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Work of the Advisory Board on Disarmament Matters

Report of the Secretary-General

Summary

At the request of the Secretary-General, the Advisory Board on Disarmament Matters undertook a strategic foresight exercise, with the 2045 – the centenary of the United Nations – as its guiding horizon. The task was to assess the future of international peace and security in the light of advances in science and technology and to consider how the United Nations disarmament machinery could respond proactively. Key areas of consideration included the intersection of emerging technologies with existing weapons systems, associated risks and opportunities, governance challenges and the role of inclusive and effective multilateral engagement.

Informed by consultations with stakeholders, the Board emphasized that technological innovation, whether for civilian or military purposes, must comply with international law. Scientific and technological progress must be guided by the principles enshrined in the Charter of the United Nations, international humanitarian law and international human rights law. According to the Board, the United Nations should serve as a central platform for convening Member States, the private sector, academia and civil society to build trust, bridge digital divides and ensure that the disarmament machinery is equipped to address the impact of scientific and technological developments on international peace and security in general, and disarmament in particular.

The Board proposed guiding principles aimed at maximizing the benefits of technological advances, while managing risks.

Looking ahead to 2045, the Board calls for scientific and technological progress to serve humanity, with a view to advancing peace, sustainable development, human rights and global equity. Multilateral cooperation and compliance with international law must underpin the full life cycle of new technologies. The Board also affirmed

* A/80/150.

the importance of transparency, human control and agency and the need to avoid an arms race in emerging technologies.

In its capacity as the Board of Trustees of the United Nations Institute for Disarmament Research (UNIDIR), the Advisory Board reviewed the current programmes, activities and finances of UNIDIR, including efforts to reinforce policy impact, boost global engagement and bolster the Institute's finances against a backdrop of geopolitical volatility. The Board welcomed a marked expansion in the Institute's production of publications, events and digital tools in 2024, while noting the adoption by consensus of General Assembly resolution 79/73, in which the Assembly underlined the significant contribution of the Institute to innovative analysis and productive thinking on multilateral disarmament and international security issues. Trustees heard briefings on key activities across various UNIDIR programmes, including new partnerships for space security, the relevance of scientific and technological advances for disarmament, innovative data dashboards designed to help in managing exits from armed conflict and nuclear issues in the Middle East that could affect the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. The Board also endorsed plans for the programme of work and budget of UNIDIR for 2026, emphasized its continued support for an increase in the Institute's regular budget subvention, welcomed its strategic vision for the period 2025–2030 and underscored the importance of its continued autonomy in times of intensifying armed conflict around the world.

I. Introduction

1. The Advisory Board on Disarmament Matters held its eighty-third session in Geneva, from 19 to 21 February 2025, and its eighty-fourth session at United Nations Headquarters in New York, from 25 to 27 June. Shorna-Kay Richards (Jamaica) served as Chair of the Board for both sessions.

2. The present report is submitted pursuant to General Assembly resolution 38/183 O. The report of the Director of the United Nations Institute for Disarmament Research (UNIDIR) was approved by the Advisory Board, in its capacity as the Institute's Board of Trustees, and has been submitted in document A/80/254.

3. At the request of the Secretary-General, the Advisory Board conducted a strategic foresight exercise, taking 2045 – the year of the 100th anniversary of the United Nations – as a horizon. The Board sought to identify: (a) the most pressing international peace and security trends emanating from advancements in science and technology and their associated risks and opportunities; (b) the ways in which those scientific and technological advancements intersect with existing weapon systems; (c) mechanisms and tools to address governance gaps and challenges to ensure responsible and accountable technological progress; and (d) the role and added value of the United Nations disarmament machinery in effectively anticipating and proactively responding to those evolving dynamics. In its 2024 report (A/79/240), which serves as an interim report on the matter, the Board outlines its foresight methodology and summarizes its initial findings on how scientific and technological developments impact international peace and security.

4. Throughout the two-year programme of work, the Board heard briefings on advances in science and technology in the context of several existing disarmament, arms control and non-proliferation instruments and frameworks,[1] held ongoing United Nations discussions on artificial intelligence (AI),[2] and heard presentations by academics and civil society representatives on topics including international law and emerging technologies, the convergence of emerging technologies with existing weapon systems, quantum technologies and opportunities for disarmament and arms control monitoring and verification stemming from scientific and technological advances.[3]

[1] Briefings were given by: Jacek Bylica, Chief of Cabinet, International Atomic Energy Agency; Megan Slinkard, Chief, Software Applications Section, Comprehensive Nuclear-Test-Ban Treaty Organization; Daniel Feakes, Head, Biological Weapons Convention Implementation Support Unit; Manuel Martínez Miralles, Programme Management Officer, Office for Disarmament Affairs, secretariat of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects; and Fabian Rutherford, Policy Officer, Organisation for the Prohibition of Chemical Weapons.

