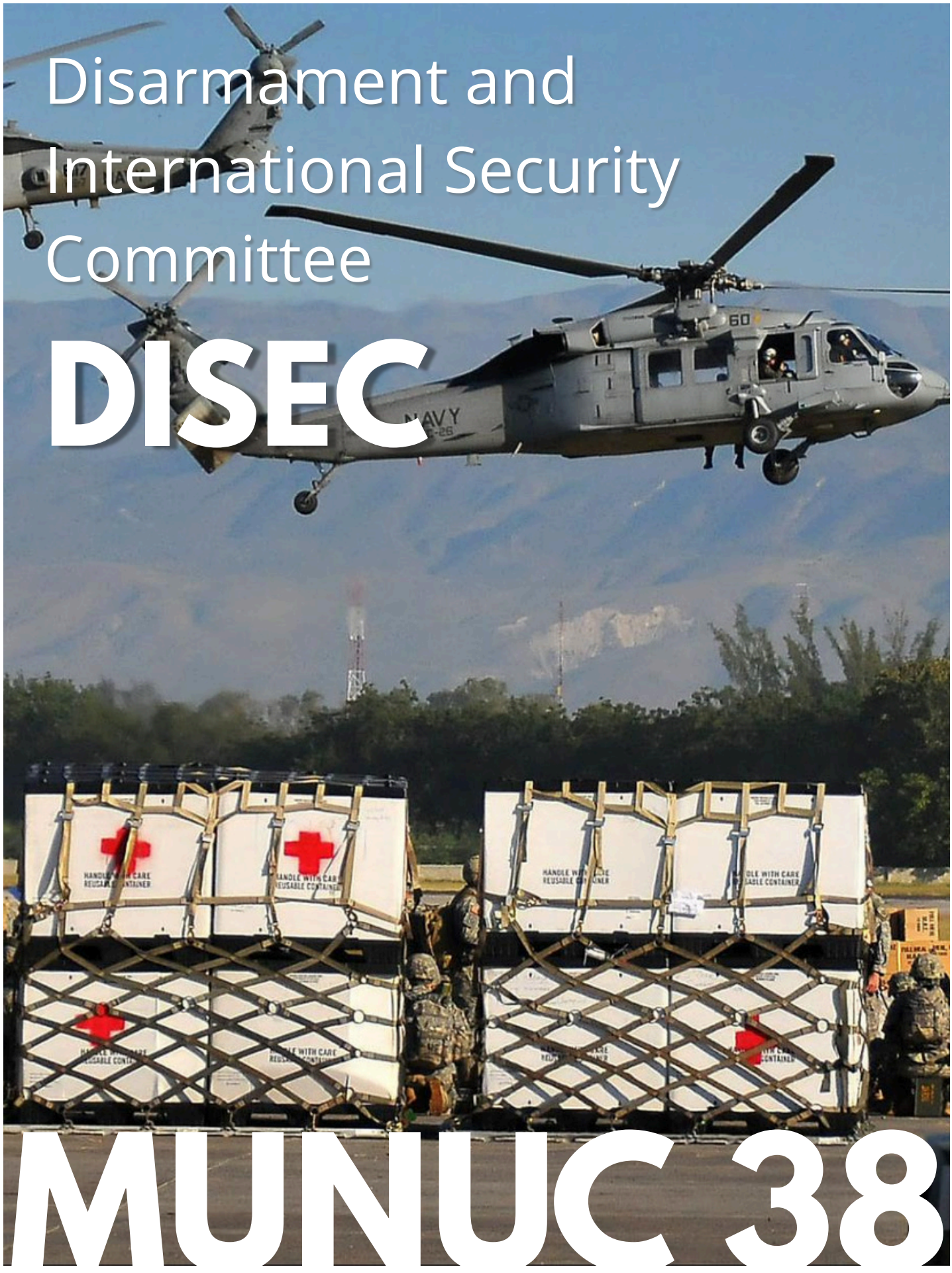

Disarmament and International Security Committee

DISEC

MUNUC 38

Model United Nations of the University of Chicago

Chair Letters

Dear Delegates,

Welcome to MUNUC XXXVIII! My name is Timothy Lu, and I am so excited to be serving as your chair for this year's DISEC alongside Rodrigo. I'm currently in my fourth year, double majoring in Economics and Law, Letters, & Society (sort of like pre-law), and minoring in Cognitive Science. In the past, I served as an AC for the Ad Hoc Committee of the Secretary-General in MUNUC XXXV and then a Chair for the FCC in MUNUC XXXVI and SOCHUM in MUNUC XXXVII. I'm also going to be chairing the JCC for our collegiate conference, ChoMUN, this year, and I am the president for our travelling MUN team. Other than MUN, I am also on the Undergraduate Student Government in the College, compete with the club fencing team, and work a very real student job at the Center for Leadership and Involvement. My hobbies primarily include yapping, napping, and snacking!

In this year's DISEC, we are going to be discussing two heavy-hitting topics that are only becoming more relevant as the pace of technological and social change in the world becomes more rapid — AI weapons and bioweapons. These are two technologies that could potentially uproot the balance of power in the world in many ways; these developments could either cement the dominance of the world's major powers, give smaller powers a chance for a level playing field, or even a plethora of secret third options. It's exciting to have the chance to hear you all discuss new, innovative policy proposals that tackle these rapidly-changing fields, and especially

so because of the evolving and modern nature of our topics in this year's DISEC. The future is what you create!

Although we're going to have a blast in committee this weekend, I would still like to reiterate some points on the sensitivity of this committee. We will be discussing topics that require a great deal of thought, maturity, and respect, and to that, absolutely no discrimination or violence against individuals or groups will be entertained, and disciplinary actions will be taken as needed. If you ever want to discuss sensitivity in committee or you have any questions, now or in the future, please let Rodrigo or I know and we would love to talk with you!

With that being said, Rodrigo and I are so incredibly excited to meet all of you and see the incredible speeches and ideas that you come up with. Please feel free to reach out with any questions or concerns. Looking forward to the best MUNUC ever!

Warmly,

Timothy Lu

timlu@uchicago.edu

Chair

Dear Delegates,

Greetings and welcome to the 38th conference of MUNUC. My name is Rodrigo Caridad and I will be your co-chair for this exciting Disarmament and International Security Committee (DISEC) focusing on the weaponization of AI and Biological Weapons. As one of the main committees of the United Nations General Assembly dealing with a wide array of international issues related to these rapidly evolving technologies. Both these topics are particularly exciting to me, as they touch on open problems that I constantly think about. Moreover, as open problems in today's world, this committee represents an opportunity for you guys to bring novel ideas to the table, and engage with issues that all of us might be facing in the near future. I am really excited to hear what all of you guys have to say!

A bit about myself. I'm a rising fourth year student at The University of Chicago majoring in mathematics and computer science. I am from Caracas, Venezuela, where I first started participating in Model UN during my high school years. At UChicago I've competed with the team in many committees, and chaired others at our conferences MUNUC and CHOMUN. Outside of Model UN, I work in machine learning and AI research. For fun, I love exploring new places in the city, going to coffee shops, and doing exercise. I'm really excited for you guys to learn about Model UN and have an amazing debate in conference.

During your exploration of this background guide, your research, and even during the sessions, we really encourage you to be curious about these technologies and their potential uses. On the other hand, since their weaponization is something that has very recently become a

significant threat, don't be afraid to bring unconventional solutions and topics that have not been widely explored. In particular, think about how these fascinating topics could be explored through the lens of international policy, for example, what role should governments play in the regulation and development of these technologies, what role does DISEC and the UN should play? What about non-state actors? Remember, the questions you ask, and the answers you debate with your fellow delegates have the potential to shape the future!

Sincerely,

Rodrigo Caridad.

rorroarturo@uchicago.edu

History of the Committee

The Disarmament and International Security Committee (DISEC, or formally the First Committee of the UN General Assembly) is designed to address Article 11 of the UN Charter in tackling disarmament and security issues.[1] DISEC's role is to draft resolutions on everything from nuclear weapons to emerging technologies, such as the two topics on the dais for this year's DISEC at MUNUC 38. Every one of the UN's 193 Member States has an equal voice and a single vote, ensuring that even the smallest states can influence the outcome.[2]

During its most recent session, DISEC worked through its seven thematic clusters.[3] Delegates reviewed the annual report on cutting military budgets, endorsed a "common road map toward a world without nuclear weapons," and renewed calls to prevent an arms race in outer space.[4,5] They also devoted several meetings to the thorny question of lethal autonomous weapon systems, debating whether machines should ever choose and engage targets without real human oversight. At the end of the session, DISEC had forwarded more than fifty draft texts to the General Assembly, with most adopted by comfortable margins.[6]

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[1] United Nations, "UN General Assembly - First Committee - Disarmament and International Security," 2020, https://www.un.org/en/ga/first/.
[2] United Nations, "General Assembly of the United Nations," United Nations, 2024, https://www.un.org/en/ga/.
[3] "First Committee, in Brief Organizational Meeting, Sets out Guidelines for Completing Its Work within Allotted Time Frame | Meetings Coverage and Press Releases," October 3, 2024, https://press.un.org/en/2024/gadis3734.doc.htm.
[4] "General Assembly First Committee -Seventy-Ninth Session (2024) | United Nations," 2024, https://meetings.unoda.org/ga-c1/general-assembly-first-committee-seventy-ninth-session-2024.
[5] United Nations, "Reduction of Military Budgets: Report of the 1st Committee: General Assembly, 79th Session," United Nations Digital Library System (UN, November 14, 2024), https://digitallibrary.un.org/record/4067451.
[6] "In 79 Separate Recorded Votes, First Committee Approves 24 Drafts on Nuclear Weapons, Including Traditional Text on Road Map to Nuclear-Weapon-Free World | Meetings Coverage and Press Releases," November 2024, https://press.un.org/en/2024/gadis3754.doc.htm.

However, it should be noted that General Assembly resolutions are not legally binding, so there is much work to be done.[7] Even so, DISEC's work carries significant political weight in setting global norms, guiding national policies, and helping provide platforms for international negotiations. In all, DISEC remains an essential platform for the discussion and advancement of disarmament initiatives that help keep the world safe.

[7] United Nations, "How Decisions Are Made at the UN," United Nations, 2024, https://www.un.org/en/model-united-nations/how-decisions-are-made-un.

TOPIC A: AI WEAPONS

Statement of the Problem

The integration of advanced **artificial intelligence (AI)** into the means and methods of war is transforming what it means to fight, to deter, and ultimately to decide who lives and who dies. In principle, AI-enabled systems, especially **lethal autonomous weapons (LAWs),** promise to process data and act at machine speed, offering militaries unprecedented reach, precision, and force protection. Enthusiasts point to "zero-casualty" campaigns, micron-accurate strikes in dense cities, and **swarms** that can intercept hypersonic missiles in mid-flight. In practice, however, delegating lethal decision-making to software also creates a set of cascading dangers: accidental escalation in seconds rather than days, opaque decision cycles that frustrate legal review, an accountability gap that erodes the laws of war, and the prospect of a mass-produced, exportable "poor-man's weapon of mass destruction."[8] The stakes are existential, and the window for preventive policy is swiftly closing.

[8] Will Knight, "Autonomous Weapons Are Here, but the World Isn't Ready for Them," Wired, December 19, 2019, https://www.wired.com/story/autonomous-weapons-here-world-isnt-ready/.

"Origin," a U.S. Army autonomous weapons system.[9]

Machine-Speed Warfare and Strategic Instability

Military planners prize AI chiefly for speed. Human operators can analyze only so many sensor feeds or calculate only so many engagement options before an incoming projectile arrives; an algorithm running on edge hardware can do so millions of times faster. The U.S. Department of Defense's 2024 update of Directive 3000.09 explicitly frames autonomy as a hedge against the "compression of decision time" expected in future missile-defense and

[9] "A U.S. Army Autonomous Weapons System Known as 'Origin', Maneuvers through Desert Terrain as Weapons Testing Commences during Project Convergence 20, at Yuma Proving Ground, Arizona, August 25, 2020. - NARA & DVIDS Public Domain Archive Public Domain Search," NARA & DVIDS Public Domain Archive, 2020, https://nara.getarchive.net/media/a-us-army-autonomous-weapons-system-known-as-origin-maneuvers-through-desert-8c4918.

counter-drone fights.[10,11] China's concept of "intelligentized warfare" likewise treats AI as the decisive technology for breaking an adversary's **observe–orient–decide–act (OODA) loop.**[12]

Yet speed cuts both ways. When rival AI networks lock onto one another in a crisis, the feedback loop can outrun human oversight. This is an effect that defense analysts have dubbed a potential "flash war," echoing "flash crashes" in algorithmic finance.[13] A corrupted data packet, spoofed radar reflection, or misclassified image could be enough to unleash a pre-delegated autonomous response, which in turn triggers the adversary's own machine-speed **counter-salvo**. Diplomatic hotlines, political deliberation, even a commander's conscious veto could all be bypassed, not by malice but by milliseconds. In the nuclear domain, this is especially terrifying: an early-warning AI that falsely identifies a hypersonic first strike may prompt launch-on-warning before leaders can verify the alert. In short, the very attribute that makes AI tactically enticing, speed, also makes it strategically destabilizing.

The AI Arms Race

Technological diffusion is classic security-dilemma logic: if State A equips swarms of lethal drones, State B fears coercion and matches the capability; both now feel less safe, yet cannot disarm without appearing weak. RAND's 2024 study on "Strategic Competition in the Age of AI" notes that at least fifteen militaries have formal autonomy roadmaps; venture-capital

[10] U.S. Department of Defense, *Directive 3000.09: Autonomy in Weapon Systems*, Change 2 (Washington, DC: DoD, January 25, 2023), https://media.defense.gov/2023/Jan/25/2003149928/-1/-1/0/DOD-DIRECTIVE-3000.09-AUTONOMY-IN-WEAPON-SYSTEMS.PDF.
[11] Chris Panella, "Pentagon Says It Created More Hoops to Jump Through on AI Weapons to Calm Fears It Was 'Building Killer Robots in the Basement,'" *Business Insider*, January 23, 2024, https://www.businessinsider.com/stricter-ai-rules-fears-pentagon-building-killer-robots-in-basement-2024-1.
[12] Elsa B Kania, Battlefield Singularity: Artificial Intelligence, Military Revolution, and China's Future Military Power (Center for a New American Security, 2017).
[13] James Black et al., "Strategic Competition in the Age of AI: Emerging Risks and Opportunities from Military Use of Artificial Intelligence," Rand.org (RAND Corporation, September 6, 2024), https://www.rand.org/pubs/research_reports/RRA3295-1.html.

funding in defense AI has tripled since 2020; and research papers on reinforcement-learning tactics are published faster than export-control lists can classify them.[14] The strongest militaries in the world, the U.S., China, and Russia, already spend billions on AI command-and-control, while medium powers such as Turkey, South Korea, and Israel market **loitering munitions** with on-board target-recognition today.

