHAL AUTONOMOUS WEAPONS UNDER INTERNATIONAL LAW

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Since 2017, the United Nations (UN) has regularly convened a group of government experts (GGE) to explore the technical, legal, and ethical issues surrounding the deployment of lethal autonomous weapon systems (LAWS). Established by the High Contracting Parties to the Convention on Certain Conventional Weapons (CCW), the UN GGE on LAWS includes

representatives from different states with disparate national interests.[1] Despite multiple meetings, the GGE has failed to reach consensus on several important issues, such as whether new international law is necessary to regulate autonomous weapon systems, or whether political measures and guidelines would be more appropriate to manage this emerging technology.[2] In March 2019, U.N. Secretary-General António Guterres underscored the urgency of the group's work and pressed for conclusions.[3] He stated, "It is your task now to narrow these differences and find the most effective way forward."[4] He further explained, "[T]his will require compromise, creativity and political will. The world is watching, the clock is ticking and others are less sanguine. I hope you prove them wrong."[5] Despite this call to action, the international community has, thus far, been unable to coalesce behind any meaningful regulation of LAWS.

This paper outlines the challenges states face in creating international regulatory schemes for LAWS. These challenges arise from several sources: difficulty in defining concepts related to LAWS, disagreements over potential substantive restrictions, and the specific nature of the weapons systems themselves, which may influence states' willingness to be bound by international law.

I.   THE IMPORTANCE OF TIMELINESS IN REGULATING EMERGING
        TECHNOLOGIES

The pace of technological development in the field of artificial intelligence (AI) has been described by the Secretary-General as happening

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1. Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, *Report of the 2017 Session of the Group of Governmental Experts on Lethal Autonomous Weapons Systems* (LAWS), U.N. DOC. CCW/GGE.1/2017/CRP.1 (Nov. 20, 2007), https://www.unog.ch/80256EDD006B8954 /(httpAssets)/B5B99A4D2F8BADF4C12581DF0048E7D0/$file/2017_CCW_GGE.1_2017_CRP. 1_Advanced_+corrected.pdf.

2. *Autonomous Weapons That Kill Must Be Banned, Insists UN Chief*, U.N. NEWS (Mar. 25, 2019), https://news.un.org/en/story/2019/03/1035381.

3. U.N. Secretary-General, Secretary-General's Message to Meeting of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (Mar. 25, 2019), https://www.un.org/sg/en/content/sg/statement/2019-03-25/secretary-generals-message-meeting-of-the-group-of-governmental-experts-emerging-technologies-the-area-of-lethal-autonomous-weapons-systems.

4. *Id.*

5. *Id.*

at "warp speed."[6] While fully automated LAWS have not yet been fielded, many experts believe existing AI capabilities and associated technology may hasten their arrival—for example, in the development of drones and self-driving cars.[7] Interestingly, many of these innovations may spring from the private sector.[8]

The ability to influence the use of an emerging technology tends to decline significantly once it becomes widely available and cheap. On occasion, the international community has acted to regulate new technology before it has been widely adopted, but these efforts generally have been the exception rather than the rule.[9] An important example of a successful pre-emptive weapons ban is the case of blinding lasers. The Protocol on Blinding Laser Weapons[10] was enacted in 1995, before these weapons were fielded by states.[11]

New technology more commonly spreads quickly and is weaponized before states have had the chance to act in any meaningful way. For example, a 2018 report released by the Combating Terrorism Center (CTC) at West Point describes how ISIS procured and modified drones to drop aerial munitions in Iraq and Syria.[12] Of note, the report found that ISIS adeptly combined "sophisticated commercial off-the-shelf technology with low-tech

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6. *'Warp Speed' Technology Must Be 'Force for Good' UN Chief Tells Web Leaders*, U.N. NEWS (Nov. 5, 2018), https://news.un.org/en/story/2018/11/1024982.

7. *See* Ari Shapiro, *Autonomous Weapons Would Take Warfare to a New domain, Without Humans*, NPR (Apr. 23, 2018), https://www.npr.org/sections/alltechconsidered/2018/04/23/604438311/autonomous-weapons-would-take-warfare-to-a-new-domain-without-humans (suggesting that AI innovations related to self-driving cars as well as the proliferation of drone technology may aid in the creation of LAWS. One scientist interviewed stated that autonomous weapons may be "easier than self-driving cars"); Kelsey Piper, *Death by Algorithm: The Age of Killer Robots is Closer Than You Think*, VOX (Jun. 21, 2019), https://www.vox.com/2019/6/21/18691459/killer-robots-lethal-autonomous-weapons-ai-war.

8. *See* Piper, *supra* note 7 (stating that although LAWS do not yet exist, the technology to use algorithm in place of human judgement does).

9. *See, e.g.*, Sean Watts, *Regulation-Tolerant Weapons, Regulation-Resistant Weapons and the Law of War*, 91 INT'L L. STUD. 540, 574-77 (2015) (describing a variety of technologies, including submarines, that the international community attempted to regulate after they had been weaponized).