[2] Discussions included a conversation with the Special Envoy of the Secretary-General for Digital and Emerging Technologies, Amandeep Singh Gill.

[3] Presentations were given by: Yi Zeng, Professor and Director at the Brain-inspired Cognitive AI Lab and the International Research Center for AI Ethics and Governance at the Institute of Automation at the Chinese Academy of Sciences; Raji Rajagopalan, Resident Senior Fellow of the Cyber, Technology and Security Program of the Australian Strategic Policy Institute; Cindy Vestergaard, Senior Fellow and Director of the Converging Technologies and Global Security Program of the Stimson Center; Dmitry Stefanovich, Research Fellow at the Center for International Security at the Primakov Institute of World Economy and International Relations of the Russian Academy of Sciences; Michal Krelina, research scientist at the Czech Technical University; Eleonore Pauwels, Senior Fellow with the Global Center on Cooperative Security; Nehal Bhuta, Professor and Chair of Public International Law at the University of Edinburgh and Commissioner on the Global Commission on Responsible Artificial Intelligence in the Military Domain; and Mary Ellen O'Connell, Robert and Marion Short Professor of Law and Professor of International Peace Studies at the Kroc Institute for International Peace Studies of the University of Notre Dame and Commissioner on the Global Commission on Responsible Artificial Intelligence in the Military Domain.

5. In a written statement to the Board at its eighty-fourth session, the Secretary-General underscored the imperative of harnessing technological and scientific innovation for the common good while mitigating associated risks. With collective resolve and bold action, he noted, the international community could ensure that emerging technologies serve as tools for peace and security, rather than as sources of division and instability. Speaking before the Board at its eighty-fourth session, the High Representative for Disarmament Affairs, Izumi Nakamitsu, expressed the hope that the Board would help to ensure that the disarmament machinery was fit to address evolving scientific and technological developments.

II. Substantive discussions

A. Context and background

6. Recognizing the complexity of the issue, the Advisory Board welcomed the two-year period to reflect on the implications of scientific and technological advances for peace, international security and disarmament.

7. The Board underscored that the world was facing profound and complex challenges to international peace and security. The global security environment continued to deteriorate at an alarming pace, with international law, the disarmament, arms control and non-proliferation architecture and, more generally, multilateral cooperation facing immense strain. Amid rising geopolitical tensions and increasing armed conflicts, the need for dialogue and trust in multilateral processes could not be greater.

8. The continued threat posed by weapons of mass destruction, whether nuclear, chemical or biological, is a pressing global concern. In addition, global military spending has reached an all-time high, while the proliferation and misuse of small arms and light weapons, the illicit arms trade and the humanitarian toll of conventional weapons continue to claim lives, fuel instability and hamper sustainable development in conflict and post-conflict settings.

9. The proliferation of so-called “vernacular” technologies, such as improvised weapons and off-the-shelf uncrewed systems armed with explosives, is adding new layers of complexity to the international peace and security landscape. Although advances in military technology could provide new operational capabilities, they could also contribute to the intensification and duration of hostilities, resulting in profound human suffering and obstructing pathways to sustaining peace. For example, the Board observed that certain technologies, such as commercially available ICT intrusion tools, AI used for military purposes and illicitly manufactured small arms, enabled by emerging technologies, were already causing widespread civilian harm.[4] Moreover, the boundaries between war and peace, and between State and non-State actors, were increasingly blurred, and non-State actors were demonstrating new capabilities sometimes on par with States. Meanwhile, the resort to the use of force and military action too often overshadowed and even prevented diplomacy and dialogue.

10. The Board observed that advancements in science and technology were expected to only accelerate in the coming years, not only bringing transformative potential, but also posing increasingly complex challenges and risks to international security. It expressed the belief that, without adequate governance frameworks, and

[4] The Board discussed various conflicts in this regard, including those in Afghanistan, Ukraine and Gaza.

practical measures to enforce them, the impact of new and emerging technologies could only exacerbate that fraught context.

11. As a guiding principle, the Board emphasized that scientific and technological advancements, whether for civilian or military applications, must not undermine international law. At all stages of the life cycle of emerging technologies, from development, to use, to obsolescence, compliance with applicable international legal frameworks, including the Charter of the United Nations, international humanitarian law and international human rights law, was paramount. The Board also stressed the need for effective multilateralism, with the United Nations serving as the global platform for inclusive engagement between Member States and the broader multi-stakeholder community on the international peace and security implications of new and emerging technologies, leveraging diverse expertise and know-how and covering the entire life cycle of emerging technologies.