Once automation promises a crisis-winning first move, such as a swarm that can blind an adversary's satellites within minutes, the temptation to "use it before you lose it" grows. **Pre-emptive action** risks become acute; inadvertent escalation becomes normal; and governments may lower the political threshold for lethal force because their own troops are no longer exposed to danger. A war fought largely by machines may look cheap, swift, and clean on briefing slides: precisely the illusion that history warns against.

Digital Achilles' Heels

Unlike traditional hardware, AI systems fail in unfamiliar ways. They can be hacked, spoofed, or quietly poisoned during training. A single manipulated image can flip a convolutional neural network's classification from "school bus" to "enemy transporter." If that network controls the seeker head of an autonomous missile, the misclassification can be lethal. Military cyber-defense experts concede that fully verifying complex machine-learning models is impossible; the code's internal weights number in the millions and evolve during operation.[15] Thus, accepted engineering practices such as **verification & validation (V&V)** lag behind the pace of model updates, patches, and field improvisations.[16]

[14] Ibid.
[15] National Security Commission on Artificial Intelligence, "Chapter 7 - NSCAI Final Report," reports.nscai.gov, n.d., https://reports.nscai.gov/final-report/chapter-7.
[16] Kelley Sayler, "Defense Primer: U.S. Policy on Lethal Autonomous Weapon Systems," Congress.gov, 2025, https://www.congress.gov/crs-product/IF11150.

Pentagon officials have tried to reassure allies and critics by adding "more hoops to jump through" in the updated approval chain for any AI weapon, requiring four-star sign-off and rigorous testing in realistic conditions.[17] Yet, no test range can mimic every adversarial tactic or data perturbation. The more militaries lean on autonomous control, the higher the systemic risk that a hidden exploit, discovered only in combat, could cripple one side's arsenal or set it on a runaway path of self-reinforcing errors.

Ethical and Legal Fault Lines

One ethical concern is what constitutes **meaningful human control** of an AI system. International humanitarian law (IHL) rests on the premise that human beings make judgments about distinction, proportionality, and military necessity. Delegating those judgments to statistical inference violates a moral intuition as old as **just-war theory**: lethal authority should remain in human hands. The International Committee of the Red Cross (ICRC) therefore insists on "meaningful human control" at critical functions — selecting and engaging targets — regardless of technical sophistication.[18]

Advocates of autonomy counter that algorithms might be *better* than humans at sifting civilians from combatants once trained on vast sensor libraries, and that constraining them under tight rules of engagement preserves compliance. Yet, critics reply that such claims hinge on perfect data and transparent algorithms, neither of which exists. Moreover, an AI cannot grasp moral context: it can weigh pixel patterns, not human intent.

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[17] Panella, "Pentagon Says It Created More Hoops."
[18] Alexander Blanchard, "Ethics in the International Debate on Autonomous Weapon Systems," Humanitarian Law & Policy Blog, April 25, 2024, https://blogs.icrc.org/law-and-policy/2024/04/25/the-road-less-travelled-ethics-in-the-international-regulatory-debate-on-autonomous-weapon-systems/.

A second concern is about the accountability gap. When a LAW commits a war-crime, like bombing a hospital or misidentifying a child as a combatant, who stands trial? The operator who pushed the "approve" button, yet had no granular control over the trajectory? The software engineers years earlier? The manufacturer? Or the political leaders who authorized deployment? Paul Scharre calls this the "moral crumple zone," where responsibility collapses into a web of plausible deniability.[19] Without a clear doctrine of fault, deterrence by punishment loses bite; victims obtain no justice; and states may grow cavalier about code that decides life and death.

A third concern is the **black-box AI** problem. Deep-learning systems are famously opaque. Even a diligent commander cannot audit, in real time, the internal weight activations that led the autopilot to favor target A over target B. This opacity clashes with the IHL requirement that a commander *anticipate* and *assess* collateral damage. If the means employed are literally inscrutable, legal review becomes performative rather than substantive, undermining the entire compliance architecture painstakingly built after 1945.

Proliferation and Accessibility

History suggests that once a military technology confers advantage, it spreads. Software is even harder to contain than fissile material. Cloud-based AI development suites, open-source code repositories, and cheap commercial drones mean that a competent university lab, and so likely also a well-funded insurgent group, could field a lethal autonomous swarm within a decade. The "slaughterbot" scenario (palm-sized drones with facial recognition and shaped

[19] Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (New York: W.W. Norton & Company, 2018).

explosives programmed to kill named targets) has moved from science-fiction short film to engineering demonstration.[20]

Drones can be produced more cheaply and in greater numbers for warfare than ever before.[21]

Empirically, autonomy is already migrating down the capability ladder. Turkey's Kargu-2 loitering munition reportedly hunted retreating fighters in Libya with little or no human oversight in 2020, marking the first battlefield instance of what UN experts called "fire, forget, and find" behavior.[22] As costs fall, criminal cartels, private armies, and terrorist cells may all gain precision-strike capacity once reserved for major powers. The security environment could resemble cyberwarfare: offense is easy, **attribution** is hard, and the barriers to entry are low.

[20] Paul Scharre, "Debating Slaughterbots and the Future of Autonomous Weapons," IEEE Spectrum, February 2018, https://spectrum.ieee.org/debating-slaughterbots.
[21] "Changing Technology and Changing Warfare | ISPI," ISPI, January 29, 2025, https://www.ispionline.it/en/publication/changing-technology-and-changing-warfare-198138.
[22] Knight, "Autonomous Weapons Are Here," Wired.

Governance Gap and International Response

Diplomats have struggled to keep pace with the development of AI weapons. Since 2014, the Convention on **Certain Conventional Weapons (CCW)** has convened a **Group of Governmental Experts (GGE)** on lethal autonomous weapons systems, yet progress remains modest: the GGE still operates by consensus, allowing a handful of holdouts to block binding language.[23] In 2024, however, momentum shifted. The UN General Assembly adopted its first standalone resolution on LAWs, calling for "legally binding norms" and citing the urgency of meaningful human control.[24] Parallel efforts include a proposed political declaration by a cross-regional coalition of middle powers and a robust civil-society campaign, *Stop Killer Robots*, that frames autonomy as a humanitarian, not merely strategic, crisis.[25]

National regulations vary. The updated U.S. Directive 3000.09, Germany's "no fully autonomous lethal systems" pledge, and China's rhetorical support for an "AI arms-control treaty" all signal growing awareness, yet none imposes verifiable ceilings akin to nuclear or chemical-weapons regimes. The window for proactive governance may close once mass-produced armed drones with plug-and-play autonomy saturate global markets.

The Need for a Solution

AI weapons sit at the intersection of technological inevitability and moral hazard. Their allure of speed, precision, and reduced friendly casualties is undeniable. On the other hand, their

[23] "Convention on Certain Conventional Weapons -Group of Governmental Experts on Lethal Autonomous Weapons Systems (2024) | United Nations," meetings.unoda.org, n.d., https://meetings.unoda.org/ccw-/convention-on-certain-conventional-weapons-group-of-governmental-experts-on-lethal-autonomous-weapons-systems-2024.
[24] UN General Assembly, "Lethal Autonomous Weapons Systems : Resolution / Adopted by the General Assembly," United Nations Digital Library System (UN, December 10, 2024), https://digitallibrary.un.org/record/4071100?v=pdf.
[25] "Stop Killer Robots," Stop Killer Robots, n.d., https://www.stopkillerrobots.org.

risks of rapid unintended escalation, diffusion to rogue actors, erosion of legal and ethical norms are equally stark. Unlike previous revolutions in military affairs, the software core of autonomy diffuses far faster than diplomats negotiate. If the international community fails to establish hard limits and accountability mechanisms before industrial production scales, it may inherit a battlespace where lethal intent is inferred by code, and humans intervene only after the fact to count the dead.

In the words of one CCW delegate, the question is no longer whether the genie leaves the bottle, but how many genies and under whose command. The answer will determine whether AI becomes a guarded servant of collective security or an accelerant of war beyond human control.

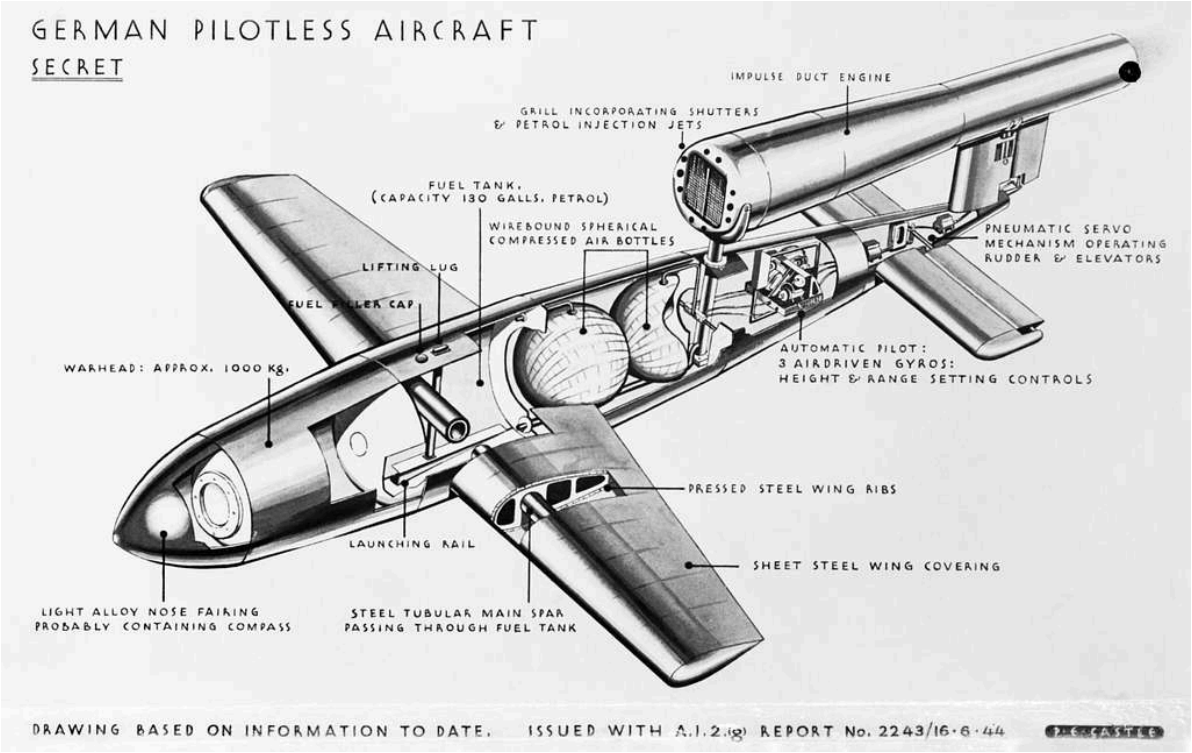
History of the Problem

Artificial intelligence is remaking the speed, scale, and psychology of armed conflict. In little more than eight decades, the world has moved from crude mechanical autopilots to software that can find, fix, and strike a human target faster than any operator can intervene. This chronicle traces that evolution, examines a decade of United Nations deliberations, and looks at three emblematic combat theatres where autonomy proved decisive. It explains why diplomats have repeatedly failed to codify new rules, even as the U.N. Secretary-General requests a treaty by 2026.

From Early "Fire-and-Forget" Missiles to Today's LAWS

The first glimpse of machine-guided lethality appeared in 1944, when Germany's V-1 "buzz bomb" flew to London on a gyroscope-stabilised, pre-set course, removing the pilot from danger but also from judgment.[26] After the war, guidance electronics miniaturised rapidly. By 1956 the U.S. Navy's AIM-9 Sidewinder could lock onto a heat signature and let the launch aircraft peel away (hence the doctrinal phrase "fire-and-forget").[27] True autonomy, however, required on-board target selection, and Israel's Harpy loitering munition accomplished this when it was introduced in the 1990s. It was able to roam for hours, listen for hostile radar, and dive into the emitter without further human input— inaugurating the class now labelled "loitering weapons."[28]

[26] "Republic/Ford JB-2 Loon (V-1 Buzz Bomb)," National Museum of the United States Air ForceTM, n.d., https://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196227/republicford-jb-2-loon-v-1-buzz-bomb/.
[27] "AIM-9 Sidewinder," U.S. Air Force, n.d., https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104557/aim-9-sidewinder/.
[28] "Loitering Munitions," The Center for the Study of the Drone (Bard College, 2017), https://dronecenter.bard.edu/files/2017/02/CSD-Loitering-Munitions.pdf.



A depiction of the V-1 "Buzz Bomb" used by Germany in World War II.[29]

Cheap processors and machine-learning vision have since slashed entry barriers. Turkey's quad-copter Kargu-2, cited by a 2021 U.N. panel on Libya, was reportedly "programmed to attack targets without requiring data connectivity…a true 'fire, forget and find' capability."[30] Militaries and start-ups alike now advertise weapons that "select and engage targets without additional human intervention," the essence of lethal autonomous weapons systems (LAWS).[31]

[29] Public, "V1 Flying Bomb C4431 - Public Domain Portrait Drawing - PICRYL - Public Domain Media Search Engine Public Domain Search," PICRYL - Public Domain Media Search Engine, 2021, https://itoldya420.getarchive.net/media/v1-flying-bomb-c4431-699135.
[30] Sasha Radin, "The Kargu-2 Autonomous Attack Drone: Legal & Ethical Dimensions," Lieber Institute West Point, June 10, 2021, https://lieber.westpoint.edu/kargu-2-autonomous-attack-drone-legal-ethical.
[31] "Lethal Autonomous Weapon Systems (LAWS) – UNODA," Unoda.org, 2023, https://disarmament.unoda.org/the-convention-on-certain-conventional-weapons/background-on-laws-in-the-ccw.