10. Protocol on Blinding Laser Weapons (Protocol IV) art. 1, Oct. 13, 1995, 1380 U.N.T.S. 370.

11. *See* Jonah Kessel, *Killer Robots Aren't Regulated. Yet.*, N.Y. TIMES (Dec. 13, 2019), https://www.nytimes.com/2019/12/13/technology/autonomous-weapons-video.html (stating that some nations including the U.S. were apparently in the development stage, however); Watts, *supra* note 9, at 614.

12. DON RASSLER, THE ISLAMIC STATE AND DRONES: SUPPLY, SCALE, AND FUTURE THREATS (2018).

components and other technological add-ons" to create "unique and fairly capable weapons," including bomb-drop capable drones.[13] Ingenuity and easy access to drone technology enabled ISIS to conduct "between 60 and more than 100 aerial drone bombing attacks per month, spread across both Iraq and Syria" in 2017.[14]

ISIS's use of drones offers just one example of how quickly weaponization can occur and states can lose exclusive control over an emerging technology. As the former General Counsel for the National Security Agency warned, rapid changes in technology present challenges that can upend our national security.[15] As the pace of technological development quickens, states may have only a very narrow window in which to craft the regulatory frameworks needed to manage the use of new technologies before they become readily accessible. Many states have therefore called upon the international community to take regulatory action in the development, procurement, and use of lethal autonomous weapons.[16]

Artificial intelligence research and development, the backbone of LAWS technology, remains controlled by those who can afford the very large data centers necessary for conducting complex calculations.[17] In practice, this means that only states and very large corporations have ready access to the computer infrastructure needed to develop AI technology. In other words, AI research and development remains a field of "haves"—states and large corporations theoretically regulated by states—and "have nots"—non-state actors seeking to weaponize new technologies for asymmetric advantage on the modern battlefield. While the high costs associated with AI may temporarily limit participation and hinder innovation, the limited pace of development also provides time to consider and promulgate international guidelines before the technology becomes widely available. Although many states have implemented their own policies regarding LAWS,[18] many in the

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13. *Id.* at IV, 1.

14. *Id.* at 4.

15. Glenn S. Gerstell, *I Work for the N.S.A. We Cannot Afford to Lose the Digital Revolution*, N.Y. TIMES (Sept. 10, 2019), https://www.nytimes.com/2019/09/10/opinion/nsa-privacy.html.

16. *Stopping Killer Robots: Country Positions on Banning Fully Autonomous Weapons and Retaining Human Control*, HUMAN RIGHTS WATCH (Aug. 10, 2020), https://www.hrw.org/report /2020/08/10/stopping-killer-robots/country-positions-banning-fully-autonomous-weapons-and.

17. Steve Lohr, *At Tech's Leading Edge, Worry About a Concentration of Power*, N.Y. TIMES (Sept. 26, 2019), https://www.nytimes.com/2019/09/26/technology/ai-computer-expense.html.

18. *See, e.g.*, U.S. DEP'T OF DEF., DIR. 3000.09, AUTONOMY IN WEAPON SYSTEMS 13 (Nov. 21, 2012) (incorporating Change 1, May 8, 2019), https://www.esd.whs.mil/Portals/54/

international community have called for a common binding regulatory framework. The likelihood of success for such an instrument is doubtful, however, for the reasons discussed below.

II.   LAWS AND DEFINITIONAL PROBLEMS

The concept of autonomous weapon systems is itself not clearly defined internationally, and absent a shared understanding of the technological processes at issue, meaningful regulation will not be possible.[19] Existing definitions generally fall into three broad categories.[20] The first tends to define machine autonomy in relation to the role of human operators.[21] For instance, the United States defines "autonomous weapon systems" as weapon systems that, "once activated, can select and engage targets without further intervention by a human operator."[22] The United States' definition notes that "[t]his includes human supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation."[23] Human Rights Watch similarly categorizes autonomous weapons by the level of human involvement in the weapons' operation.[24] The potential for human engagement varies depending on whether a human is "in-the-loop," "on-the-loop," or "out-of-the-loop."[25] For Human Rights Watch, the term "fully autonomous weapon" refers "to both out-of-the-loop weapons

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Documents/DD/issuances/dodd/300009p.pdf [hereinafter DoDD 3000.09] (outlining the U.S. military policy for autonomous weapons).

19.   Kelley M. Sayler, *Defense Primer: U.S. Policy on Lethal Autonomous Weapon Systems*, CONG. RESEARCH. SVC., Mar. 27, 2019 ("There is no agreed definition of lethal autonomous weapon systems that is used in international fora.").

20.   VINCENT BOULANIN & MAAIKE VERBRUGGEN, STOCKHOLM INT'L PEACE RESEARCH INST., MAPPING THE DEVELOPMENT OF AUTONOMY IN WEAPON SYSTEMS 8 (2017) (describing three categories of definitions of autonomous weapon systems).

21.   *See id*. at 8; Sayler, *supra* note 19.

22.   DoDD 3000.09, *supra* note 18, at 13.

23.   *Id.*

24.   BONNIE DOCHERTY, HUMAN RIGHTS WATCH, LOSING HUMANITY: THE CASE AGAINST KILLER ROBOTS 2 (2012); *see also* BOULANIN & VERBRUGGEN, *supra* note 20, at 8.