12. On the eve of the eightieth anniversary of the United Nations, the Board emphasized that the commitment of all States to the vision on which the Organization was founded, a vision rooted in international law, diplomacy and multilateral engagement, must be continuously renewed and strengthened. The Board's work and the present report are part of that ongoing effort.

B. Peace and security trends emanating from advancements in science and technology

13. Throughout its two-year discussion cycle, the Board emphasized that the rapid pace of technological and scientific development was poised to further reshape the disarmament, arms control and non-proliferation landscape in both positive and negative ways. Taking 2045 as a horizon, the foresight exercise was designed to enable Board members to systematically explore relevant trends, drivers, opportunities and risks associated with advances in science and technology. The Board thus mapped current and potential future developments in science and technology of relevance to weapons and means or methods of warfare.[5] In the Board's assessment, these span, inter alia:

(a) Information and communications technology (ICT);

(b) Data science;

(c) AI;

(d) Quantum technologies;

(e) Autonomy;

(f) Biotechnology;

(g) Space and aerospace technologies;

(h) Materials technologies, such as the additive manufacturing of small arms, including the use of non-traditional materials.[6]

14. Following that mapping exercise, the Board identified numerous opportunities and risks, noting that many technologies were inherently dual-use, meaning that they could be used in different contexts and for both peaceful and military purposes.

[5] In this regard, the Board noted the 2024 report of the Secretary-General on current developments in science and technology and their potential impact on international security and disarmament efforts (A/79/224).

[6] These include polymers, the use of three-dimensional printing and modularity in weapon design.

Opportunities

15. The Board placed significant emphasis on analysing the transformative impacts that advancements in science and technology could bring to humanity. It underscored the accelerating role of innovation in achieving the 2030 Agenda for Sustainable Development, identifying key areas where technological progress could drive positive change. It highlighted that innovations could reduce poverty through improved infrastructure, boost agricultural productivity, expand access to healthcare and education, enhance the effectiveness of humanitarian and disaster relief operations and offer significant potential for addressing climate change. For example, advances in biotechnology, including genetic engineering and synthetic biology, could propel forward medical breakthroughs, while precision farming, enabled by AI-driven crop monitoring and drone-assisted irrigation, could increase yields and mitigate food insecurity.

16. In that connection, the Board reaffirmed that the core goal was to ensure that such advancements benefited all of humanity, rather than being unequally concentrated among a select few. Inclusive technological and scientific progress must prioritize equitable access and safeguard against exacerbating existing inequalities.

17. The Board also identified potential for leveraging emerging technologies for international peace and security. For example, it noted that innovations in satellite imaging and AI-driven disaster response models could enable the rapid assessment of crises, improving the efficiency of relief operations.

18. The Board also recognized the potential for emerging technologies to bolster disarmament, non-proliferation and arms control efforts, particularly through advanced surveillance, tracking and verification mechanisms. In this regard, it explored applications of technologies, particularly AI, and their potential to strengthen global security. For example, AI-driven analysis of satellite data could improve strategic assessments by detecting military activity and weapons deployments with a view to mitigating conflict escalation. The Board also considered how greater autonomy could enable more rapid threat detection, which could reduce collateral damage through more precise targeting. However, the Board acknowledged the importance of maintaining human control over the use of force, to ensure compliance with international law.

19. The Board considered that satellite imagery analysis supported by AI tools could improve monitoring of nuclear arsenals and ensure compliance with relevant treaties and agreements. In that connection, broad public access to satellite imagery, coupled with machine learning, could provide new opportunities for civil society groups to support transparency measures.

20. In addition, inventory-tracking systems integrating AI or secure transactions incorporating blockchain technology could enhance stockpile management, with a view to preventing diversion. Furthermore, the Board considered that quantum communication and secure data analytics could, for example, contribute to real-time and secure information-sharing between States, reducing misunderstandings and fostering trust.

21. Lastly, the Board envisioned the deployment of robotics and autonomous systems, not only in support of arms control regimes, but also in humanitarian operations, particularly in clearing landmines and unexploded ordnance in post-conflict zones. These innovations hold immense promise in making post-conflict environments safer, enabling displaced communities to return home and fostering long-term development.

Risks

22. At the same time, the Board stressed that technological and scientific advances necessitated governance, particularly with regard to their military applications.

23. As a key observation, the Board highlighted the risk of assuming that technological advancements provided a panacea for military challenges. It cautioned that such thinking might spark arms race dynamics and competition among States to gain technological superiority that could further fuel global tension and distrust. The Board warned that such dynamics might be exacerbated by sizeable private industry investments, haste in developing weapons applications or in using systems not adequately tested for reliability, safety or appropriateness for national military doctrines and an inclination towards downplaying the human costs of modern conflicts.