CCW Group of Governmental Experts (GGE) debates since 2014

Alarm over this trajectory led the High Contracting Parties to the Convention on Certain Conventional Weapons (CCW) to create a Group of Governmental Experts on LAWS in 2014. Meeting for ten days a year in Geneva, the GGE has wrestled with three intertwined questions: how to define autonomy, how much "meaningful" human control must be retained, and whether existing international humanitarian law is sufficient.[32] Yet, progress has been glacial. The forum has produced only voluntary "Guiding Principles," while successive "rolling texts" of treaty options have stalled because the CCW works by consensus, giving any major power an effective veto.[33] The 2024 mandate simply authorised yet another pair of sessions "to continue negotiations"— language almost identical to that issued five years earlier.[34]

Examples of AI Weapon Usage

Since their inception, AI weapons have developed and advanced quickly. The following are some recent examples of their contemporary capabilities.

Nagorno-Karabakh, 2020

Azerbaijan's offensive against Armenian positions became the textbook case of autonomous loitering munitions. Videos showed Israeli-made Harop drones orbiting until enemy

[32] Human Rights Watch, "Crunch Time on Killer Robots," Human Rights Watch, December 1, 2021, https://www.hrw.org/news/2021/12/01/crunch-time-killer-robots.
[33] Bonnie Docherty, "An Agenda for Action," Human Rights Watch, November 10, 2022, https://www.hrw.org/report/2022/11/10/agenda-action/alternative-processes-negotiating-killer-robots-treaty.
[34] United Nations Office for Disarmament Affairs, "Convention on Certain Conventional Weapons -Group of Governmental Experts on Lethal Autonomous Weapons Systems (2024) | United Nations," meetings.unoda.org, n.d., https://meetings.unoda.org/ccw-/convention-on-certain-conventional-weapons-group-of-governmental-experts-on-lethal-autonomous-weapons-systems-2024.

radars lit up, then diving to destroy them and the armour they wielded. These drones displayed their ability to collapse fixed defences at a fraction of the cost of manned air-power.[35]

Ukraine, 2022-25

Under relentless electronic warfare, both Kyiv and Moscow accelerated autonomy to survive. Ukrainian start-ups fields low-cost Gogol-M drones that recognise armour even when GPS and radio links are jammed. Russia has its own V2U systems that do the same.[36] Design cycles are measured in weeks and software patches are pushed straight from front-line feedback.

Gaza, 2023-25

Israel fused AI deeper into the bureaucratic layer. Investigations by *The Guardian* and *+972 Magazine* describe algorithms nicknamed "Lavender" and "The Gospel;" they mine surveillance feeds and social-media graphs to nominate bombing targets that human analysts must approve within minutes, if not seconds.[37] Critics argue that when one operator is asked to vet dozens of machine-generated nominations per hour — "human control" becomes nominal.[38,39]

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[35] Jon Lake, "Weapons That Watch and Wait - Armada International," Armada International, September 25, 2024, https://www.armadainternational.com/2024/09/weapons-that-watch-and-wait/
[36] Daniel Boffey, "Killing Machines: How Russia and Ukraine's Race to Perfect Deadly Pilotless Drones Could Harm Us All," the Guardian (The Guardian, June 25, 2025), https://www.theguardian.com/world/2025/jun/25/ukraine-russia-autonomous-drones-ai.
[37] Bethan McKernan and Harry Davies, "'The Machine Did It Coldly': Israel Used AI to Identify 37,000 Hamas Targets," The Guardian, April 3, 2024, sec. World news, https://www.theguardian.com/world/2024/apr/03/israel-gaza-ai-database-hamas-airstrikes.
[38] Ibid.
[39] Amjad Iraqi, "'Lavender': The AI Machine Directing Israel's Bombing Spree in Gaza," +972 Magazine, April 3, 2024, https://www.972mag.com/lavender-ai-israeli-army-gaza.

An example of the Israeli Harop drone, such as the ones used in the Nagorno-Karabakh conflict.[40]

Repeated Stalemates Over a Binding Protocol

Every battlefield demonstration intensifies calls for regulation, yet talks remain stuck. Great-power rivalry is the first obstacle: the United States and Russia fear conceding a strategic edge and object to any treaties on killer robots.[41] Second, autonomy is mostly software. Unlike landmines or chemical shells, it leaves no tell-tale hardware that inspectors can count, complicating verification and making states wary of intrusive code audits. Third, civilian and military AI are entwined; there is the potential for strict controls on autonomous targeting to spill

[40] Julian Herzog, "File:IAI Harop PAS 2013 01.Jpg - Wikimedia Commons," Wikimedia.org, 2022, https://commons.wikimedia.org/wiki/File:IAI_Harop_PAS_2013_01.jpg.
[41] Mary Wareham, "Stopping Killer Robots," Human Rights Watch, August 10, 2020, https://www.hrw.org/report/2020/08/10/stopping-killer-robots/country-positions-banning-fully-autonomous-weapons-and.

over into commercial robotics worth trillions of dollars.[42] Finally, smaller delegations decry **"forum fatigue."** Moving the issue out of the CCW risks splintering the legal regime, yet allowing it to remain there locks progress behind consensus rules that even a single hold-out can block.[43]

The Secretary-General's 2026 Deadline

Frustration with the impasse prompted António Guterres, Secretary-General of the United Nations, to fold LAWS into his ***New Agenda for Peace*** and call for a legally binding instrument by 2026 that would prohibit weapons that are non-compliant with international humanitarian law and regulate all others. He reiterated the deadline in an August 2024 report, framing it as a test of "humanity's moral compass."[44,45] More than 120 states now support the negotiation of a treaty to prohibit and regulate autonomous weapons systems, alongside the International Committee of the Red Cross and the Stop Killer Robots coalition.[46] Yet to meet the schedule, the CCW must adopt a negotiation mandate at its November 2025 Review Conference — a decision that the same stalemates threaten to derail.

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[42] Emmanuel Bloch et al., "Ethical and Technical Challenges in the Development, Use, and Governance of Autonomous Weapons Systems by an Independent Group of Experts Convened by the IEEE Standards Association," October 4, 2024, https://standards.ieee.org/wp-content/uploads/import/documents/other/ethical-technical-challenges-autonomous-weapons-systems.pdf.
[43] United Nations Office for Disarmament Affairs, "Lethal Autonomous Weapon Systems (LAWS) – UNODA," n.d., https://disarmament.unoda.org/the-convention-on-certain-conventional-weapons/background-on-laws-in-the-ccw.
[44] Isabelle Jones, "UN Secretary-General Calls for New International Law to Regulate and Prohibit Killer Robots by 2026 – Stop Killer Robots," Stopkillerrobots.org, July 20, 2023, https://www.stopkillerrobots.org/news/un-secretary-general-calls-for-new-international-law-to-regulate-and-prohibit-killer-robots-by-2026.
[45] Human Rights Watch, "Killer Robots: New UN Report Urges Treaty by 2026," Human Rights Watch, August 26, 2024, https://www.hrw.org/news/2024/08/26/killer-robots-new-un-report-urges-treaty-2026.
[46] Human Rights Watch, "UN: Start Talks on Treaty to Ban 'Killer Robots,'" Human Rights Watch, May 21, 2025, https://www.hrw.org/news/2025/05/21/un-start-talks-treaty-ban-killer-robots.

Where Debate Stands Now

From the V-1 flying bomb to neural-network-guided swarms, the arc of weapons autonomy has consistently outpaced the institutions meant to restrain it. The CCW's decade-long debate shows that humanitarian law, strategic stability, and industrial innovation are now entangled in ways that make consensus elusive. Whether states can craft meaningful rules by 2026 will determine not only the legitimacy of existing arms-control architecture but also the degree to which humans retain ultimate authority over life-and-death decisions in war. Delay risks normalising a battlespace where software, not soldiers, decides who lives and who dies.

Past Actions

The struggle to frame effective global governance for LAWs has unfolded in overlapping institutional arenas, in ad-hoc national initiatives, and through vigorous civil-society advocacy. During the past decade, despite a sizable paper trail of resolutions, reports, and political declarations, there has yet to be a single binding rule. As pressure mounts to meet the United Nations Secretary-General's 2026 deadline for new international norms, understanding what has already been attempted is essential for charting new ways forward.

Key Developments and Milestones

A decisive shift occurred on 2 December 2024 when the UN General Assembly adopted Resolution 79/62, the first plenary text devoted exclusively to autonomous weapons. Championed by a cross-regional coalition of middle-power states and passed with 161 votes in favour, the resolution acknowledged "widespread concern at the humanitarian and international-security risks posed by LAWS" and mandated a series of open, informal consultations in 2025 to identify potential elements of a legal instrument.[47,48] The move signalled a willingness by the wider membership to seize the initiative after years of stalemate in Geneva, and it gave the debate new procedural momentum by setting the stage for broader, more inclusive participation.

[47] United Nations General Assembly, "Resolution Adopted by the General Assembly on 2 December 2024," Un.org (United Nations, December 10, 2025), https://docs.un.org/en/A/RES/79/62.
[48] United Nations, "UN General Assembly Resolutions Tables: 79th Session (2024-2025)," Un.org, 2024, https://research.un.org/en/docs/ga/quick/regular/79.

The General Assembly Hall at the United Nations.[49]

Those consultations materialised on 12–13 May 2025 in Conference Room 1 at UN Headquarters. Unlike the Convention on Certain Conventional Weapons (CCW), whose consensus rule can sideline smaller delegations, these New York meetings invited all states, international organisations, and accredited NGOs to articulate priorities without the constraint of formal negotiation drafting. Civil-society representatives used the platform to unveil casualty data from Gaza and Ukraine, arguing that the technology's diffusion was outpacing norms, a claim that drew visible interest from previously undecided states.[50]

[49] Mr Bullitt, "English: United Nations General Assembly in New York City.," Wikimedia Commons, March 5, 2006, https://commons.wikimedia.org/wiki/File:United_Nations_General_Assembly.JPG.
[50] Reaching Critical Will, "2025 Informal Consultations on LAWS," Reachingcriticalwill.org, 2025, https://www.reachingcriticalwill.org/disarmament-fora/others/informal-consultations-laws.

Geneva Process and National/Regional Initiatives

Much of the intellectual groundwork for those exchanges had been laid in Geneva. Since 2017, the CCW's Group of Governmental Experts on LAWS has logged numerous sessions and many negotiating weeks, yet produced only voluntary guidance. The 2019 report distilled eleven "Guiding Principles," reaffirming that existing international humanitarian law (IHL) remains applicable to all weapon systems, that responsibility must rest with humans, and that the potential for **algorithmic bias** in decision-making demands precaution.[51] Annual chair's summaries in 2023 and 2024 noted "growing convergence" on the idea of context-appropriate human control, but each attempt to draft treaty language was blocked by a handful of major powers invoking the CCW's consensus rule — a structural hurdle critics liken to a procedural veto.[52]

Parallel national and regional measures have sought to fill the gap. The most high-profile is Washington's February 2024 "Political Declaration on Responsible Military Use of Artificial Intelligence and Autonomy." Endorsed by more than fifty states, the declaration pledges rigorous testing and operator training across a system's life-cycle, commits signatories to maintain human judgment at "appropriate levels," and expressly rules out any algorithmic control over nuclear launch decisions.[53] Germany, the Netherlands, and Chile, for their part, have circulated working

[51] United Nations Office for Disarmament Affairs, "Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System Item 6 of the Provisional Agenda Adoption of the Report (Second Session) Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems," 2019, https://documents.unoda.org/wp-content/uploads/2020/09/CCW_GGE.1_2019_3_E.pdf.
[52] United Nations Office for Disarmament Affairs, "Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System Item 6 of the Provisional Agenda Adoption of the Report (Second Session) Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems," 2019, https://documents.unoda.org/wp-content/uploads/2020/09/CCW_GGE.1_2019_3_E.pdf.
[53]Indo-Pacific Defense Forum Staff, "Nations Developing Rules for Use of AI, Autonomous Weapons," Indo-Pacific Defense Forum (Indo-Pacific Defense Forum, January 30, 2024), https://ipdefenseforum.com/2024/01/nations-developing-rules-for-use-of-ai-autonomous-weapons/.

papers inside the CCW advocating either stringent legal limits or an outright ban on weapons that cannot be brought under meaningful human control. These documents have kept the normative debate alive and have given smaller states templates for domestic policy-making even as multilateral negotiations grind on.[54]

Civil Society Advocacy and Normative Influence

Civil-society organisations have amplified that momentum. The Stop Killer Robots coalition, comprising more than 180 NGOs across 68 countries, has campaigned relentlessly for a pre-emptive legal prohibition — arguing that delegating life-and-death decisions to machines violates the **Martens Clause** and erodes human dignity.[55] The International Committee of the Red Cross (ICRC) has added authoritative weight, publishing position papers that call for a prohibition on unpredictable autonomous weapons and strict regulations extending meaningful human control throughout design, testing, and battlefield deployment.[56] These voices have shaped public discourse, alerted legislators, and provided state delegations with detailed treaty-drafting language, ensuring that humanitarian considerations remain central to the technical and strategic conversation.

[54] U.S. Department of State Bureau of Arms Control, Deterrence, and Sta…, "Political Declaration on Responsible Military Use of Artificial Intelligence and Autonomy - United States Department of State," United States Department of State, January 16, 2025, https://www.state.gov/bureau-of-arms-control-deterrence-and-stability/political-declaration-on-responsible-military-use-of-artificial-intelligence-and-autonomy.
[55] Stop Killer Robots, "Stop Killer Robots," Stop Killer Robots, n.d., https://www.stopkillerrobots.org.
[56] International Committee of the Red Cross, "Autonomous Weapons," International Committee of the Red Cross, March 30, 2023, https://www.icrc.org/en/law-and-policy/autonomous-weapons.