25.   DOCHERTY, *supra* note 24, at 2, Human Rights Watch's *Losing Humanity* report defines "human-in-the-loop" weapons as those "that can select targets and deliver force only with a human command. *Id.* "Human-on-the-loop" weapons are those "that can select targets and deliver force under the oversight of a human operator who can override the robots' actions" and that "human-out-of-the-loop" weapons are those "that are capable of selecting targets and delivering force without any human input or interaction."

and those that allow a human on the loop, but that are effectively out-of-the-loop weapons because the supervision is so limited."[26]

Alternatively, some states base their definition of autonomous weapon systems on the capabilities of the systems themselves. For example, the United Kingdom defines an "autonomous system" as one that "is capable of understanding higher-level intent and direction."[27] The U.K. definition further explains that "[f]rom this understanding and its perception of its environment, such a system is able to take appropriate action to bring about a desired state."[28]

The third definitional category emphasizes the nature of the tasks to be performed autonomously and the legal implications of autonomous action.[29] For example, the International Committee for the Red Cross (ICRC) has proposed that an autonomous weapon system "is one that has autonomy in its 'critical functions,' meaning a weapon that can select (i.e. search for or detect, identify, track) and attack (i.e. intercept, use force against, neutralize, damage or destroy) targets without human intervention."[30] For the ICRC, "critical functions" are "the functions most relevant to 'targeting decision-making,' and therefore to compliance with international humanitarian law."[31] Meanwhile, Switzerland currently defines "autonomous weapon systems" as "weapons systems that are capable of carrying out tasks governed by [international humanitarian law] in partial or full replacement of a human in the use of force, notably in the targeting cycle."[32] Switzerland concedes, however, that its working definition "could and probably should evolve to become more specific and purposeful."[33]

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26. *Id.*

27. U.K. MINISTRY OF DEFENCE, JOINT DOCTRINE PUB. 0-30.2, UNMANNED AIRCRAFT SYSTEMS 13 (2018), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/673940/doctrine_uk_uas_jdp_0_30_2.pdf.

28. *Id.*

29. BOULANIN & VERBRUGGEN, *supra* note 20, at 8.

30. *Autonomous Weapon Systems: Is It Morally Acceptable for a Machine to Make Life and Death Decisions?*, INT'L COMM. RED CROSS (Apr. 13, 2015), https://www.icrc.org/en/document/lethal-autonomous-weapons-systems-LAWS (Statement of the ICRC to the UN GGE on Lethal Autonomous Weapons Systems).

31. *Id.* (explaining that the ICRC also observes that autonomy in selecting and attacking targets "also raise significant ethical questions, notably when force is used autonomously against human targets").

32. Government of Switzerland, *Towards a "Compliance-Based" Approach to LAWS*, ¶ 6, Mar. 30, 2016 (Informal Working Paper submitted by Switzerland at the Informal Meeting of Experts on Lethal Autonomous Weapons Systems, Geneva, 11-15 April 2016).

33. *Id.* at 2.

III. SUBSTANTIVE LEGAL CHALLENGES

Until these definitional questions are resolved, it is difficult to imagine how any regulatory scheme governing autonomous weapons technology could prove workable. Of even greater challenge, however, is the gulf in state perspectives over the potential substantive legal regulation of LAWS. Dozens of countries have publicly expressed concern over fully autonomous weapons because of a "wide array of serious ethical, legal, operational, proliferation, moral, and technological concerns over removing human control from the use of force."[34] Some of these states, as well as non-governmental organizations and corporations, have advocated for a pre-emptive ban on fully autonomous LAWS.[35] At least twenty-six states have called for such a ban.[36] China has expressed support for banning the use of fully autonomous weapons, but not their development.[37] Countries including the U.S., U.K., Israel, Russia, and Turkey oppose such a ban.[38] In fact, the U.S., U.K., and Russia have not supported negotiating any treaty regulating LAWS, noting that such an instrument would be unnecessary and premature.[39]

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34.   HUMAN RIGHTS WATCH, *supra* note 16, at 3.

35.   Hayley Evans, *Lethal Autonomous Weapons Systems at the First and Second U.N. G.G.E. Meetings*, LAWFARE (Apr. 9, 2018, 9:00 AM), https://www.lawfareblog.com/lethal-autonomous-weapons-systems-first-and-second-un-gge-meetings. Notable organizations include the Campaign to Stop Killer Robots as well as Human Rights Watch; *see, e.g.*, *A Growing Global Coalition*, CAMPAIGN TO STOP KILLER ROBOTS, https://www.stopkillerrobots.org/about/ (last visited Oct. 11, 2020); *Killer Robots*, HUMAN RIGHTS WATCH, https://www.hrw.org/topic/arms/killer-robots (last visited Oct. 11, 2020).

36.   Hayley Evans & Natalie Salmanowitz, *Lethal Autonomous Weapons Systems: Recent Developments*, LAWFARE (Mar. 7, 2019, 3:28 PM), https://www.lawfareblog.com/lethal-autonomous-weapons-systems-recent-developments; *Country Views on Killer Robots*, CAMPAIGN TO STOP KILLER ROBOTS (Nov. 22, 2018), https://www.stopkillerrobots.org/wp-content/uploads/2018/11/KRC_CountryViews22Nov2018.pdf [hereinafter *Country Views*].

37.   *Country Views*, *supra* note 36.