24. In that connection, the Board noted that emerging technologies and scientific developments could fundamentally reshape the nature of warfare. One significant concern is the intensification of armed conflicts, driven by advancements in AI and autonomy. For example, AI-powered surveillance systems and predictive analytics could enhance battlefield awareness, but they also risked accelerating decision-making cycles, potentially leading to inadvertent escalation. As automation and AI became more integrated into battlefield operations, military personnel might rely excessively on algorithmic outputs, leading to automation bias that could undermine critical thinking in high-stakes scenarios. In addition, autonomous weapon systems could lower the threshold for initiating conflict, as they might enable States to engage militarily without exposing their own personnel to danger, while complicating efforts to de-escalate and potentially weakening civilian oversight of military operations.

25. The Board further examined the potential rise of multi-domain operations, where state and non-State actors increasingly rely on offensive cybercapabilities, disinformation campaigns and autonomous systems. Generative AI, such as for the production of deepfakes, could be weaponized to manipulate public opinion or destabilize Governments.

26. The Board identified the development of fully autonomous weapons systems as a significant risk to international peace and security. Recalling the Secretary-General's position that machines that have the power and discretion to take human lives without human control are politically unacceptable, morally repugnant and should be banned by international law,[7] the Board stressed that, without meaningful human control, such weapons could undermine fundamental principles of international law and erode the principle of human responsibility and accountability in the use of force.

27. Members were alarmed at the notion of integrating AI into nuclear command, control and communications, which could lead to compressed time frames for decision-making, resulting in miscalculation and escalation during crises. Additional concerns centred on data poisoning and "black box" decision-making in AI systems, potentially undermining traditional notions of command and control within militaries.

28. The Board also acknowledged specific biotechnology-related risks, including the eventual creation of "mirror organisms".[8] Advances in this field raise concerns

[7] See https://press.un.org/en/2025/sgsm22643.doc.htm.

[8] In one article, an international working group of scientists raised concerns, based on an extensive analysis, that the eventual creation of "mirror bacteria" through progress made in synthetic biology could pose unprecedented global risks to all life on the planet. The 38 authors argued that mirror bacteria, or any other form of mirror life, should not be created and called for global discussion to address outstanding questions and inform effective governance (Katarzyna P. Adamala and others, "Confronting risks of mirror life: broad discussion is needed to chart a path forward", *Science*, vol. 386, No. 6728 (12 December 2024)).

about the potential development of novel biological agents, including convergence with chemical agents, as well as potentially catastrophic ecological consequences. These developments could present unprecedented, perhaps existential, risks. Moreover, progress in neuroscience could have far-reaching implications for international peace and security, including in relation to human augmentation that could enhance soldiers' capabilities.

29. In addition, the Board noted that technological advancements, such as additive manufacturing, are fuelling the widespread availability of (illicit) small arms and light weapons, exacerbating human rights violations and stunting development across regions. These weapons, often untraceable, exacerbate violence, particularly in regions plagued by organized crime and structural inequalities. A further concern is that, in addition to traditional smuggling routes, such weapons are increasingly circulated through online platforms like social media and messaging apps, supported by online payment mechanisms, exposing regulatory gaps.

30. The Board considered the potential high-risk applications of artificial general intelligence. Given the progression of artificial general intelligence development, the Board cautioned about its possible unintended consequences, especially in regions far from where the technology was created. In particular, it noted the potential capacity of artificial general intelligence to surpass human intelligence and to act autonomously. If misaligned with human values or poorly controlled, artificial general intelligence could make decisions that lead to large-scale harm, including disruption of critical infrastructure.

31. In the light of the rapid advances in quantum computing, the Board observed that it could have serious implications for security, including undermining current cryptographic systems that protected sensitive military and critical infrastructure communications.

32. Lastly, the Board considered that the misuse of technologies by terrorists and criminal actors presented another pressing security risk. AI-powered malicious cyberactivity, autonomous vehicle hijacking or biotechnological threats, such as synthetic pathogens, could create new forms of asymmetric and hybrid warfare.

Trends and drivers

33. In addition to analysing technological and scientific developments and their associated risks and opportunities, the Board took a comprehensive view of broader global trends shaping the intersection of scientific innovation and international security. These included:

(a) Growing dependence on digital technologies, data and automation;

(b) The evolving role of non-State actors (private companies and research institutions) and their increasingly complex interactions with States in technology development and governance;

(c) The accelerating convergence of emerging technologies with existing weapon systems and across multiple domains.