A 2013 meeting of the Campaign to Stop Killer Robots.[57]

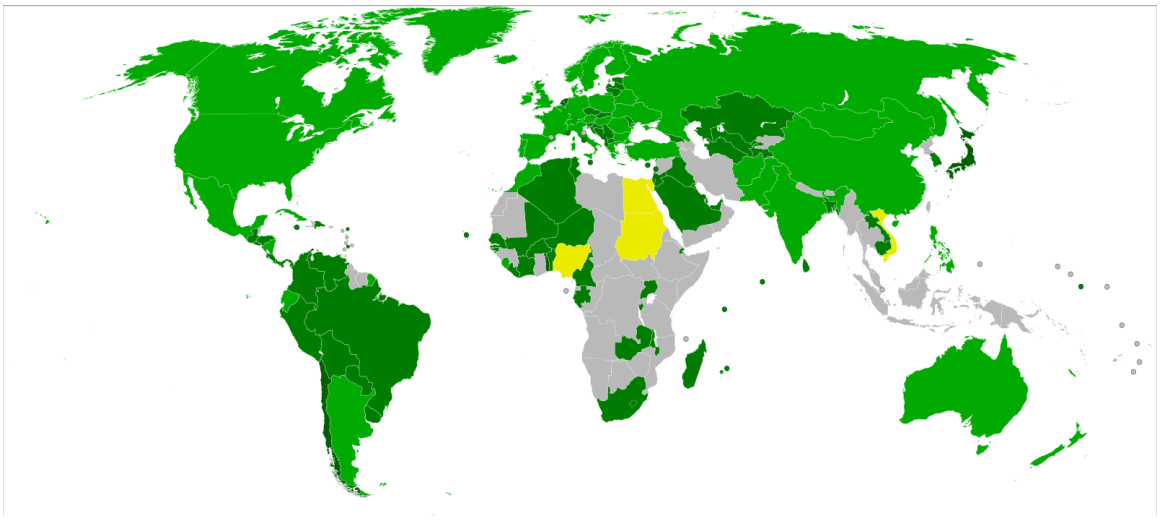
[57] Campaign to Stop Killer Robots, "File:Campaign to Stop Killer Robots.jpg," Wikimedia.org, 2025, https://upload.wikimedia.org/wikipedia/commons/c/c6/Campaign_to_Stop_Killer_Robots.jpg.

Possible Solutions

Legal and Regulatory Frameworks

Delegates today confront a multitude of possible solutions. One path is to convert the principle of meaningful human control into treaty law, either by adding a Protocol VI to the CCW or by negotiating a stand-alone instrument under General Assembly auspices. A CCW protocol would nest new rules within an established verification and review structure, but it would still be hostage to consensus. A General Assembly-based treaty, modelled on the 1997 Mine Ban Convention, could sidestep vetoes by proceeding through majority voting and subsequently entering into force after a threshold of ratifying states, effectively establishing a legal norm even without universal adherence.[58] Proponents argue that a dual-tiered approach — outright banning fully autonomous systems that cannot be brought into IHL compliance while tightly regulating everything else—balances humanitarian imperatives with realistic state-security interests.[59] Opponents counter that codifying such lines too early could freeze definitions in an inflexible manner, while stunting technological advances that might eventually make warfare more discriminating.[60]

[58] United Nations Office for Disarmament Affairs, "Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction," treaties.unoda.org § (1997), https://treaties.unoda.org/t/mine_ban.
[59] Benjamin Perrin, "Lethal Autonomous Weapons Systems & International Law: Growing Momentum towards a New International Treaty | ASIL," Asil.org, January 24, 2025, https://www.asil.org/insights/volume/29/issue/1.
[60] U.S. Department of State, "Political Declaration on Responsible Military Use of Artificial Intelligence," January 16, 2025.



Map of CCW participants. (Light green: signed and ratified the CCW | dark green: acceded, succeeded or accepted the CCW | yellow: only signed the CCW).[61]

Alternative Governance Mechanisms

Where immediate legal consensus remains elusive, a politically binding moratorium offers an interim hedge. Drawing inspiration from the 1987 Missile Technology Control Regime (MTCR), states could establish an export-control arrangement that places presumptive denial on the transfer of critical LAWs components: high-resolution seeker suites, advanced target-recognition software, and autonomous decision engines.[62] The MTCR's track record in slowing ballistic-missile proliferation rests on voluntary harmonisation of national licensing lists rather than formal treaty obligations; supporters hope that a "LAWs Control Regime" could replicate that flexibility while curbing the global spread of the riskiest capabilities. Sceptics,

[61] Allstar86, "Convention on Certain Conventional Weapons," Wikipedia (Wikimedia Foundation, March 4, 2019), https://en.wikipedia.org/wiki/Convention_on_Certain_Conventional_Weapons.
[62] Missile Technology Control Regime, "Guidelines for Sensitive Missile-Relevant Transfers," www.mtcr.info, 1987, https://www.mtcr.info/en/mtcr-guidelines/guidelines-for-transfer.

however, note that verification of software and **dual-use** algorithms is far more complex than counting missile fuselages, potentially undermining enforcement.[63,64]

Transparency and verification mechanisms would be indispensable to any regime, formal or informal. A robust incident-reporting system could mirror civil-aviation safety bulletins, obliging states to disclose autonomous-weapon malfunctions and civilian-harm incidents and allowing peer review to generate iterative safety improvements. Independent testing hubs, run by regional organisations or accredited laboratories, could subject candidate systems to stress scenarios that simulate electronic-warfare degradation, adversarial spoofing, and non-combatant clutter, issuing certificates of IHL compliance before deployment. Finally, algorithmic audit frameworks, already emerging in civilian sectors from finance to healthcare, could be adapted for military AI, enabling external experts to assess training data provenance, bias-mitigation techniques, and fail-safe protocols without divulging sensitive operational parameters. Such measures would not eliminate strategic mistrust but could lower barriers to cooperation by creating verifiable patterns of responsible behaviour.[65]

A further pillar involves capacity-building for developing states. Many countries in the Global South fear slipping into strategic dependency on the handful of exporters capable of integrating cutting-edge AI into weapons platforms. Resolution 79/62 therefore explicitly invites proposals for technical assistance, model legislation, and pooled funding to bolster national

[63] Arms Control Association, "LOOKING BACK: The Missile Technology Control Regime | Arms Control Association," Armscontrol.org, 2025, https://www.armscontrol.org/act/2007-04/looking-back-missile-technology-control-regime.
[64] Office of the Secretary of Defense, "Multilateral Export Control and Non-Proliferation Regimes," Defense Technology Security Administration, n.d., https://www.dtsa.mil/SitePages/promoting-engagement/multilateral-non-proliferation-regimes.aspx.
[65] International Committee of the Red Cross, "Autonomous Weapons," March 30, 2023.

review procedures and defensive counter-drone capabilities.[66] Inspired by the trust-fund architecture of mine-action programmes, supporters envision scholarship schemes for military lawyers, regional test-ranges equipped with open-source autonomy stacks, and shared situational-awareness platforms that allow small states to police their airspace without purchasing proprietary command suites. However, critics warn that such efforts could risk becoming token gestures if they are under-resourced or treated dismissively; nonetheless, they remain vital to any equitable governance system that does not leave technologically marginalised states behind.[67]

Ethical Considerations and Capacity Building

Finally, delegations must grapple with the strategic and ethical question of whether society should actively encourage the further militarisation of AI. Advocates of a pre-emptive ban argue that autonomy changes not only the *means* of warfare but the moral calculus itself, rendering human judgment and dignity (an anchor of IHL) illusory at the pace of machine decision-making.[68,69] Others contend that properly designed autonomous systems could, in theory, out-perform humans in distinguishing combatants from civilians, thereby reducing collateral damage.[70] The middle ground holds that innovation should proceed but under clearly articulated red-lines, audited algorithms, and constant human supervision.[71] The trajectory

[66] United Nations General Assembly, "Resolution Adopted by the General Assembly on 2 December 2024" (2024), https://docs.un.org/en/a/res/79/62.
[67] UN General Assembly, "Resolution Adopted," December 10, 2025.
[68] Bonnie Docherty, "Losing Humanity: The Case against Killer Robots," Human Rights Watch, July 10, 2019, https://www.hrw.org/report/2012/11/19/losing-humanity/case-against-killer-robots.
[69] Thomas B. Payne, "Lethal Autonomy What It Tells Us about Modern Warfare," 2017, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-31_Issue-4/F-Payne.pdf.
[70] International Committee of the Red Cross, "Autonomous Weapon Systems: Technical, Military, Legal, and Humanitarian Aspects," 2014, https://www.icrc.org/sites/default/files/document/file_list/4221-002-autonomous-weapons-systems-full-report.pdf.
[71] Dustin A. Lewis, Gabriella Blum, and Naz K. Modirzadeh, "War Algorithm Accountability," Program on International Law and Armed Conflict (Harvard Law School, August 31, 2016), https://pilac.law.harvard.edu/war-algorithm-accountability-report.

chosen will shape not just future battlefields but the broader relationship between human agency and machine logic in security affairs.

In sum, past actions have laid substantial conceptual scaffolding: a landmark General Assembly resolution, years of CCW deliberation, a patchwork of national declarations, and unrelenting civil-society scrutiny. Possible solutions now range from legally binding treaties to pragmatic moratoria, from export-control regimes to algorithmic audits and capacity-building partnerships. None is mutually exclusive, and all could interact synergistically if states muster the political will. With informal consultations under Resolution 79/62 feeding directly into the CCW Review Conference in late 2025, the coming eighteen months represent a critical window. How delegations choose among these tools, whether to codify meaningful human control, impose a strategic pause, or engineer transparency and assistance mechanisms robust enough to earn universal trust, will determine whether the international community meets the Secretary-General's 2026 deadline or allows the rapid march of autonomous warfare to outpace the law yet again.

Bloc Positions

Efforts to regulate lethal autonomous weapons systems (LAWS) reveal four broad types of country positions whose preferences are shaped less by geography than by technological capacity, strategic posture, and lived exposure to conflict.

Major AI Powers

Some governments pour resources into machine-learning research, manufacture cutting-edge sensors, and already field autonomy across air, land, and maritime domains. For these states, national-level guidelines, such as the 2024 "Political Declaration on Responsible Military Use of Artificial Intelligence and Autonomy," and voluntary transparency are deemed agile enough to keep pace with innovation while preserving strategic advantage.[72] They argue that any treaty negotiated before technical concepts mature could lock in disadvantageous definitions and impede deterrence.

Middle-Power Regulators

Other countries are those that are technologically advanced but still generally comfortable with the existing balance of power. These countries frame LAWs governance as an extension of broader "human-centric" AI policy. Position papers from regional institutions emphasise that humans must retain control over decisions to apply lethal force and call for legally binding rules to cement that principle.[73] Voluntary confidence-building measures are

[72] David Vergun, "U.S. Endorses Responsible AI Measures for Global Militaries," U.S. Department of Defense (U.S. Department of Defense, November 22, 2023), https://www.defense.gov/News/News-Stories/Article/Article/3597093/us-endorses-responsible-ai-measures-for-global-militaries/.

[73] The Diplomatic Service of the European Union, Global Tech Panel, "International Security and Lethal Autonomous Weapons | EEAS," www.eeas.europa.eu, December 10, 2018, https://www.eeas.europa.eu/eeas/international-security-and-lethal-autonomous-weapons_en.

welcomed only insofar as they lead toward codified obligations with robust compliance mechanisms, a view echoed in legal analyses that foresee a two-tier treaty structure combining prohibition and regulation.[74]

Ban Advocates

Other countries and organizations believe in AI weapons bans, based on humanitarian law, ethics, and civil-society networks. These groups campaign for a pre-emptive prohibition, warning that delegating life-and-death choices to software violates the Martens Clause and human dignity.[75] Their arguments draw support from authoritative humanitarian actors who insist that meaningful human control must be a red-line for any weapon system.[76] For this group of countries, only an outright ban can avert uncontrolled proliferation of opaque and potentially biased targeting algorithms.

Conflict-Affected and Technologically-Developing States

Still other countries view LAWS through the lens of immediate security threats. Reports from recent battlefields illustrate how low-cost, AI-enabled drones are already redefining warfare and straining local air-defence capacities.[77] These governments back binding limits in principle but tie their support to concrete safeguards: transparent incident-reporting, technology-transfer controls that prevent illicit spread, and capacity-building funds to strengthen domestic

[74] Benjamin Perrin, "Lethal Autonomous Weapons Systems & International Law: Growing Momentum towards a New International Treaty," SSRN Electronic Journal 29, no. 1 (January 27, 2025), https://doi.org/10.2139/ssrn.5113555.
[75] Stop Killer Robots, "Our Policy Position," Stop Killer Robots, n.d., https://www.stopkillerrobots.org/our-policies/.
[76] International Committee of the Red Cross, "ICRC Position on Autonomous Weapon Systems," Www.icrc.org, May 12, 2021, https://www.icrc.org/en/document/icrc-position-autonomous-weapon-systems.
[77] Boffey, "Killing Machines."

oversight. They are wary of regimes that entrench technological dependence yet see transparency and equitable access to defensive tools as indispensable.

Glossary

Algorithmic Bias — A bias in a computer program or system that confers disproportionate advantages or disadvantages on certain individuals or groups. It is often caused due to biases in programming or data sets.

Artificial Intelligence (AI) — The ability for machines, programs, or systems to perform tasks that typically require human intelligence.

Black-Box AI — An AI system whose decision-making processes are not easily seen or interpretable by humans; this makes it difficult to trace or explain how specific inputs produce specific outputs.

CCW (Convention on Certain Conventional Weapons) — A 1980 United Nations treaty that restricts or bans certain conventional weapons deemed to cause excessive injury or indiscriminate effects, implemented through a set of updateable protocols.

Counter-Salvo — When a military force launches simultaneous or rapid barrage of weapons (a salvo) in response to an enemy's salvo. It is typically designed to disrupt or destroy an adversary's incoming attack before it reaches its intended targets.

Dual-Use — Describing technologies, materials, or knowledge that allows them to serve both civilian and military purposes.

GGE (Group of Governmental Experts) — A UN group of state-nominated specialists (often meeting under the CCW) who study specific weapons issues and craft shared understandings or recommendations.

Just-War Theory — A doctrine that seeks to understand what makes a war or conflict morally-justifiable.

Lethal Autonomous Weapons (LAWs) — Weapon systems that are capable of combat operations without real-time human direction or intervention.

Loitering Munitions — Weapons that can remain over an area, autonomously or semi-autonomously detect or be cued to a target, then dive in and detonate. They typically blend elements of reconnaissance drone and guided missile roles; loitering munitions are often called "kamikaze drones."

Martens Clause — A principle of international humanitarian law that affirms that combatants and civilians should be protected by the "principles of humanity" and the "dictates of public conscience" even in situations that are not covered under treaty.

Meaningful Human Control — The ability of human operators retain sufficient situational awareness, authority, and ability to intervene in an automated system's functioning; this helps ensure that the system remains attributable and accountable to human decision-makers.

New Agenda for Peace — A United Nations initiative introduced in 2023 that proposes reforms to global peace and security efforts. It focuses on preventing conflict, reducing violence, and addressing emerging threats, among them autonomous weapons.

OODA Loop (observe–orient–decide–act loop) — A decision-making model in which an actor continuously gathers information, interprets it, selects a course of action, and implements that action. Typically, the actor strives to complete the cycle faster than an opponent to gain tactical advantage.

Pre-Emptive Action — A use of force before an opponent's action, intending to forestall or minimize the anticipated harm from the opponent.