38.   Hayley Evans, *Too Early for a Ban: The U.S. and U.K. Positions on Lethal Autonomous Weapons Systems*, LAWFARE (Apr. 13, 2018, 3:00 PM), https://www.lawfareblog.com/too-early-ban-us-and-uk-positions-lethal-autonomous-weapons-systems; *see* Michael N. Schmitt, *Autonomous Weapon Systems and International Humanitarian Law: A Reply to the Critics*, HARV. NAT. SEC. J. (Feb. 5, 2013), http://harvardnsj.org/wp-content/uploads/2013/02/Schmitt-Autonomous-Weapon-Systems-and-IHL-Final.pdf. (explaining that autonomous weapons do not *per se* violate existing laws of armed conflict); *see also* Charles J. Dunlap, Jr., *Accountability and Autonomous Weapons: Much Ado about Nothing?*, 30 TEMPLE INT'L & COMP. L.J. 63 (2016).

39.   *See* Evans & Salmanowitz, *supra* note 36 (suggesting that new treaty law on LAWS would be premature); *see* Ray Acheson, *New Law Needed Now*, 6 No. 9, CCW REP. 1, 1 (Aug. 30, 2018), https://reachingcriticalwill.org/images/documents/Disarmament-fora/ccw/2018/gge/reports/CCWR6.9.pdf.

From the U.S. and U.K. perspective, existing laws of armed conflict are sufficient to govern the development and use of LAWS.[40] Indeed, there are strong arguments that existing treaty and customary law regarding armed conflict are adequate to regulate LAWS, assuming states properly interpret and apply this legal framework.[41] In documents submitted to the GGE, the U.S. took the position that the use of autonomous weapons could in fact enhance conformity to the existing laws of war by increasing targeting precision, thus avoiding inadvertent civilian casualties.[42] In opposition to the argument that existing law is sufficient, some posit that machine decision-making could not properly assess whether a use of force would comply with the requirements of proportionality and distinction under international law.[43] Other critiques include the claim that upholding law of armed conflict principles requires human judgement, with associated legal culpability for decision-makers.[44] Finally, some argue that because LAWS technology is so speculative in nature, it is unclear how traditional principles of the law of war would operate.[45]

Rather than a binding legal agreement, some countries have instead recommended political declarations or other non-binding documents for the purpose of affirming the importance of human control over lethal force and

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40. Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, *Report of the 2018 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, ¶ 28, U.N. DOC. CCW/GGE.1/2018/3 (Oct. 23, 2018); *see* Charles P. Trumbull, *Autonomous Weapons: How Existing Law Can Regulate Future Weapons*, 34 Emory Int'l L. Rev. 533, 535 (2020).

41. *See generally* Trumbull, *supra* note 40, at 535 (exploring how international humanitarian law can be interpreted and applied to autonomous weapons technology); Kenneth Anderson et al., *Adapting the Law of Armed Conflict to Autonomous Weapons Systems*, 90 INT'L L. STUD. 386 (2014) (concluding that although there are challenges posed by the unique aspects of autonomous weapons, application of traditional international humanitarian law principles is possible).

42. Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, *Autonomy in Weapon Systems*, ¶¶ 16–18, U.N. DOC. CCW/GGE.1/2017/WP.6 (Nov. 10, 2017).

43. Anderson et al., *supra* note 41, at 395; *see* Marco Sassoli, *Autonomous Weapons and International Humanitarian Law: Advantages, Open Technical Questions and Legal Issues to be Clarified*, 90 INT'L L. STUD. 308, 338–39 (2014) (concluding that although it may be possible for machines to adequately assess the legality of a use of force under the law of armed conflict, it may be wise to limit their use in certain contexts at this time).

44. Anderson et al., *supra* note 41, at 395; *see also* BONNIE DOCHERTY, MIND THE GAP: THE LACK OF ACCOUNTABILITY FOR KILLER ROBOTS 1-2 (2015), https://www.hrw.org/sites/default/files/reports/arms0415_ForUpload_0.pdf.

45. Anderson et al., *supra* note 41, at 395-96.

guiding states in using this technology in accordance with law of armed conflict principles.[46] Achieving consensus among states to even enter into negotiations for a legal agreement appears difficult.

States would also have to agree on the substantive provisions of any such agreement. Short of an outright ban, potential regulatory limits on LAWS could address a variety of issues concerning the technology. At a fundamental level, an international agreement might affirm that existing rules of armed conflict also govern LAWS and that LAWS must undergo state weapons legal reviews prior to deployment.[47] The international regulation of LAWS might also stipulate that such weapons must feature "meaningful human control."[48] Technological uncertainties and the debate on taxonomy discussed above, would likely provoke considerable debate and possible disagreement. Additionally, a regulatory instrument might also clarify what information military commanders must possess before they may use an automated weapons system, whether the system requires a human-override capability, and what sensory-input capacity a system must have to comply with the law of armed conflict principles, such as the principle of distinction.[49] Finally, the instrument may address legal accountability in the use of autonomous weapons, including clarifying states' liabilities and responsibilities regarding the unlawful use of force by such technology.[50] To achieve the greatest agreement among state parties, the above provisions would presumably be rooted in existing laws governing armed conflict and would be made more clearly and specifically applicable to LAWS.