34. The Board recognized the profound influence of digital technologies and automation on modern conflict. For example, while greater data transparency could improve early warning systems and conflict prevention, it also introduced vulnerabilities, particularly in data exploitation and manipulation. A growing number of civilians becoming involved in conflict through digital means further complicated warfare and could blur the line between civilians and combatants and contribute to the further erosion of the principle of distinction. The Board also cautioned that automation in warfare raised ethical and legal concerns, including the risk of

dehumanizing conflict, fostering automation bias and impeding oversight and critical thinking. The Board noted that technological advancements could make conflicts easier to start and escalate, but harder to resolve.

35. Considering the growth and aggregation of data associated with new and emerging technologies, the Board also noted the increasing relevance of data protection. The extensive use of personal data could raise concerns surrounding data appropriation, colonization and privatization, all of which might lead to violations of fundamental human rights absent the appropriate safeguards. The Board observed the risk of bias that could occur in AI systems, including in data collection, algorithmic design or system implementation, leading to unequal or distorted outcomes, including those related to gender and race, and noted that preventing and addressing such bias should be a central priority.

36. The Board observed that non-governmental actors, including private companies and scientific institutions, played a significant role in the design, development and deployment of technologies that could have direct implications for international peace and security, including disarmament. The involvement of a diverse set of actors in the development and use of such technologies complicates accountability and posed governance challenges. In this connection, the Board expressed concern that developments in science and technology of relevance to security and disarmament were outpacing the capacity of normative and governance frameworks to manage the risks. Furthermore, the Board noted the risk of non-State actors, such as transnational criminal or terrorist networks using technological developments to enable or sustain, for example, arms trafficking or malicious cyberactivity.

37. The Board was also seized by the urgency of addressing the increasing convergence between technologies, as well as with existing weapon systems. In particular, the Board focused on several critical convergences:

(a) AI and autonomous weapon systems;

(b) AI, ICT and outer space applications;

(c) AI and the life sciences;

(d) AI and ICT integration with nuclear weapon systems.

38. As previously noted, the Board voiced serious concerns about the potential integration of AI into nuclear command, control and communications systems, emphasizing that, in such high-stakes environments, that could diminish human oversight, increase the risk of miscalculation and heighten the likelihood of unintended escalation. It stressed that, pending the total elimination of nuclear weapons, ensuring human involvement and control in nuclear decision-making remained essential. Furthermore, the proliferation of cybercapabilities raised concerns over the vulnerability of critical infrastructure. The Board noted that malicious cyberactivity targeting nuclear command systems, early warning networks or missile launch protocols could compromise decision-making during crises and would be extremely escalatory. The Board also emphasized the broader intersection of digital technologies, such as AI, ICT and quantum technologies, with conventional weapons systems. It observed that current discussions on those technological convergences remained fragmented and insufficient, lacking structured, inclusive and forward-looking engagement among stakeholders.

C. Identifying existing governance mechanisms and gaps

39. The Board emphasized that addressing the above-mentioned risks and harnessing the opportunities required a holistic approach to governance,

incorporating technological safeguards, multi-stakeholder engagement and proactive policy measures. Establishing clear guardrails for the application of the new and emerging technologies, particularly those with potential military relevance, was vital.

40. Recognizing the extensive research and initiatives on emerging technologies across various sectors and by a range of stakeholders, the Board focused on areas where the Secretary-General and the United Nations could offer the greatest added value, complementing and building upon ongoing efforts.

41. The Board noted that the United Nations already serves as a key platform for addressing the international peace and security implications of emerging technologies. Key processes include the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, the open-ended working group on the security of and in the use of information and communications technologies 2021–2025, and the open-ended working group on the prevention of an arms race in outer space in all its aspects.

42. The Board welcomed the decision of the Disarmament Commission to include the agenda item entitled "Recommendations on common understandings related to emerging technologies in the context of international security" in its 2024–2026 triennial cycle, which presents an important opportunity for Member States to address cross-cutting technological issues, including those not yet covered by existing United Nations processes. The Board also expressed its appreciation for the report of the Secretary-General on current developments in science and technology and their potential impact on international security and disarmament efforts (A/80/237).

43. The Board observed that, within the frameworks of several treaties and instruments, States were increasingly assessing the implications of scientific and technological developments on existing weapon systems. Notable examples include discussions within the Working Group on the Strengthening of the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction and the newly established open-ended technical expert group under the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects. The Board highlighted those as promising models and encouraged other frameworks to adopt similar approaches, thereby leveraging existing multilateral processes and structures to make them more responsive to fast-paced technological developments. It also emphasized the value of fostering sustained exchanges between existing initiatives to promote mutual learning and the sharing of good practices.