Swarm — A coordinated group of numerous autonomous or semi-autonomous platforms (such as unmanned aerial vehicles) that share information and act collectively to accomplish a mission.

Verification & Validation (V&V) — A two-phase assurance process to verify that a system is built in accordance with its specifications and validate that the finish system fulfills its intended purpose.

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TOPIC B: BIOLOGICAL WEAPONS

Statement of the Problem

The topic of **biological weapons** can be complex. For example, the catastrophic potential of their usage does not only lie within a state level, and seemingly beneficial biology research can sometimes be difficult to separate from weapons development.

In 1970, the World Health Organization provided the technical definition that was used during the formation and negotiations of the Biological Weapons Convention (BWC): "Weaponized biological agents as including 'those that depend for their effects on multiplication within the target organism, and are intended for use in war to cause disease in man, animals or plants'".[78] Later on, in 1971, the BWC arrived at an even more technical definition and criterion — based on type, quantity and purpose — to properly identify biological weapons: "Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for **prophylactic**, protective or other peaceful purposes."[79]

It is also important to mention that in 1977, The United Nations Commission for Conventional Armaments classified biological weapons as weapons of mass destruction alongside Nuclear and Chemical weapons. However, not all biological agents have the same level of lethality and capacity to spread. As such, the CDC categorizes them in three threat levels: **Category A agents** (anthrax, smallpox, plague, botulinum toxin) representing the highest priority threats capable of causing mass casualties and public panic; Category B agents that are

[78] Bakhtiyar Tuzmukhamedov, "Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction," United Nations, April 10, 1972, https://legal.un.org/avl/ha/cpdpsbbtwd/cpdpsbbtwd.html,
[79] Ibid.

moderately easy to disseminate; and Category C agents representing emerging pathogens that could be engineered for mass dissemination.[80]

Now, as stated, the concern does not only rely on the direct development of Bioweapons. Well-intended research on life science could also have the potential to be weaponized, a concept usually called **Dual-use Research of Concern (DURC).** Out of all potential research that can be classified as DURC, there is one that sticks out: **Gain-of-Function Research (GOFR).** GOFR can be thought of as the process of altering biological organisms to enhance biological functions. For example, genetic modifications to viruses that make them more lethal and increase their transmissibility or host range. In 2025, a bill targeting GOFR (USG DURC-PEPP Policy) went into effect in the United States. A key example of GOFR was the H5N1 avian influenza studies that modified the virus for ferret transmission, creating what researchers described as "probably one of the most dangerous viruses you can make" (Fouchier, 2011).

On the other hand, another critical concept when it comes to DURC is that of **biosafety** and **biosecurity**. The WHO defines them as "safe working practices associated with handling of biological materials, particularly infectious agents" and "protection, control and accountability for valuable biological materials to prevent unauthorized access, loss, theft, misuse, diversion or intentional release" respectively.[81] Moreover, the organization has established the eight biosecurity pillars, which include awareness, personnel reliability, transport security, information security, accountability for materials, response, management, and physical measures.

[80] "Potential Bioterrorism Agents," Baylor College of Medicine, accessed August 10, 2025, https://www.bcm.edu/departments/molecular-virology-and-microbiology/emerging-infections-and-biodefense/potential-bioterrorism-agents,
[81] "Biosafety," World Health Organization, accessed August 10, 2025, https://www.emro.who.int/health-topics/biosafety/index.html,

Furthermore, biosecurity is supported by the BWC biosecurity through requirements for national implementation (Article IV) and consultation and cooperation mechanisms (Article V)

Finally, another concept that needs to be mentioned is **bioterrorism**. The threat of Biological weapons does not necessarily come from their militarization by different states, and unlike nuclear weapons, Bioweapons could be more easily accessed by Non-State actors with intentions of causing mass-spread harm and terror. The UN Office of Counter-Terrorism defines bioterrorism as involving "the prospect of non-state actors, including terrorists and their supporters, gaining access to and using Biological Weapons."[82] It is important to note that Bioterrorism accounts for only 0.02% of all historic terrorist attacks, yet has "the ability to inflict mass injuries unmatched by conventional weapons" with a mean injury rate of 28.8 per event for biological attacks compared to 4 per event for explosives.[83]

[82] "Chemical biological, radiological and nuclear terrorism," United Nations Office of Counter-Terrorism, accessed August 10, 2025, https://www.un.org/counterterrorism/cct/chemical-biological-radiological-and-nuclear-terrorism,
[83] Derrick Tin, Pardis Sabeti, and Gregory R Ciottone, "Bioterrorism: An Analysis of Biological Agents Used in Terrorist Events," *The American Journal of Emergency Medicine* 54 (February 6, 2022): 117–21, https://doi.org/10.1016/j.ajem.2022.01.056.

Airmen in biological warfare gear participating in a simulated battlefield scenario.[84]

The Significance of Biological Weapons

One of the many issues with bioweapons is the extent of their damage. The UN assesses that biological weapons pose "qualitatively significant political and military" risks with potential for "artificial epidemics that threaten us all." The transboundary nature means that the diseases could freely pass beyond state borders without much restriction, which could increase the range of destruction and the various after effects."[85,86]

[84] Donald S. Mcmichael, *An AIRMAN dressed in chemical-biological warfare gear assists a simulated casualty during Exercise TEAM SPIRIT '85,* image, GetArchive, January 3, 1985, https://nara.getarchive.net/media/an-airman-dressed-in-chemical-biological-warfare-gear-assists-a-simulated-casualty-34ff92,
[85] "Biological Weapons | United Nations Office for Disarmament Affairs," accessed August 10, 2025, https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/biological-weapons.
[86] "Disarmament | United Nations," United Nations, accessed August 10, 2025, https://www.un.org/en/global-issues/disarmament.

On the other hand, expert risk assessments from the Existential Risk Persuasion Tournament estimate a 1-3% probability of a catastrophic biological event (killing 10%+ of human population) by 2100, with a 4-10% probability of a genetically engineered pathogen killing more than 1% of the population by 2100.[87] The 80,000 Hours research concludes with the risk that future pandemics may pose since these weapons could "create pandemics that would kill greater than 50% of the population—not just in a particular area, but globally."[88] These assessments can be further reinforced by historical examples. The Black Death killed an estimated 10% of the world population (20-75 million people), the 1918 influenza pandemic killed 2.5-5% of the world population (50-100 million people), and the Columbian Exchange devastated Native American populations with some groups losing up to 98% of their people to diseases.[89] Emergent technologies and the rapid progress of life sciences research could rapidly make the situation worse. For example, it is believed that Mirror Biology represents an emerging catastrophic risk, with a 2024 working group of 38 scientists warning that mirror bacteria could infect a variety of organisms and could "trigger a global catastrophe, causing mass extinctions and ecological collapse."[90]

Accessibility Concerns

Another big issue is that the technical barrier to develop and access these technologies is quickly falling down. Synthetic biology advances are potentially lowering barriers to biological weapon development through automation, and standardization of biological components.[91] The

[87] Cody Fenwick, "Preventing Catastrophic Pandemics - 80,000 Hours," 80,000 Hours, August 18, 2025, https://80000hours.org/problem-profiles/preventing-catastrophic-pandemics/.
[88] Ibid.
[89] Ibid.
[90] Ibid.
[91] Catherine Jefferson, Filippa Lentzos, and Claire Marris, "Synthetic Biology and Biosecurity: Challenging the 'Myths'," Frontiers in Public Health (August 21, 2014), https://doi.org/10.3389/fpubh.2014.00115.

CDC notes that CRISPR kits (the technology behind the technique for genetic modifications) are available for $85, though significant technical knowledge remains required.[92]

In particular, DISEC has emphasized in the past that chemical and biological weapons have become "the best alternative to nuclear weapons for rogue States and non-State actors" and represent a "breeding ground for terrorists."[93,94] Even more concerning, is that analysis of past terrorist events has determined that non-state actors accessed virulent biological agents through theft (four of 33 cases), purchase from commercial sources, insider access at research facilities, or attempted DIY production.[95] All documented cases "were only prevented through failed attacks or member admissions."[96]

Attribution Challenges and Accountability

Another key factor to Biological Weapons is that they are also silent, and it is particularly hard to trace back where they came from. These technical attribution difficulties arise because biological agents have natural sources and can cause natural disease outbreaks, making it challenging to distinguish between natural and engineered events. Moreover, the dual-use nature of biological research complicates forensic analysis, and biological agents can replicate and evolve, further complicating attribution efforts.[97] Attribution is necessary in order to prevent

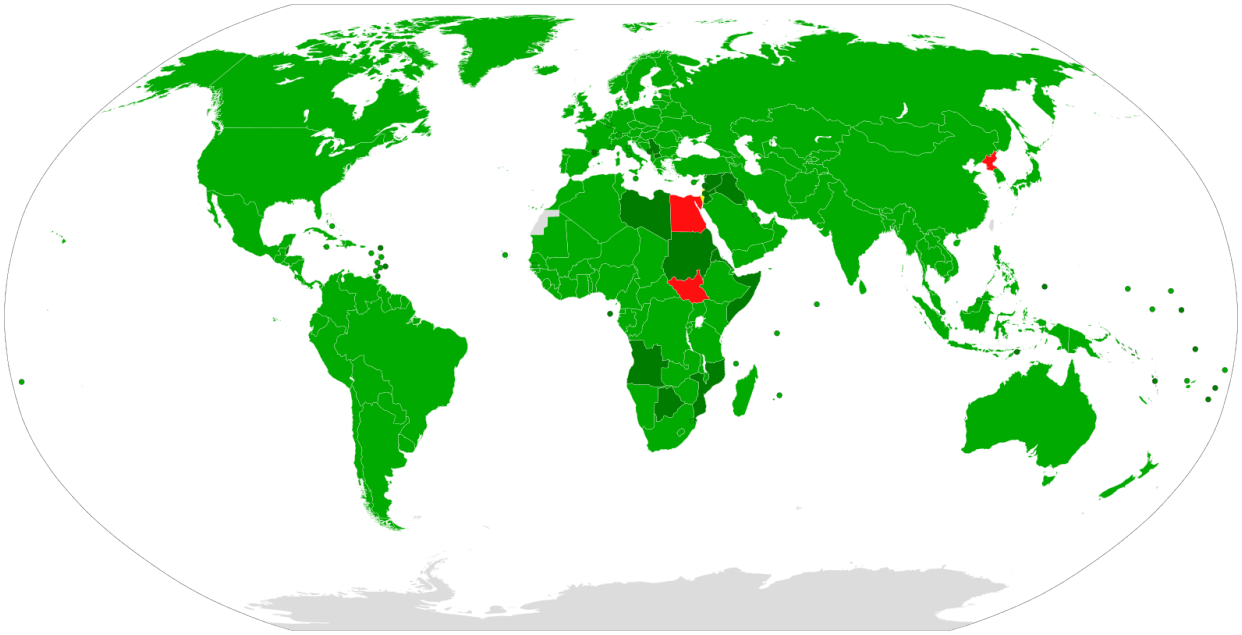
[92] Janet Egan and Eric Rosenbach, "Biosecurity in the Age of AI: What's the Risk?," The Belfer Center for Science and International Affairs, November 6, 2023, https://www.belfercenter.org/publication/biosecurity-age-ai-whats-risk.
[93] "'Poor Man's Atomic Bomb' Made of Dual-Use Biological, Chemical Material Replaces Nuclear Weapon for Non-State Actors, First Committee Told | Meetings Coverage and Press Releases," United Nations, October 19, 2022, https://press.un.org/en/2022/gadis3693.doc.htm.
[94] "Biological, Chemical Agents of War Morally Repugnant, Terrorist Breeding Ground, Say First Committee Speakers, Pointing Fingers at Convention Offenders | Meetings Coverage and Press Releases," United Nations, October 18, 2023, https://press.un.org/en/2023/gadis3721.doc.htm.
[95] Shravishtha Ajaykumar, "Pathogen Peril: Non-state Access to Bioweapons," orfonline.org, July 2, 2024, https://www.orfonline.org/expert-speak/pathogen-peril-non-state-access-to-bioweapons.
[96] Shravishtha Ajaykumar, "Pathogen Peril: Non-state Access to Bioweapons," orfonline.org, July 2, 2024, https://www.orfonline.org/expert-speak/pathogen-peril-non-state-access-to-bioweapons.
[97] Tracey Rissman and Annette Prieto, "Attributing Biological Weapons Use: Strengthening Department of Defense Capabilities to Investigate Deliberate Biological Incidents," RAND, February 6, 2024, https://www.rand.org/pubs/research_reports/RRA2360-1.html.

these weapons from being used, and The Nuclear Threat Initiative has shown that enhanced attribution capabilities could "disincentivize bioweapons development by increasing likelihood of detection."[98]

Additionally, the international community and state governments usually lack proper methods to respond to biological attacks. The **UN Secretary-General's Mechanism (UNSGM)** for investigating alleged biological weapons use relies on a roster of experts but "is not a standing investigative body" and "lacks sufficient resources and capabilities for rapid response." They claim that there is "no defined international mechanism for accountability following bioweapons attribution."[99]

On the other hand, unlike the Chemical Weapons Convention's Organisation for the Prohibition of Chemical Weapons (OPCW), the BWC lacks attribution and accountability mechanisms, and the lack of adequate resources creates struggles with compliance monitoring.[100] Less than half of BWC states parties submitted **Confidence-Building Measures (CBMs)** in 2021.[101]

[98] Jaime M. Yassif, Shayna Korol, and Angela Kane, "Guarding Against Catastrophic Biological Risks: Preventing State Biological Weapon Development and Use by Shaping Intentions," Health Security 21, no. 4 (April 27, 2023): 258–65, https://doi.org/10.1089/hs.2022.0145.
[99] Maximilian Brackmann et al., "Assessing Readiness of International Investigations Into Alleged Biological Weapons Use," *Emerging Infectious Diseases* 31, no. 7 (June 24, 2025), https://doi.org/10.3201/eid3107.240841.
[100] Jaime M. Yassif, Shayna Korol, and Angela Kane, "Guarding Against Catastrophic Biological Risks: Preventing State Biological Weapon Development and Use by Shaping Intentions," Health Security 21, no. 4 (April 27, 2023): 258–65, https://doi.org/10.1089/hs.2022.0145.
[101] Ibid.