As noted earlier, major military powers, including the U.S. and Russia, are currently opposed to any legally binding agreement regarding LAWS. In fact, the U.S. has not ratified several important treaties that govern conduct in hostilities, including the Additional Protocols to the Geneva

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46. *Id*. at 396-97; Countries advocating for such a declaration include France and Germany. Others have suggested that an international group of experts convene to draft a *Tallinn Manual*-style guide for states- but with more state input than the *Tallinn Manual*. Anderson, *supra* note 41, at 407 (citing TALLINN MANUAL ON THE INTERNATIONAL LAW APPLICABLE TO CYBER WARFARE (Michael N. Schmitt ed., 2013).

47. *Id*. at 406-07.

48. *Id.* at 396; *see generally* Neil Davidson, *A Legal Perspective: Autonomous Weapons Systems under International Humanitarian Law*, UNODA Occasional Papers No. 30, 11–15 (2017) (outlining a framework for understanding "meaningful human control" under international humanitarian law).

49. Anderson et al., *supra* note 41, at 407.

50. *See* Jens David Ohlin, *The Combatant's Stance: Autonomous Weapons on the Battlefield*, 92 INT'L L. STUD. 1, 21–22 (2016) (stating that although international law is poised to handle intentional war crimes related to autonomous weapons, it may not be equipped to handle crimes which result from recklessness).

Conventions,[51] the Convention on Cluster Munitions,[52] and the Mine Ban Treaty.[53] The U.S.' resistance to these treaties stems in part from opposition to specific restrictions outlined in these agreements.[54] The U.S.' decision to not ratify these treaties, however, also highlights broader differences among world powers in their approaches to law of armed conflict-related requirements.[55] The U.S., arguably the world's most active military power, will likely continue to reject any overly-restrictive legal limitations that could diminish its warfighting powers.[56] This is particularly true if it believes its adversaries will continue to develop LAWS technology even in violation of a mutually-binding agreement.[57]

IV. REGULATORY SUCCESS OF WEAPONS AND THE NATURE OF LAWS

Aside from issues of taxonomy and agreement on applicable substantive law, the history of weapons treaties demonstrates how other factors may influence states' willingness to be bound by international regulations. In an article published in the *International Law Studies*, Sean Watts identifies several factors that could be used to predict the likely success of weapons regulations.[58] Watts first emphasizes that the principles of unnecessary suffering, discrimination, and honor remain the primary determiners of

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51. Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts, June 8, 1977, 1125 U.N.T.S. 3.

52. Convention on Cluster Munitions, May 30, 2008, 2688 U.N.T.S. 39.

53. Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel Mines and on Their Destruction, Sept. 18, 1997, 2056 U.N.T.S. 211.

54. *See generally* Watts, *supra* note 9.

55. Notable studies in the field of international relations and law have analyzed possible relevant factors in predicting states' willingness to ratify treaties. Identified factors include the regional and global spread of norms, number of states previously ratifying a treaty, levels of democracy within states, and the nature of domestic legal systems. *See, e.g*., Brian Greenhill & Michael Strausz, *Explaining Non-ratification of the Genocide Convention: A Nested Analysis*, 10 FOREIGN POL'Y ANALYSIS 371, 377–84 (2014). *See* Oona Hathaway, *Why Do Countries Commit to Human Rights Treaties?*, 51 J. CONFLICT RES. 588 (2007) (arguing that considerations of domestic legal enforcement and collateral consequences of legal commitment are central to states' decisions to enter into treaties).

56. Theodore Richard, *Unofficial United States Guide To The First Additional Protocol To The Geneva Conventions Of 12 August 1949* (2019), https://www.airuniversity.af.edu/Portals/10/ AUPress/Books/B_0157_UNOFFICIAL_UNITED_STATES_GUIDE_TO_THE_FIRST_ADDIT IONAL_PROTOCOL_TO_THE_GENEVA_CONVENTIONS_OF_12_AUGUST_1949.PDF.

57. Restrictions on LAWS development and use will be generally difficult to enforce. *See* Anderson, *supra* note 41, at 397 (positing that it will be difficult to enforce regulations mandating certain levels of human control over autonomous weapons).

58. Watts, *supra* note 9, at 608 ("The three principles of unnecessary suffering, discrimination and honor certainly remain the primary indicators for predicting regulatory success").

regulatory success. Watts then argues that traits intrinsic to the weapons themselves have also historically influenced states' acceptance or rejection of specific weapons regulations. In particular, states' willingness to enter into, and then obey, international legal limitations have been influenced by factors such as effectiveness, novelty, deployment, medical compatibility, disruptiveness, and notoriety of the weapons.[59] An analysis of these factors suggests that attempts to regulate LAWS may ultimately prove unsuccessful.[60]

A. *Effectiveness*

According to Watts, the effectiveness of a weapon may play an important role in a state's willingness to regulate it.[61] Historically, states have been reluctant to impose self-limits regarding genuinely effective weapons.[62] Under his definition, effectiveness may be measured both in terms of the weapon providing access to otherwise limited enemy areas, and its ability to confer a military advantage.[63]