44. The Board noted that the Pact for the Future and its Global Digital Compact (General Assembly resolution 79/1 and annex I thereto), adopted in September 2024, presented a key opportunity to bridge digital divides and promote responsible innovation. It recognized the contributions of the High-level Advisory Body on Artificial Intelligence and its report, published in 2024 and entitled *Governing AI for Humanity*, which informed the Global Digital Compact and provides support for advancing international AI governance. The Board noted that the Global Digital Compact contained the outline of a road map for cooperation, including the multidisciplinary Independent International Scientific Panel on Artificial Intelligence within the United Nations and the launch of the Global Dialogue on Artificial Intelligence Governance involving Member States and diverse stakeholders.

45. The Board agreed that implementation of the Pact for the Future and the Global Digital Compact was an immediate priority, while noting that the consideration of military applications of AI remained relatively underdeveloped within the United Nations context. It therefore drew particular attention to the call set out in the Pact for continuing to assess the existing and potential risks associated with the military

applications of AI and the possible opportunities throughout their life cycle, in consultation with relevant stakeholders. In that regard, the Board welcomed General Assembly resolution 79/239, in which the Secretary-General was requested to submit a report on the implications of AI in the military domain for international peace and security. The Board deemed this a significant and timely first step towards promoting a much-needed multilateral approach to a rapidly evolving issue of global concern.

46. In addition, the Board signalled that structured, robust and comprehensive dialogue about the convergence of technologies, specifically digital tools like AI, ICT and quantum technologies, with existing weapon types, was lagging behind. Noting the uniquely destructive power of nuclear weapons, the Board flagged convergence of new technology with those weapons as a source of immediate concern.

47. The Board observed there was currently no intergovernmental process dedicated exclusively to addressing quantum technologies in the context of international security, possibly leaving a gap in global governance as quantum capabilities continued to evolve.

48. With 2045 in mind, and given the unpredictable and potentially existential risks of artificial general intelligence, the Board anticipated that multi-stakeholder discussions on the topic would become necessary to prevent unintended consequences. It saw scope for the United Nations to convene stakeholders, particularly from the scientific community and the private sector, to explore safeguards to ensure that artificial general intelligence was developed and used safely, ethically and in accordance with international law. That included designing mechanisms, such as “kill switches”, to prevent misuse or harmful behaviour. The goal was to proactively manage the risks of artificial general intelligence before it became a widespread reality.

49. The Board noted a pressing need for putting in place guardrails around fully autonomous weapons systems, recalling the Secretary-General’s position that machines with the power and discretion to take lives without human involvement should be prohibited by international law.

50. Lastly, the Board underscored that multilateral governance and dialogues should include engagement with all Member States and a broad range of stakeholders, leveraging diverse expertise and know-how and covering the entire life cycle of emerging technologies. This includes not only their development and deployment, but also their regulation and oversight. In that connection, they saw a role for the private sector, as well as researchers, scientists and civil society actors, to be involved in multilateral discussions.

51. The Board also emphasized the critical role of the private sector in leading corporate responsibility efforts, particularly through the adoption of codes of conduct and responsible policies aligned with principles of the common public good.

52. Board members also pointed to a need for greater knowledge among Member States, policymakers, civil society and the general public about quickly evolving technologies, particularly as they relate to AI, and about their potential impact on international security. According to the Board, generating knowledge required a better understanding of the categorization of risks and the fostering of informed public debate through education and engagement. It emphasized that strengthening public engagement, in particular, was crucial for navigating both the risks and the opportunities associated with the military applications of new technologies, as public support for ethical and transparent innovation was essential.

D. Pathways to action

53. As a final step in the its foresight exercise, the Board examined how the United Nations could play a central role in bringing together both Member States and other vital stakeholders, such as the private sector, academia and civil society, to strengthen dialogue, build trust, bridge digital divides and ensure that the disarmament machinery was equipped to address advancements in science and technology. To that end, the Board developed guiding principles aimed at balancing the innumerable benefits of technological progress with the potential risks to international peace and security.

Guiding principles

54. Looking ahead to 2045, the Board affirms that innovation should serve to benefit humanity, guided by evidence- and context-based scientific assessments of its opportunities, risks, capabilities and impacts on international peace and security. Scientific and technological progress should be harnessed to support global disarmament efforts and to create a more inclusive, equitable, peaceful, sustainable and prosperous world for all, rooted in the promotion of international peace, security, sustainable development and human rights.

55. Anchored in the purposes and principles of the Charter, Board members envision that scientific and technological progress should contribute to building and sustaining peace and reducing inequalities, including by addressing the drivers and root causes of armed conflict, violence and instability, strengthening societal resilience and maximizing opportunities while minimizing the risks.