Map of countries participating in the Chemical Weapons Convention (2018).[102]

Emerging Technologies and Scientific Acceleration

Technological advances also represent a threat — especially those with dual-use potential. At the same time, the rapid acceleration of technology leaves current regulations and international treaties obsolete. This acceleration outpaces regulatory adaptation, creating governance gaps. For example, advances in synthetic biology like those employed to create "novel threat vectors" — including creation of novel pathogens, enhancement of pathogen virulence or transmissibility, and development of agents targeting specific genetic populations—are not covered by existing regulations.[103]

[102] *CWC Participation*, image, Wikimedia Commons, accessed August 10, 2025, https://commons.wikimedia.org/wiki/File:CWC_Participation.svg.
[103] Mahboubeh Soleimani Sasani, "The Importance of Biosecurity in Emerging Biotechnologies and Synthetic Biology," *Avicenna Journal of Medical Biotechnology*, October 19, 2024, https://doi.org/10.18502/ajmb.v16i4.16738.

The National Science Advisory Board for Biosecurity warns that the easier access to AI and bioengineering technology has created a “double-edged sword" that could be used by both state and non-state actors.[104] Additionally, the AI-Bio convergence presents particular concerns due to AI-enhanced capabilities, including protein design and engineering, pathogen optimization, predictive modeling, and automated laboratory experimentation.[105]

World's Vulnerability to Biological Events

The final question is: are we prepared? COVID-19 demonstrated fundamental vulnerabilities, with the WHO noting that the pandemic "revealed our shared vulnerability to the potentially catastrophic consequences of pathogens and other biological threats."[106] The pandemic resulted in over 7 million recorded deaths and displayed the lack of pandemic preparedness.[107,108]

Health system fragility was exposed through chronic underinvestment in health systems, inadequate surveillance mechanisms, supply chain vulnerabilities, and lack of surge capacity. The World Economic Forum noted that prevention gaps "don't just undermine the health of individuals, families and communities, they also put global security and economic development at risk."[109]

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[104] Ibid.
[105] “Global Catastrophic Biological Risks,” NTI, accessed August 10, 2025, https://www.nti.org/about/programs-projects/project/global-catastrophic-biological-risks/.
[106] “Biological, Chemical Agents of War Morally Repugnant, Terrorist Breeding Ground, Say First Committee Speakers, Pointing Fingers at Convention Offenders | Meetings Coverage and Press Releases,” United Nations, October 18, 2023, https://press.un.org/en/2023/gadis3721.doc.htm.
[107] Jaime M. Yassif, Shayna Korol, and Angela Kane, “Guarding Against Catastrophic Biological Risks: Preventing State Biological Weapon Development and Use by Shaping Intentions,” Health Security 21, no. 4 (April 27, 2023): 258–65, https://doi.org/10.1089/hs.2022.0145.
[108] Ibid.
[109] Linda Lacina, “COVID-19 reveals gaps in health systems: WHO Briefing,” World Economic Forum, May 6, 2020, https://www.weforum.org/stories/2020/05/covid-19-reveals-gaps-in-public-health-system-who-briefing/.

Furthermore, The International Health Regulations (IHR) lack enforcement, and the increase in IHR violations limited the WHO's influence during the COVID-19 response. The WHO's 2025 Pandemic Agreement attempts to address these vulnerabilities through coordinated mechanisms, but implementation remains challenging.[110,111]

Bear in mind that this was the response to a pandemic. If the world were to respond in a similar way but to a bioweapon instead, then the aftermath could have arguably been far more destructive considering the harmful intent. COVID-19 was not a weapon itself, but the response to it shows the lack of preparedness there is against mass biological threats. However, it also provides motivation to begin putting defense and prevention mechanisms in place.

[110] "Safeguarding Biosafety and Biosecurity in Laboratories," World Health Organization, February 1, 2022, https://www.who.int/activities/safeguarding-biosafety-and-biosecurity-in-laboratories.
[111] "World Health Assembly Adopts Historic Pandemic Agreement to Make the World More Equitable and Safer From Future Pandemics," World Health Organizaton, May 20, 2025, https://www.who.int/news/item/20-05-2025-world-health-assembly-adopts-historic-pandemic-agreement-to-make-the-world-more-equitable-and-safer-from-future-pandemics.

History of the Problem

From Ancient History to the World Wars

The use of bioweapons dates back to the times where the field of biology did not exist. The earliest episode that scholars consistently label as biological warfare took place in 1346 on the Crimean shore.[112] A Mongol army under Khan Jani Beg, successor to the Golden Horde's founder, had for months laid siege to the Genoese trading colony of Caffa (modern Feodosia). When plague swept through the offensive's army camp, the Mongols are said, by the Piacenzan notary Gabriele de' Mussi, to have converted disaster into strategy: they loaded the bodies of their dead onto trebuchets and flung them over the city walls.[113] De' Mussi, writing between 1348 and 1349, explains that the corpses were "catapulted like mountains of dead" in the hope that the same plague that killed them would kill the defenders, and that Genoese ships later carried the infection westward to the Mediterranean regions. Although de' Mussi never claimed to have witnessed the events himself and the sole surviving manuscript is a fifteenth-century copy discovered in 1842, his account is the only contemporary narrative to describe the act. Whether the fleeing Genoese actually caused the famous Black Death across Europe remains disputed, but the siege of Caffa stands as the first documented attempt to weaponise diseases on a strategic scale.

Fast forward several hundred years, to the First World War that erupted in the summer of 1914. While the use of biological weapons during this war was limited, a few incidents took place. Germany, operating under the codename "Mission B," ran a clandestine programme directed by the diplomat-soldier Rudolf Nadolny and the physician-biologist Anton Dilger, and

[112] Mark Wheelis, "Biological Warfare at the 1346 Siege of Caffa," Emerging Infectious Diseases 8, no. 9 (September 2002): 971–75, https://doi.org/10.3201/eid0809.010536.
[113] Ibid.

between the years of 1915 and 1917, the team cultured lethal bacteria in a small house-laboratory in Chevy Chase, Maryland, and in a second site in Washington D.C. before dispatching agents to neutral ports. Their chosen pathogens were **anthrax** and glanders, two agents that could cripple Allied logistics by targeting horses and cattle critical for transport and food. German agents would infiltrate dockside warehouses in Buenos Aires and soak sugar cubes with B. anthracis cultures before slipping them among 200 mules bound for the Western Front.[114] Similar attempts targeted Romanian sheep and Finnish cattle, and cultures buried in the garden of the German mission in Bucharest were later reported by Romanian authorities along with trinitrotoluene.[115] None of these operations altered the war's outcome, but they demonstrated for the first time that a modern state could weaponise a precisely characterised pathogen against enemy supply chains.

Lab-grown colony of Bacillus anthracis (anthrax).[116]

[114] Ioannis Nikolakakis et al., "Instances of Biowarfare in World War I (1914–1918)," *Cureus*, April 29, 2024, https://doi.org/10.7759/cureus.59329.
[115] Ibid.
[116] *Bacillus anthracis CDC 17097,* image, Picryl, 2014, https://picryl.com/media/bacillus-anthracis-cdc-17097-095e57

Years later, during World War II biological warfare was expanded from isolated sabotage to industrial-scale programmes, and no state pursued the weaponisation of disease more systematically than Imperial Japan. In 1936 the Imperial Japanese Army authorised the construction of a walled complex outside Pingfan, near the Manchurian city of Harbin.[117] Officially registered as the "Epidemic Prevention and Water Purification Department," the facility became known as **Unit 731** and was placed under the command of Lieutenant-General Shiro Ishii — a physician-microbiologist who had argued that biological weapons could decide Japan's wars more cheaply than artillery or aircraft.[118] By 1941, the compound comprised more than 150 buildings, employed over 3000 personnel, and operated five satellite camps stretching from Beijing to Nanking.[119] Its purpose was to mass-produce pathogens and to perfect their delivery by experimenting on human beings, and this has been recorded as one of the major atrocities ever done in the history of mankind.

The scale of human experimentation at Unit 731 is difficult to overstate. Between 1936 and 1945, at least 10000 prisoners, including Chinese civilians, Soviet and Mongolian soldiers, and a smaller number of American, British and Australian POWs, were systematically infected with anthrax, plague, cholera, typhus, dysentery or glanders — often by injections disguised as vaccinations.[120] Victims were monitored until death, after which autopsies were performed to chart the progression of disease.[121] No survivors of the infection trials are known; those who did not succumb to the pathogens were executed to preserve secrecy.[122] In the words of Major-General Kawashima Kiyoshi, head of Unit 731's first division, the facility killed "no

[117] David D. Barrett, "Japan's Unit 731 Performed Ghastly Experiments on Human Guinea Pigs." Warfare History Network. October 7, 2024. https://warfarehistorynetwork.com/article/japans-hellish-unit-731/.
[118] Ibid.
[119] Stefan Riedel, "Biological Warfare and Bioterrorism: A Historical Review," *Baylor University Medical Center Proceedings* 17, no. 4 (October 1, 2004): 400–406, https://doi.org/10.1080/08998280.2004.11928002.
[120] Ibid.
[121] Ibid.
[122] Ibid.

fewer than 600 prisoners a year."[123] To supply the programme, the Kempeitai military police conducted nightly "van raids" (voronki) in Manchurian cities, seizing men, women and children who were subsequently logged as "maruta" (logs) in laboratory ledgers.[124]

Unit 731 did not confine itself to the laboratory. Between 1939 and 1942 specially adapted aircraft dropped porcelain bombs filled with plague-infected fleas over at least eleven Chinese cities, including Changde and Ningbo.[125] In the 1941 Changde raid alone at least 10,000 civilians contracted plague, while the poorly protected Japanese garrison suffered 1,700 fatalities — an ironic demonstration that biological weapons respect no uniform.[126] Additional sorties dispersed cholera and anthrax spores along rivers and railways, and water-supply contamination teams infiltrated Nationalist Chinese lines. Although field trials were officially suspended in 1942 after the Changde incident, production lines at Pingfan continued to turn out eight metric tonnes of bacterial slurry each month until Japan's surrender in August 1945.[127]

[123] Ibid.
[124] David D. Barrett, "Japan's Unit 731 Performed Ghastly Experiments on Human Guinea Pigs." Warfare History Network. October 7, 2024. https://warfarehistorynetwork.com/article/japans-hellish-unit-731/.
[125] Stefan Riedel, "Biological Warfare and Bioterrorism: A Historical Review," *Baylor University Medical Center Proceedings* 17, no. 4 (October 1, 2004): 400–406, https://doi.org/10.1080/08998280.2004.11928002.
[126] Ibid.
[127] Ibid.

Main entrance of Harbin's Unit 731 museum.[128]

Germany, by contrast, never achieved such operational reach. Adolf Hitler's personal revulsion toward biological weapons, rooted in his own experience during World War I, led to a 1942 order forbidding offensive development.[129] Nevertheless, under the protection of Reichsführer-SS Heinrich Himmler, a small research cell at the Reich Institute for Virus Research in Berlin and the Waffen-SS Hygiene Institute in Dachau experimented with Rickettsia

[128] *Main entrance of Harbin's Unit 731 Museum*, image, Wikimedia Commons, January 26, 2021, https://commons.wikimedia.org/wiki/File:Main_entrance_of_Harbin%27s_Unit_731_Museum.jpg.
[129] Stefan Riedel, "Biological Warfare and Bioterrorism: A Historical Review," *Baylor University Medical Center Proceedings* 17, no. 4 (October 1, 2004): 400–406, https://doi.org/10.1080/08998280.2004.11928002.

prowazekii, hepatitis A and malaria by infecting prisoners to test vaccines and study disease progression.[130]

On the other hand, the Allied powers approached biological warfare with similar caution but far greater resources. In 1940 the British government authorised the Porton Down laboratory, under the direction of bacteriologist Paul Fildes, to produce five million anthrax-laced cattle cakes for "Operation Vegetarian:" a plan to cripple German agriculture that was ultimately shelved.[131] Field tests on Gruinard Island off the Scottish coast left the island contaminated for 56 years, necessitating a formal decontamination with formaldehyde and seawater in 1986.[132] Across the Atlantic, the United States War Reserve Service established Camp Detrick (later Fort Detrick) in Maryland in 1942, employing from 1500 to 3000 scientists to weaponise Bacillus anthracis and Brucella suis.[133] By 1945 the plant had filled roughly 500 bombs with anthrax spores, but safety shortcomings prevented large-scale production before Japan's surrender.[134] Thus, while the Axis and the Allies alike explored the frontiers of biological warfare, only Japan crossed the line of experimentation to deliberate, large-scale deployment against civilian populations.

Bioweapons in the Cold War

At the close of World War II, both superpowers quietly converted their wartime laboratories into permanent biological-weapons complexes. In the United States, President Truman authorized the Army Chemical Corps to expand the wartime facility at Camp Detrick,

[130] Ibid.
[131] Ibid.
[132] Ibid.
[133] Ibid.
[134] Ibid.