Though LAWS technology is speculative in nature, experts have predicted that such weapons systems could offer distinct military advantages as well as access to previously restricted environments. As mentioned above, the U.S. takes the position that autonomous weapons could have more accurate targeting abilities, resulting in fewer civilian casualties and other collateral damage on the battlefield. This presents not only a humanitarian benefit, but also a potential operational benefit considering the importance of local civilian sentiment to the success of counter-insurgency operations.[64]

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59. *Id.*

60. *See* John Lewis, *The Case for Regulating Fully Autonomous Weapons*, 124 YALE L. J. 1309, 1310 (2015) (positing that autonomous weapons are amenable to international regulation). Admittedly, there may be some challenges in using Watts' framework in analyzing the chances of success for regulating LAWS. First, most of his historical examples involve efforts to completely ban certain weapons, such as blinding lasers and napalm. The most likely result of attempts at regulating LAWS will be an agreed-upon legal framework, not outright ban. Second, where Watts draws his examples from singular weapons, LAWS would potentially include many discrete kinds of weapons, including air frames, missile defense systems, and drones, all under the umbrella of "autonomous weapons." Nevertheless, application of these factors may be instructive.

61. Watts, *supra* note 9, at 609.

62*. Id*.

63*. Id*.

64. *See generally* U.S. MILITARY JOINT PUBLICATION 3-24, COUNTERINSURGENCY (Apr. 25, 2018, validated Apr. 4, 2020), *available at* https://www.jcs.mil/Portals/36/Documents/ Doctrine/pubs/jp3_24pa.pdf.

More accurate targeting would also tend to enable faster battlefield victory.[65] Additionally, LAWS technology has the capacity to increase data analysis speeds, thereby enhancing weapon reaction times.[66] Enhanced capabilities would make autonomous weapons strategically advantageous as they may be programmed to execute unpredictable or random maneuvers that could confuse enemy forces.[67] Furthermore, LAWS devices would not be hindered by traditional human endurance limits and could operate for long periods of time.[68] These weapons systems may also be used in operational environments where the risk of harm to servicemembers is high, ultimately reducing military casualties.[69] Finally, autonomous weapons could be useful in battlefield situations where communications are degraded, enabling military forces to operate in areas that would otherwise be off-limits.[70] The potential effectiveness of LAWS technology suggests that states willing and able to develop such technology may be disinclined to enter into legal agreements establishing limits on its use.

B. *Novelty*

Watts next argues that the degree of novelty of a weapons system may influence the potential success of a regulatory scheme. Watts notes that military attitudes towards weapons can be "critical determinants of approval" and that weapons perceived as new or novel are more likely to be regulated.[71] Accordingly, states' willingness to regulate LAWS may depend in part on the military's perceptions of the novelty of the technology.

Watts observes that, in general, weapons with an identifiable ancestry are less likely to be suppressed than novel military technologies.[72] Weapons

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65.   Amitai Etzioni & Oren Etzioni, *Pros and Cons of Autonomous Weapons Systems*, MIL. REV. (2017), *available at* https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/.

66.   Trumbull, *supra* note 40, at 545.

67.   Etzioni & Etzioni, *supra* note 65.

68.   Trumbull, *supra* note 40, at 545 (noting that because autonomous weapons lack other aspects of "human frailty" such as desire for revenge, their propensity for war crimes may be lower than a servicemember's); Jason S. DeSon, *Automating the Right Stuff? The Hidden Ramifications of Ensuring Autonomous Aerial Weapon Systems Comply with International Humanitarian Law*, 72 AIR FORCE L. REV. 85 (2015).

69.   Trumbull, *supra* note 40, at 546.

70*. See id.*; *see also* Etzoni and Etzoni, supra note 65 (stating that each service member deployed to Afghanistan costed the U.S. roughly $850,000 per year and explaining that costs over time may be lowered by using automated weapons systems).

71.   Watts, *supra* note 9, at 612-13.

72*. Id.*

viewed as an evolutionary step in a class of armaments generally enjoy greater acceptance, perhaps because they are already familiar to military professionals.[73] For example, because surface-to-surface missiles could be traced to catapult shots, and naval cruisers to triremes, these evolutionary advances were more readily accepted, rather than suppressed, by the international community.[74] In contrast, chemical weapons, biological weapons, and the new technologies associated with aerial bombardment, which had no historical antecedents, were broadly regulated.[75]

Several notable exceptions to this pattern, however, suggest that novelty is not always a reliable indicator of the likelihood of regulation. Submarines, for example, were resistant to early regulation efforts.[76] So, too, were nuclear weapons.[77] Given these varying responses, Watts notes that a "wait and see" approach has come to prevail with respect to the early regulation of new military technologies.[78] The international community's posture regarding LAWS appears to bear this out. The GGE, for example, has yet to reach the consensus the Secretary-General has pushed for, although the group plans to present at least some recommendations related to emerging technologies and LAWS at the 2020 Meeting of the High Contracting Parties to the CCW.[79] Ultimately, it is unclear whether the novelty of LAWS would militate in favor of regulation or against it.