56. To that end, compliance with international law must be guaranteed throughout the full life cycle of emerging technologies, from development to deployment, operational use and disposal or obsolescence. Board members reject “arms racing” in technologies and support cooperative and responsible approaches. Recognizing that many technologies are dual-use in nature and that their applications may evolve over time, States should promote transparency at every stage, with the aim of fostering trust, accountability and responsible innovation. As human-machine interaction continues to evolve, it is essential that human control, agency and responsibility remain central, including in the context of weapons systems and the use of force.

57. The United Nations plays a vital role in promoting dialogue, responsibility and accountability and provides a platform for effective multilateral solutions, particularly in the area of military applications of technologies.

Five pathways to action

58. From the above guiding principles, the Board derived five mutually reinforcing pathways for action with concrete recommendations, details of which are provided below. These recommendations complement informal efforts, such as network-building among scientists and private sector actors, with formal measures, such as structured multilateral discussions on the military applications of AI.

59. The Board also considered various other ideas and proposals, such as the establishment of a permanent United Nations body dedicated to monitoring scientific and technological developments relevant to international peace and security, but deemed that further discussions were needed for more definitive recommendations in the future.

Pathway I
Affirming the applicability of, and strengthening compliance with, international law

60. International law, including the Charter, international humanitarian law and international human rights law, applies fully to emerging technologies throughout

their life cycle, including their military applications, and should be complied with at all times. When gaps related to the governance of specific technologies or scientific developments are identified, new norms, rules and principles, including those of a legally binding nature, should be considered.

Recommendation 1. Member States should ensure that emerging technologies are developed, deployed, used and eventually disposed of with respect for and in compliance with international law, including obligations contained in the Charter, international humanitarian law and international human rights law.

Recommendation 2. Member States should conduct weapons reviews, including in accordance with article 36 of Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I). Furthermore, Member States are encouraged to share their policies, practices and lessons learned regarding weapons reviews of new and emerging technologies.

Recommendation 3. Member States should assess whether additional norms or international legal rules are needed to strengthen governance of specific technologies, with a view to the prevention of conflict and the preservation and promotion of international peace and security. Furthermore, Member States may also request the International Law Commission or other appropriate organs to undertake such an assessment.

Recommendation 4. Member States should undertake measures at the national level that address the malicious use of new and emerging technologies. In doing so, they may consider, where relevant and appropriate, the general-purpose criterion, whereby technologies are broadly defined by intended purpose.

Recommendation 5. When governance gaps related to specific technological or scientific developments are identified, Member States should develop mechanisms in response, which may include new best practices, norms or legally binding instruments or other agreements. In this connection, Member States could, for example, examine how a framework instrument could address the international peace and security implications of specific scientific developments and technologies.[9]

Pathway II
Assessing opportunities, risks and the impacts of new technologies

61. New and emerging technologies offer a myriad of opportunities and benefits that could positively contribute to disarmament objectives, such as monitoring, verification, tracing and export control.

Recommendation 6. Member States should promote and invest in the development of new technologies for disarmament, arms control and non-proliferation, including technologies that support confidence-building among States, enhance monitoring and verification processes and improve tracing mechanisms.

Recommendation 7. Member States should pursue common understandings on the categorization of risks of new and emerging technologies, which could inform further discussion and consideration by Member States of measures in response, such as regulation or prohibition or their development of relevant confidence-building measures.

[9] See, for example, the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects.

Pathway III
Strengthening and leveraging existing multilateral frameworks

62. Multilateral, regional and bilateral forums are essential to effectively examine the potential risks arising from new and emerging technologies, including their convergence with each other and their intersection with existing weapons systems. Moreover, the development of confidence-building measures through such frameworks, including in areas related to science and technology, plays a key role in mitigating risks, preventing misunderstandings, fostering trust, enhancing predictability and promoting international cooperation.[10]

Recommendation 8. Building on the report of the Secretary-General on AI in the military domain and its implications for international peace and security (A/80/78), Member States should engage in structured discussions, through the First Committee of the General Assembly, on international peace and security implications of AI in the military domain, with a view to addressing potential governance gaps.

Recommendations 9. Member States should, through the Disarmament Commission, develop guiding principles to address international peace and security challenges stemming from advances in science and technology, including those emanating from the convergence of such technologies.

Recommendation 10. The Secretary-General should facilitate regular meetings among Chairs of scientific advisory bodies of various disarmament bodies, to share good practices, lessons learned and anticipated developments and to explore synergies.