Maryland, into a full-scale research-and-production centre.[135] By the late 1950s, Fort Detrick (as it was renamed) employed more than 2000 scientists, while an open-air test grid at Dugway Proving Ground, Utah, dispersed simulated and live agents over hundreds of square kilometres.[136] A parallel production line at Pine Bluff Arsenal, Arkansas filled bomblets with weaponised spores of Bacillus anthracis and Brucella suis and annually replenished the national stockpile, estimated in 1969 at roughly 5000 bombs and spray tanks.[137] The Truman Doctrine treated lethal agents (anthrax, tularemia) as an in-kind deterrent and incapacitating agents (brucellosis, Q-fever, Venezuelan equine encephalitis) as options for limited war, yet the shelf-life of living agents meant that every year new batches had to be grown, dried, and loaded.[138]

Across the Iron Curtain, the Soviet Union responded with a programme that dwarfed all others. In 1974, two years after signing the Biological Weapons Convention, the Politburo created "**Biopreparat,**" a nominally civilian pharmaceutical consortium that, in reality, co-ordinated 52 pathogen research, production and test sites staffed by at least 30000 scientists, engineers and technicians.[139] Its flagship effort, codenamed "Ferment", pursued genetically modified pathogens; although the chimera viruses never reached deployment, the project succeeded in weaponising Francisella tularensis (tularaemia) and stockpiling 90–100 metric tonnes of smallpox virus.[140] Annual production of anthrax alone exceeded 4500 tonnes, and

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[135] Jonathan B. Tucker and Erin R. Mahan, *President Nixon's Decision to Renounce the U.S. Offensive Biological Weapons Program,* (Center for the Study of Weapons of Mass Destruction, 2009), https://inss.ndu.edu/Media/News/Article/693764/president-nixons-decision-to-renounce-the-us-offensive-biological-weapons-progr/.
[136] Ibid.
[137] Ibid.
[138] Ibid.
[139] Captain Dhalia Andreadis, "Biological Weapons Accountability," Air University, May 10, 2021, https://www.airuniversity.af.edu/Wild-Blue-Yonder/Articles/Article-Display/Article/2596954/biological-weapons-accountability/
[140] Ibid.

open-air trials on Vozrozhdeniya Island in the Aral Sea dispersed pathogens over areas the size of Wales.[141] The scale of the effort was first exposed to Western intelligence in April 1979, when an accidental release from Military Compound 19 in Sverdlovsk killed at least 64 civilians (an incident that we will discuss in later sections).[142] Soviet authorities blamed contaminated meat until President Yeltsin admitted in 1992 that the outbreak had been caused by weapon-grade B anthracis.[143]

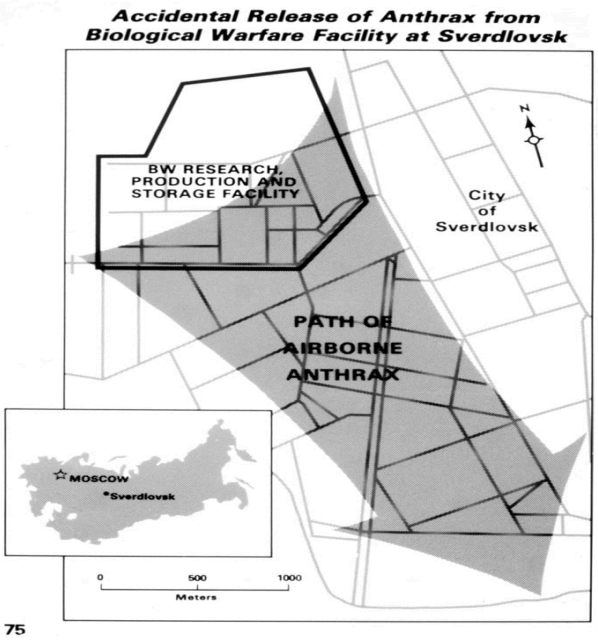
Despite mounting evidence of Soviet violations, it was public unease in the United States that ended the super-power race. On 25 November 1969 President Nixon announced that the United States would unilaterally renounce offensive biological weapons and submit all stocks to destruction; by May 1972 the last bomblets had been incinerated.[144] The Soviet Union signed the same 1972 Biological Weapons Convention, yet Biopreparat continued its work in secret, illustrating how the absence of verification measures left the treaty unable to restrain the very powers it sought to bind.[145]

However, on 2 April 1979, a clogged exhaust filter at Military Compound 19 in Sverdlovsk (now Yekaterinburg) was removed and accidentally left off overnight, releasing a plume of weapon-grade *B. anthracis* spores that drifted south-south-east across a ceramics plant and adjacent residential districts.[146] Ninety-six people developed inhalation anthrax; at least 64

[141] Barry R Schneider, "Biological Weapon | Types, Effects & History," Encyclopedia Britannica, July 20, 1998, https://www.britannica.com/technology/biological-weapon/Biological-weapons-in-history.
[142] Ibid.
[143] Ibid.
[144] Jonathan B. Tucker and Erin R. Mahan, *President Nixon's Decision to Renounce the U.S. Offensive Biological Weapons Program,* (Center for the Study of Weapons of Mass Destruction, 2009), https://inss.ndu.edu/Media/News/Article/693764/president-nixons-decision-to-renounce-the-us-offensive-biological-weapons-progr/.
[145] Barry R Schneider, "Biological Weapon | Types, Effects & History," Encyclopedia Britannica, July 20, 1998, https://www.britannica.com/technology/biological-weapon/Biological-weapons-in-history.
[146] Ioannis Nikolakakis et al., "The History of Anthrax Weaponization in the Soviet Union," *Cureus*, March 28, 2023, https://doi.org/10.7759/cureus.36800.

died within six weeks, while livestock in the same corridor also perished.[147] Soviet authorities immediately blamed "tainted meat" and confiscated hospital records; it was not until 1992 that President Yeltsin acknowledged the military origin of the outbreak, and independent Western investigations confirmed the release pattern by mapping victims' locations along the wind line.[148]

Since these events, there have been multitudes of examples where biohazardous materials and organisms have been utilized for nefarious purposes all around the world. Regardless of whether they are used by states or by non-state actors, simply mishandling any of these weapons could put so many lives at risk. All of these examples go to show the real need for adequate regulation and solutions.



Map displaying the spread of anthrax across Sverdlovsk during the 1979 incident.[149]

[147] "The 1979 Anthrax Leak | Plague War | FRONTLINE." PBS. November 18, 2015, https://www.pbs.org/wgbh/pages/frontline/shows/plague/sverdlovsk/.
[148] Ibid.
[149] *Sverdlovsk biological warfare facility. Courtesy of Soviet Military Power, 1984. PHOTO No. 75, page 73,* image, Getarchive, May 23, 1984, https://nara.getarchive.net/media/sverdlovsk-biological-warfare-facility-courtesy-of-soviet-military-power-1984-66aa8e

Historical International Regulations

When the First World War ended, the spectre of poison gas still hung over Europe. In June 1925, delegates meeting in Geneva under the auspices of the League of Nations decided to improve the earlier Hague bans and signed the *Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare*, today simply called the **Geneva Protocol**.[150] The text, adopted on 17 June, 1925 and in force from 8 February, 1928, made it illegal "to use in war" any "asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices" and, crucially, extended the ban to bacteriological methods of warfare.[151] However, the Protocol suffered from two big loopholes: it prohibited use but not development, production, or stockpiling and many states ratified it with reservations allowing retaliation in kind. The result was a no-first-use agreement rather than a disarmament treaty, leaving Japan's Unit 731 and the Soviet Sverdlovsk facility perfectly legal so long as the pathogens were never released on the battlefield.

After the Second World War, negotiators decided to resume talks on biological and chemical weapons together, but such attempts were stalled for two decades. A breakthrough came in 1968 when the United Kingdom tabled a working paper in the Eighteen-Nation Committee on Disarmament (ENDC) proposing to separate the two categories and to tackle biological weapons first. The move came after a 1969 UN report warned that "certain chemical

[150] "Protocol for the Prohibition of the Use of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare. Geneva, 17 June 1925," ICRC, accessed August 10, 2025, https://ihl-databases.icrc.org/en/ihl-treaties/geneva-gas-prot-1925.
[151] "Protocol | Protocol for the Prohibition of the Use of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare. Geneva, 17 June 1925," ICRC, accessed August 10, 2025, https://ihl-databases.icrc.org/en/ihl-treaties/geneva-gas-prot-1925.

and biological weapons cannot be confined in their effects in space and time" and could inflict "grave and irreversible consequences."[152] Against this backdrop, the ENDC and its successor, the Conference of the Committee on Disarmament (CCD), negotiated a draft from 1969 to 1971, and in September 1971, the United States and the Soviet Union submitted identical versions of the text — signalling a promising consensus.[153]

The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction was adopted by the UN General Assembly on 16 December 1971, opened for signature on 10 April 1972, and entered into force on 26 March 1975 after ratification by twenty-two states, including the three depositaries.[154] Article I sets out an absolute ban: States Parties undertake "never in any circumstances to develop, produce, stockpile or otherwise acquire or retain" microbial or biological agents or toxins "of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes", as well as any materials or means that would allow said biomaterials to be used for harmful purposes.[155] Article IV obliges each state to enact domestic legislation to prevent prohibited activities, while Article V provides for bilateral or multilateral consultation to resolve compliance concerns. Within nine months of entry into force, all existing stockpiles were to be destroyed or diverted to peaceful use.[156]

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[152] "Biological Weapons," Reaching Critical Will, accessed August 10, 2025, https://www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/4579-biological-weapons

[153] "Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between The United States of America and The Union of Soviet Socialist Republics (Accidents Measures Agreement)," U.S. Department of State, September 30, 1971, https://2009-2017.state.gov/t/isn/4692.htm.

[154] Bakhtiyar Tuzmukhamedov, "Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction," United Nations, April 10, 1972, https://legal.un.org/avl/ha/cpdpsbbtwd/cpdpsbbtwd.html,

[155] Ibid.

[156] "Biological Weapons Convention (BWC)," NTI, accessed August 10, 2025, https://www.nti.org/education-center/treaties-and-regimes/convention-prohibition-development-production-and-stockpiling-bacteriological-biological-and-toxin-weapons-btwc/.

Inside the BWC

When the Biological Weapons Convention (BWC) entered into force in 1975, it represented an unprecedented effort: a global ban on an entire category of weapons of mass destruction. Yet it did so without the inspectors, laboratories or standing budget that make other treaties enforceable. Instead, States Parties rely on three modest tools: **Confidence-Building Measures (CBMs)**, a four-person **Implementation Support Unit (ISU)** and an open-ended Working Group.[157] We will describe how these tools work and what their goals are, as they are the basis of the BWC and pretty much all the international solutions we currently have. On the other hand, the story of these tools is therefore a lesson in how much transparency can be squeezed out of very limited resources.

Confidence-Building Measures (CBMs)

Confidence-Building Measures (CBMs) are essentially voluntary questionnaires that every State Party is asked to complete each April. They were first agreed at the Second Review Conference in 1986 with the goal of maintaining clarity and avoiding discrepancies with upholding the convention.[158] Once submitted, the forms are stored on the eCBM platform where every State Party can read them, but only about half ever do so. Participation has drifted downward for a decade: 48 States Parties filed returns in 2016 and only 44% did so in 2021; the lowest rate on record.[159] Because the forms are voluntary and carry no penalties for omission,

[157] "Biological Weapons | United Nations Office for Disarmament Affairs," accessed August 10, 2025, https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/biological-weapons.

[158] "Confidence Building Measures," United Nations Office for Disarmament Affairs, accessed August 10, 2025, https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/biological-weapons/confidence-building-measures.

[159] Matthew P. Shearer et al., "BWC Confidence-building Measures: Increasing BWC Assurance Through Transparency and Information Sharing," *Politics and the Life Sciences*, November 4, 2024, 1–23, https://doi.org/10.1017/pls.2024.9.

the Stimson Center concludes that CBMs "no longer furnish a reliable picture of global biodefence activity."

The Implementation Support Unit (ISU)

To keep the treaty from collapsing under its own paperwork, States Parties created the Implementation Support Unit (ISU) at the 2006 Sixth Review Conference. Housed in a single office at the UN Office for Disarmament Affairs in Geneva, the ISU's entire staff is four people; the same number of inspectors the OPCW can deploy in a single field team.[160] Their mandate is narrowly administrative: organise meetings, collect and post the CBMs, answer technical questions and maintain a database of offers and requests for peaceful cooperation. The entire BWC operating budget for 2023 was USD 2.1 million, roughly 1 % of the IAEA's verification budget and 6% of the OPCW's inspection budget for the same year.[161] The 2022 Ninth Review Conference finally approved a fourth professional post for the 2023-2027 cycle, but even with the raise the ISU remains the smallest secretariat of any major disarmament treaty.[162]

[160] Nicholas R. Cropper et al., "A Modular-Incremental Approach to Improving Compliance Verification With the Biological Weapons Convention," *Health Security* 21, no. 5 (July 27, 2023): 421–27, https://doi.org/10.1089/hs.2023.0078.
[161] Ibid.
[162] "Implementation Support Unit," United Nations Office for Disarmament Affairs, accessed August 10, 2025, , https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/biological-weapons/implementation-support-unit.

Opening session of the Sixth Review Conference of the Biological Weapons Convention.[163]

Working Group on Strengthening the Convention

Frustrated by decades of under-reporting and under-funding, States Parties agreed at the 2022 Ninth Review Conference to create an open-ended Working Group mandated to develop specific and effective measures in seven areas, including compliance and verification, national implementation, scientific-technological review and international cooperation.[164] Meeting four times between March 2023 and December 2024, the group has explored options ranging from a publicly accessible database of peaceful-assistance projects to a possible Special Conference in 2025 that could revive legally-binding verification measures similar to those negotiated by the

[163] UN Geneva, *Secretary General visit to Geneva, image, Flickr, August 13, 2010,* https://www.flickr.com/photos/unisgeneva/4887635094/
[164] Matthew P. Shearer et al., "BWC Confidence-building Measures: Increasing BWC Assurance Through Transparency and Information Sharing," *Politics and the Life Sciences*, November 4, 2024, 1–23, https://doi.org/10.1017/pls.2024.9.

1994 Ad Hoc Group.[165] Whether the Working Group can translate discussion into enforceable rules is still to be tested, but for now it remains the most concrete attempt in twenty years to close the BWC's verification gap.

Regional Initiatives

Because the BWC has no global inspectorate, governments have written their own rule-books when it comes to biosafety and biosecurity. Below are examples on what this looks like in terms of policy and implementation.

Export Controls

Every shipment of freeze-dried anthrax spores, CRISPR kits or high-throughput fermenters now passes through a layered global filter long before it reaches a laboratory. In October 2024 China issued Decree No. 365/2024, adding 67 biological agents and related equipment to its Dual-Use Items Export Control List and obliging exporters to obtain an individual license from the Ministry of Commerce (MOFCOM) whenever the end-user is outside China.[166] The U.S. operates a parallel system under the Export Administration Regulations (EAR) and the **Select Agent Regulations** (42 CFR §73), which require an individual license and an end-use certificate for any of 67 human, animal or plant pathogens bound for foreign laboratories.[167] Both lists are harmonized through the **Australia Group** and the Wassenaar

[165] Ibid.
[166] "China's Export Control of Dual-Use Items and Anti-Sanctions | Professional Articles," AllBright Law Offices, accessed August 10, 2025, https://www.allbrightlaw.com/EN/10475/c5ca6770ad261d5d.aspx.
[167] "Part 73 — Select Agents and Toxins," Code of Federal Regulations, accessed August 10, 2025, https://www.ecfr.gov/current/title-42/chapter-I/subchapter-F/part-73.