C.   *Deployment*

Next, Watts asserts that the degree to which a state has acquired and deployed a weapon within its military's arsenal could influence that state's

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73. *See, e.g.*, *id.*; *see also* ROBERT L. O'CONNELL, OF ARMS AND MEN: A HISTORY OF WAR, WEAPONS, AND AGGRESSION 24 (1989) (suggesting that "the inclination to fight by the rules, to use similar weapons in a prescribed fashion, is a vestige of intraspecific combat" and arguing that "there is within the military mind a deep and abiding need for order arising out of the very chaos of warfare …Weapons, then, tend to be viewed in a manner which makes their effects most calculable").

74. Watts, *supra* note 9, at 612-13.

75. *Id.* at 612.

76. *See, e.g.*, W. Hays Parks, *Making Law of War Treaties: Lessons from Submarine Warfare Regulation*, 75 Int'l L. Stud. 339, 343 (2000).

77. Watts, *supra* note 9, at 605-07.

78. *Id.* at 612.

79. Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, *Report of the 2019 Session of the Group of Governmental Experts on Lethal Autonomous Weapons Systems* (LAWS), U.N. DOC. ¶ 26(d), CCW/GGE.1/2019/3 (Sep. 25, 2019).

acquiescence to the regulation of the weapon.[80] Historically, nations have been less resistant to enact binding limitations regarding weapons that have not yet been integrated into their military operations.[81] Analyzing LAWS under this criterion is difficult given the uncertainty of definition and spectrum of weapons that may qualify. For example, weapons that use artificial intelligence to select targets of attack already exist in the arsenals of multiple states.[82] These are mostly human-supervised defensive weapons.[83] The Israeli Aerospace Industries Harpy, for instance, is an automated armed drone that can detect, seek out, and destroy enemy radar infrastructure.[84] Some states are also in the development stage for offensive automated weapons. The U.S. military's Advanced Targeting and Lethality Automated System (ATLAS) program, for example, seeks to develop combat vehicles with the ability to "acquire, identify, and engage targets at least 3X faster than the current manual process."[85] The development of autonomous weapons, however, is likely to be largely shielded from public view, casting doubt on true state capabilities in this area.

Since LAWS potentially encompasses a wide range of devices that will likely be introduced incrementally over time, the timing of any international regulation would be crucial in assessing the influence of this factor.

D. *Medical Compatibility*

Watts observes that medical compatibility offers "impressive predictive value" in determining a weapon's susceptibility to regulation.[86] Weapons that produce wounds that can be treated under existing medical protocols, using regularly available medical resources, are less likely to be regulated than weapons that produce injuries military medical personnel are unaccustomed, or ill equipped, to treat. An example of the latter includes weapons that injure primarily by non-detectable fragments. Fragmentation weapons of this type frustrate the detection and treatment of injuries on the battlefield through the

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80. Watts, *supra* note 9, at 613-14.

81. *Id*.

82. Kessel, *supra* note 11.

83. Shapiro, *supra* note 7 (noting that at least 30 countries currently have this kind of weapons technology).

84. Kessel, *supra* note 11.

85. *See* Patrick Tucker, *US Military Changing 'Killing Machine' Robo-tank Program After Controversy*, Defense One (Mar. 1, 2019), https://www.defenseone.com/technology/2019/03/us-military-changing-killing-machine-robo-tank-program-after-controversy/155256/ (stating that information about the program was revealed in a Government posting regarding a possible contract opportunity).

86. Watts, *supra* note 9, at 616.

use of non-detectable fragments—such as those made of plastic, for example—which may be difficult or impossible to detect by X-ray in the human body.[87]

Presumably, the injuries caused by LAWS will not necessarily cause wounds incompatible with current medical protocols. So long as LAWS enable the autonomous targeting of personnel using existing weapons capabilities, the medical compatibility factor of Watts' survey suggests that this consideration, at least, will not weigh in favor of regulation.

E. *Disruptiveness*

Watts defines "disruptiveness" as the capability of certain weapons to alter the status quo of the worldwide hierarchy of military power or state hegemony.[88] Strong military powers have historically proven willing to enter into regulations regarding weapons that pose a threat to their position in the existing international order.[89]

In 2017, Russian President Vladimir Putin declared that whoever mastered the field of artificial intelligence "will become ruler of the world." Some predict that AI technology will be a game-changer in terms of state war-fighting power and military domination, analogous to the transformative nature of nuclear weapons.[90] The U.S. and other countries have already committed significant funding and research efforts into AI development, believing it will be highly influential in future military conflicts.[91] LAWS are one element of military AI technology. As discussed above, their potential operational benefits are broad and far-reaching.

While development and use of LAWS technology by the world's military powers may not significantly alter existing military hierarchy (assuming such military powers would develop these weapons in absence of international regulation, and all maintain a commitment to abide by existing laws of armed conflict), possession of such weapons by smaller countries or

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87. *Id.* (the principle of unnecessary suffering "has long considered wound severity and treatment prospects in its balancing calculus.").

88. *Id*.

89. *Id*.

90. *See* Greg Allen & Teniel Chan, *Artificial Intelligence and National Security,* BELFER CENTER STUDY, Jul. 2017 10-26 (predicting that "[o]ver the long term, these capabilities will transform military power and warfare").

91. *See* Trumbull, *supra* note 40, at 536 (citing Defense Secretary Shanahan's commitment to pursuing AI capabilities to enhance military readiness).

non-state armed groups may have such an effect.[92] It is possible that the risk of rogue states or non-state armed groups gaining access to LAWS technology would have a positive effect on international willingness to establish regulations on the weapons' sale and transfer.