Arrangement, so a single consignment now triggers simultaneous alerts in Beijing, Washington, Brussels and Canberra before it ever reaches a dock or runway.[168]

National Legislation

Article IV of the BWC simply orders each State Party to take "any necessary measures" to implement the Convention domestically. The practical translation is a library of statutes now catalogued by VERTIC, which counts more than 1,500 national laws, regulations and ministerial orders ranging from Australia's Biological Weapons Act 1976 to Nigeria's National Biosafety Regulations 2019.[169] Yet the same survey finds "persistent gaps in coverage and enforcement, especially in definitions of dual-use research and extradition for foreign offenders." The United States has tried to close some of these gaps with the Biological Weapons Policy Act of 2021, which mandates classified Country-Team Assessments for any life-science collaboration with designated "countries of concern" and obliges the intelligence community to declassify information bearing on BWC compliance.[170]

The Tianjin Biosecurity Guidelines

In July 2021, Chinese, Pakistani, British and U.S. scientists agreed on ten non-binding principles that cover ethics, risk assessment, data-sharing and public engagement for anyone handling dangerous pathogens. Because the text is voluntary, China and Pakistan have tabled the

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[168] "Multilateral Export Control Regimes," Bureau of Industry and Security, accessed August 10, 2025, https://www.bis.gov/guidance-frequently-asked-questions/multilateral-export-control-regimes.
[169] "Regulations of the People's Republic of China on Export Control of Dual-Use Biological Agents and Related Equipment and Technologies," Ministry of Ecology and Environment | The People's Republic of China, accessed August 10, 2025, https://english.mee.gov.cn/Resources/laws/regulations/Natural_Conservation_Biosafety/201708/t20170803_419100.shtml.
[170] K.P. Saalbach, "Chapter Three - Gain-of-function research," *Advances in Applied Microbiology* 120, (2022), 79-111, https://www.sciencedirect.com/science/article/abs/pii/S0065216422000193

Tianjin Biosecurity Guidelines at every BWC Review Conference since 2021 for global voluntary adoption, explicitly comparing them to the Hague Ethical Guidelines that helped professionalize chemistry after the OPCW was created.[171] The U.S. State Department welcomed the move as "an excellent first step to encouraging scientific institutions worldwide to incorporate biosecurity norms."[172]

Headquarters of the OPCW.[173]

[171] BWC, *The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists,* BWC, 2021, https://docs.un.org/en/BWC/MSP/2020/MX.2/WP.6
[172] Gigi Kwik Gronvall et al., "Final Report to PASCC Improving Security Through International Biosafety Norms," report (Naval Postgraduate School, July 2016), https://centerforhealthsecurity.org/sites/default/files/2023-01/finalreporttopascc071416.pdf.
[173] *HQ of OPCW in the Hague (Cropped)*, image, Wikimedia Commons, February 17, 2007, https://commons.wikimedia.org/wiki/File:HQ_of_OPCW_in_The_Hague_%28cropped%29.jpg.

Bans on Gain of Function Research

Gain-of-function work was already subject to the 2017 HHS P3CO Framework, but on 15 May 2025 President Trump issued Executive Order 14207, immediately halting all new federal funding for experiments that enhance the transmissibility or virulence of pathogens with pandemic potential and giving the Office of Science and Technology Policy 120 days to craft a "safer, more enforceable policy."[174] The order froze dozens of ongoing NIH and DoD projects one day before a long-planned 2024 oversight rule was due to take effect, forcing universities to mothball high-containment suites and renegotiate international collaborations. The House of Representatives has since voted to codify the moratorium by attaching a rider to the FY-2026 HHS appropriations bill that would bar federal agencies from funding any "gain-of-function research of concern" unless explicitly authorized by the Director of National Intelligence.[175]

[174] K.P. Saalbach, "Chapter Three - Gain-of-function research," *Advances in Applied Microbiology* 120, (2022), 79-111, https://www.sciencedirect.com/science/article/abs/pii/S0065216422000193
[175] Ibid.

Possible Solutions

At this point of the background guide, there has been some allusion to certain areas that require improvement regarding international law and governance around biological weapons. Nevertheless, in this section we include a series of possible directions and questions that might guide your search for solutions to this complex topic.

For one, how can DISEC and the BWC ensure compliance with international treaties? The need for a group of experts to oversee governments around the world is pretty clear. However, questions like how such a group would look, their powers, and funding remain to be answered. On the other hand, when discussing verification, it is also important to consider accountability. Delegates should think about the consequences for states and institutions that are found to be in violation of the treaties, or states that refuse to cooperate and comply with **verification protocols** discussed in committee.

Furthermore, the proposal to ban dual-use research comes with a major concern: it might significantly slow down innovation or even kill it. Research in the life sciences that could be classified as potentially dangerous might have immense potential to improve people's lives around the world. Balancing the tension between these two realities should be a major focus of discussion.

Overseen state efforts are a relatively easier task. After all, the international committee dedicates the majority of their disarmament efforts to ensuring that states comply with their responsibilities. Nonetheless, when it comes to state actors, everything starts to get complicated. Delegates should think of ways we could prevent state actors from acquiring and utilizing biological weapons. A good starting point could be to establish frameworks that allow for

effective moderation of the supply chain of materials and equipment that could be used for developing these kinds of weapons.

Finally, while we believe these three areas should be part of the committee's agenda, we encourage delegates to think and propose topics that they consider important to be handled by the committee.

States that Emphasize Proprietary Research

Countries like the United States, The United Kingdom, Russia, India, and Japan consistently resist legally-binding verification protocols, arguing that intrusive inspections would expose proprietary platforms and dual-use defense research critical to national security. The U.S. National Security Commission on Emerging Biotechnology (2024) frames oversight as a sovereignty issue: "oversight must remain domestic to avoid compromising strategic advantage."[176] U.S. Government policy explicitly instructs federal agencies to classify any life-science data "whose release could enable development of a biological weapon," and thus justifying non-disclosure to foreign inspectors.[177] Similar language appears in the UK's Biological Security Strategy (2018) and Russia's 2021 Federal Law on Biological Safety, both of which restrict external access to genomic data on national-security grounds. Although the Biden Administration briefly explored a reversible transparency offer at the 2022 BWC Review Conference, congressional opposition (echoing industry warnings that on-site audits could leak trade secrets) prevented any formal shift.[178]

On the other hand, China simultaneously promotes multilateral science diplomacy while tightly controlling site access. Its 2019 "Collection of Laws and Regulation on Biosafety" allows foreign cooperation yet explicitly exempts military-affiliated institutes from any

[176] "The Strategic Imperative of Biotechnology: Implications for U.S. National Security," CSIS, accessed August 10, 2025, https://www.csis.org/blogs/strategic-technologies-blog/strategic-imperative-biotechnology-implications-us-national.
[177] Kavita M. Berger and Phyllis A. Schneck, "National and Transnational Security Implications of Asymmetric Access to and Use of Biological Data," *Frontiers in Bioengineering and Biotechnology* 7 (February 25, 2019), https://doi.org/10.3389/fbioe.2019.00021.
[178] "The Strategic Imperative of Biotechnology: Implications for U.S. National Security," CSIS, accessed August 10, 2025, https://www.csis.org/blogs/strategic-technologies-blog/strategic-imperative-biotechnology-implications-us-national.

disclosure requirements under China's state-secrets law.[179] U.S. analysts counter that China's military-civilian fusion model means such exemptions swallow the rule: "dual-use research is routinely performed in nominally civilian labs that refuse international inspection," notes a 2021 CSIS study.[180] The resulting asymmetry — China sells open-data platforms while U.S. intelligence alleges hidden gain-of-function work — epitomizes the compliance gap the U.S. cites for rejecting binding verification.[181]

Countries within this bloc, thus, are more focused on maintaining proprietary knowledge and avoiding verification as a means of exposing their secrets and losing any strategic edge they may have.

Researchers with Biosafety Level 4 gear and laboratory equipment.[182]

[179] Yang Xue et al., "Towards Good Governance on Dual-Use Biotechnology for Global Sustainable Development," *Sustainability* 13, no. 24 (2021), 14056, https://www.mdpi.com/2071-1050/13/24/14056
[180] "The Strategic Imperative of Biotechnology: Implications for U.S. National Security," CSIS, accessed August 10, 2025, https://www.csis.org/blogs/strategic-technologies-blog/strategic-imperative-biotechnology-implications-us-national.
[181] Ibid.
[182] *BSL-4 Research Scientists at the NIAID Integrated Research Facility in Ft Detrick, Maryland Preparing Noninfectious Laboratory materials,* image, Wikimedia Commons, March 2, 2022, https://commons.wikimedia.org/wiki/File:BSL-4_research_scientists_at_the_NIAID_Integrated_Research_Facility_in_Ft_Detrick,_Maryland_preparing_noninfectious_laboratory_materials.jpg.

States that Promote Verification and Collaboration

Canada, Australia and the EU treat verification and scientific openness as mutually reinforcing. The EU's 2009 *Community Regime for the Control of Exports, Transfer, Brokering and Transit of Dual-Use Items* pairs strict export-licensing with secure on-site audits, explicitly designed to protect commercial IP while verifying peaceful end-use.[183] Australia's 2022 Biosecurity Amendment mirrors this approach, mandating confidential risk audits that are then shared with treaty partners under non-disclosure agreements.[184] Canada funds the Biological Security Working Group with ASEAN states to demonstrate that routine inspections need not leak proprietary data, arguing the opposite: transparency is a prerequisite for sustained North-South technology transfer.[185] Thus, countries in this block see collaboration as a means of not only maintaining the peace, but also sharing advancements in more beneficial realms of biotech research that go far beyond just bioweapons.

States Focused on Equitable Verification

Across Latin America, Africa and Southeast Asia, governments welcome joint international efforts but fear verification frameworks could mutate into technological gatekeeping. A 2021 survey of 41 African delegations to the BWC found 78% viewed "mandatory on-site inspections" as discriminatory absent technology-transfer guarantees.[186] Brazil's 2018 General Data Protection Law and similar statutes in South Africa explicitly

[183] Yang Xue et al., "Towards Good Governance on Dual-Use Biotechnology for Global Sustainable Development," *Sustainability* 13, no. 24 (2021), 14056, https://www.mdpi.com/2071-1050/13/24/14056
[184]Ibid.
[185]Ibid.
[186]Ibid.

classify genomic data as a strategic resource, warning that foreign inspectors could weaponize transparency to deny access to reagents or cloud bioinformatics.[187] Therefore, they advocate tiered verification - light-touch for low-capacity labs, stringent only for **BSL-4 laboratories**—to avoid replicating the inequities of the Nuclear Non-Proliferation regime.[188]

States Without Bioweapons Access

For micro-states and post-conflict nations, the priority is not sovereignty but survival. The 2016 UN Office at Geneva briefing paper "Acquisition and Use of Biological and Toxin Weapons: Addressing the Threat" notes that countries without a single **BSL-3 laboratory** rely entirely on external rapid-response funds and pre-positioned medical countermeasures to counter either deliberate release or accidental outbreaks.[189] The Pacific Islands Forum's 2022 Boe Declaration frames bioterrorism as an existential threat greater than sea-level rise, urging a dedicated global fund to finance both laboratory capacity and third-party verification they cannot perform themselves.[190] Thus, these states champion strong global norms (universal criminalization of bioterrorism and guaranteed international assistance) over any verification mechanism that presumes domestic capacity they do not yet possess.

[187] Kavita M. Berger and Phyllis A. Schneck, "National and Transnational Security Implications of Asymmetric Access to and Use of Biological Data," *Frontiers in Bioengineering and Biotechnology* 7 (February 25, 2019), https://doi.org/10.3389/fbioe.2019.00021.
[188] Yang Xue et al., "Towards Good Governance on Dual-Use Biotechnology for Global Sustainable Development," *Sustainability* 13, no. 24 (2021), 14056, https://www.mdpi.com/2071-1050/13/24/14056
[189] Ibid.
[190] Ibid.

Glossary

Anthrax (Bacillus anthracis) — A spore-forming bacterium that causes infectious disease through inhalation, ingestion, or skin contact, producing toxins leading to systemic collapse and death without immediate treatment.

Attribution — The technical process of identifying the source and responsible party for a biological attack, serving to inform response efforts, identify perpetrators, and deter future attacks.

Australia Group — An informal export control arrangement harmonizing biological agent and equipment export restrictions among member states to prevent proliferation.

Biological Weapons — Microbial or other biological agents, or toxins of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes, intended for use in war to cause disease in humans, animals or plants.

Biological Weapons Convention (BWC) — The 1972 Convention prohibiting the development, production, stockpiling of bacteriological (biological) and toxin weapons, entered into force in 1975 with 183 States Parties.

Biopreparat — The Soviet Union's nominally civilian pharmaceutical consortium that coordinated 52 pathogen research sites and 30,000+ personnel in violation of the BWC from 1974-1992.

Biosafety — Safe working practices associated with handling of biological materials, particularly infectious agents, to prevent accidental exposure or release.

Biosecurity — Protection, control and accountability for valuable biological materials to prevent unauthorized access, loss, theft, misuse, diversion or intentional release.

Bioterrorism — The intentional release of biological agents or toxins by non-state actors to harm or kill humans, animals or plants with intent to intimidate governments or civilian populations for political/social objectives.

BSL-3/BSL-4 Laboratories — Biosafety Level 3 and 4 facilities representing high and maximum containment laboratories for handling dangerous pathogens, with BSL-4 being the highest safety level.

Category A Agents — The highest priority biological threat agents capable of causing mass casualties and public panic, including anthrax, smallpox, plague, and botulinum toxin.

Confidence-Building Measures (CBMs) — Voluntary annual questionnaires submitted by BWC States Parties covering research centers, disease outbreaks, dual-use publications, national laws, and vaccine facilities to increase transparency.

Dual-use Research of Concern (DURC) — Life sciences research that can be reasonably anticipated to provide knowledge, information, products, or technologies that could be directly misapplied to pose a significant threat to public health, agriculture, environment, or national security.

Gain-of-Function Research (GOFR) — The process of altering biological organisms to enhance biological functions, such as genetic modifications to viruses that increase lethality, transmissibility, or host range.

Geneva Protocol (1925) — The Protocol prohibiting the use in war of asphyxiating, poisonous gases and bacteriological methods, but not their development, production, or stockpiling.

Implementation Support Unit (ISU) — The four-person administrative body supporting the BWC, responsible for organizing meetings, collecting CBMs, and maintaining cooperation databases with an annual budget of $2.1 million.

Select Agent Regulations — U.S. regulations (42 CFR §73) requiring individual licenses and end-use certificates for export of 67 specified human, animal, or plant pathogens to foreign laboratories.

Unit 731 — Imperial Japan's biological warfare facility (1936-1945) that conducted human experimentation on 10,000+ prisoners and deployed plague-infected fleas over Chinese cities.

UN Secretary-General's Mechanism (UNSGM) — A roster of experts available to investigate alleged biological weapons use, but not a standing investigative body, lacking sufficient resources for rapid response.

Verification Protocol — The failed 1991-2001 attempt to create legally-binding BWC inspection mechanisms, rejected by the U.S. over concerns about compromising biodefense and commercial secrets.

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