F.   *Notoriety*

Lastly, Watts notes that one of the strongest historical indicators of future LAWS regulation is notoriety. Watts points out that in the past, efforts to revise weapons laws have been heavily influenced by public opinion and that in the Information Age, "public perceptions of weapons and their effects are likely to be increasingly influential forces in international regulation of weapons."[93] In a study of public opinion and the politics of autonomous weapons, Michael Horowitz explained that public opinion is a "microfoundation" that can influence the preferences of bureaucrats and elites who make decisions about the acquisition and deployment of weapon systems.[94] If the historical trend Watts identified holds true, the notoriety of LAWS and apparent public resistance to such technology suggests LAWS may be susceptible to regulation.

One poll commissioned by the Campaign to Stop Killer Robots and conducted by Ipsos revealed that 61% of respondents in 26 countries indicated they oppose the use of LAWS.[95] Conducted between November and December 2018, the poll also showed that 22% of respondents supported the use of LAWS and 17% were unsure about their use.[96] A majority of respondents in the United States (52%) indicated they somewhat or strongly opposed the use of LAWS, compared with 22% of respondents who somewhat or strongly supported their use.[97] Horowitz's study on public opinion and the autonomous weapons debate, however, highlighted the need to exercise caution when evaluating the results of polls like Ipsos's. Horowitz's work revealed that public opposition to autonomous weapons can

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92. *See* Allen & Chan, *supra* note 89, at 15 ("Like the impact of cyber, increased utilization of robotics and autonomous systems will augment the power of both non-state actors and nation states.").

93. Watts, *supra* note 9, at 618.

94. Michael C. Horowitz, *Public Opinion and the Politics of the Killer Robot Debate*, 3 Res. & Pol. 1, 2 (2016).

95. Chris Deeney, *Six in Ten (61%) Respondents Across 26 Countries Oppose the Use of Lethal Autonomous Weapons Systems*, Ipsos (Jan. 21, 2019), https://www.ipsos.com/en-us/news-polls/human-rights-watch-six-in-ten-oppose-autonomous-weapons.

96*.   Id.*

97*.   Id.*

be contextual, and while support for autonomous weapons may be low when considered in a vacuum, support for such weapons increases when it is understood that the technology would be used to protect U.S. forces.[98] His findings suggest that "the public is willing to make tradeoffs and overcome its opposition to a weapon system when US troops are on the line."[99]

The notoriety of LAWS is not surprising given the predatory, apocalyptic light in which they are commonly cast. In the media and elsewhere, LAWS are frequently identified with the killer robots of *The Terminator* movie franchise and other ruthless mechanical killing agents.[100] Horowitz's study suggests, however, that the autonomous weapons debate may be more nuanced than polling numbers may at first imply. Nevertheless, negative characterizations of LAWS and apparent public opposition to them may ultimately influence decision-makers to support regulation in this area.

V.   CONCLUSION

Shortly after the first manned balloon flight in 1783, the novelist Horace Walpole penned a letter to Horace Mann expressing some unease about the achievement. "Well!" Walpole wrote, "I hope these new *mechanic meteors* will prove only playthings for the learned and idle, and not be converted into new engines of destruction to the human race—as is so often the case of refinements or discoveries in Science."[101] Like the specter of air warfare, the danger posed by LAWS is stark, leading many in the international community to desire restrictions on their development, sale, and use.

Currently, multiple hurdles stand in the way of the international regulation of LAWS. Questions of taxonomy and differences in legal approach continue to pose major challenges for those seeking international consensus on a regulatory framework. Historical trends also indicate that specific traits of LAWS may further deter states to be bound to such an instrument. Global and individual state-specific political landscapes are ever in flux, however, and it is possible that the inclination of major powers to join an agreement may change. It will be interesting to see, for example, how highly-publicized objections to LAWS by well-known corporations and

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98. Horowitz, *supra* note 94, at 4-6.

99. *Id.* at 4.

100. *See, e.g.*, Cameron Jenkins, *AI Innovators Take Pledge Against Autonomous Killer Weapons*, NPR (Jul. 18, 2018, 5:26 PM), https://www.npr.org/2018/07/18/630146884/ai-innovators-take-pledge-against-autonomous-killer-weapons; Horowitz, *supra* note 93, at 4 (noting public associations with *The Terminator* and *The Matrix*).

101. RICHARD HOLMES, THE AGE OF WONDER: HOW THE ROMANTIC GENERATION DISCOVERED THE BEAUTY AND TERROR OF SCIENCE 135 (2008).

personalities, including Google and Elon Musk, may impact public opinion regarding the weapons systems, perhaps affecting the "notoriety" analysis above.[102] Certainly, if LAWS technology were to be used by a military in a way antithetical to established rules of law, or were acquired by a non-state armed group, a new impetus to create legal limitations on the development, sale, or use of LAWS would likely emerge.

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102. *See* Jenkins, *supra* note 100; *see also* Uba Oberdorster, *Why Ratify? Lessons from Treaty Ratification Campaigns*, 61 VAND. L. R. 681 (2008) (exploring the role of persuasive campaigns in states' decisions to ratify various treaties).