Pathway IV
Strengthening preparedness and resilience, including through capacity-building

63. Preparedness for the impacts of emerging technologies on international peace and security requires more than anticipation; it demands sustained investment in capabilities, knowledge and cooperation. As innovation accelerates, disparities in access to expertise and resources risk deepening global risks. At the same time, emerging technologies also represent powerful tools for advancing international peace and security, including disarmament objectives, and for addressing global inequality, including to close the digital divide. Building resilience in this context requires a renewed focus on inclusive capacity-building, particularly for developing States, underpinned by efforts that target systemic causes of disparity, so as to ensure that all States can both address risks and harness opportunities.

Recommendation 11. Member States should exchange information, knowledge and experience on the safe and secure use of emerging technologies, including on their benefits for disarmament, arms control and non-proliferation.

Recommendation 12. Member States should support capacity-building initiatives by, inter alia, offering training and resources, including through existing multilateral and regional frameworks. The Office for Disarmament Affairs should be engaged and resourced to support such activities. These initiatives should serve to enhance understanding of scientific and technological advancements across States, enable more inclusive and informed dialogues on their governance and promote cooperative and responsible approaches to global security challenges.

Recommendation 13. Drawing on examples of existing frameworks and instruments that have considered the impact of scientific and technological advances within their respective mandates, Member States should request and resource UNIDIR to create a

[10] Reference here is to confidence-building measures in ICT security and in outer space activities.

comprehensive and accessible database of good practices for the benefit of all Member States.

Pathway V
Promoting multi-stakeholder approaches and raising public awareness

64. The United Nations should serve as the global platform for inclusive engagement between Member States and the broader multi-stakeholder community, including international and regional organizations, civil society, industry, the scientific community and academia, on the peace and security implications of new and emerging technologies. This commitment to openness and inclusivity will promote trust and public engagement and provide access to specialist knowledge and expertise, enabling the United Nations disarmament machinery, with adequate staff and resources, to better serve the needs of Member States and to foster peace and security in an evolving landscape.

Recommendation 14. The Secretary-General of the United Nations should continue to exercise leadership in advancing the United Nations as a platform for fostering multi-stakeholder dialogue on the implications of military applications of new and emerging technologies on international peace and security. In addition, the Secretary-General is encouraged to consider convening a high-level summit on this topic, on the sidelines of the General Assembly, before 2030.

Recommendation 15. Member States should strengthen their engagement with and through international and regional organizations, academia, civil society and the private sector to foster active public participation and raise awareness about the international peace and security implications of new and emerging technologies.

Recommendation 16. Member States should encourage technology companies to join the United Nations Global Compact and uphold its 10 principles, which foster corporate social responsibility, and to take a leading role in advancing corporate responsibility efforts, particularly by adopting codes that address the risks associated with military applications of new and emerging technologies.

Recommendation 17. The Secretary-General should request that the Advisory Board revisit the issue of military applications of new and emerging technologies as part of a future programme of work.

III. Board of Trustees of the United Nations Institute for Disarmament Research

65. The Advisory Board, acting in its capacity as the Board of Trustees of UNIDIR, met twice in 2025 (18 February and 24 June) to review the Institute's operations, funding and programmes.

Achievements in 2024 and 2025: results and impact

66. During the first meeting of 2025, trustees welcomed the adoption by consensus of General Assembly resolution 79/73 on the activities and operations of UNIDIR, in which the Assembly underlined the significant contribution of the Institute to innovative analysis and productive thinking on multilateral disarmament and international security issues and its valuable contribution in the field of disarmament, non-proliferation education and capacity-building in all regions of the world and welcomed its efforts and progress to improve diversity of both international reach and meaningful participation.

67. Trustees recognized the success of UNIDIR in continuously bringing together government representatives, policy experts, academics and industry leaders through the 2024 Innovations Dialogue on quantum technologies, a major conference on harnessing arms flows data to improve conflict early warning systems and the Roundtable for AI, Security and Ethics. Trustees welcomed the Institute's workshop on international conventional arms control instruments, held in Benin, and noted the significant interest garnered by a timely and comprehensive assessment of global maritime security. Trustees also commended the Institute for having given two briefings to the Security Council in 2024, once at an Arria-formula meeting on ICT security and once at a formal meeting on scientific developments and international security.

68. Trustees acknowledged the comprehensive and continuous support provided by UNIDIR to General Assembly-mandated groups of governmental experts and open-ended working groups, review conferences and other multilateral and regional processes. Trustees welcomed the further expansion of the Institute's range of interactive digital confidence-building tools and recognized a year-on-year rise of 26 per cent in the number of events and 38 per cent in publication output.

69. Trustees heard briefings by senior UNIDIR staff on the Institute's innovative work on community-led arms control, the Biological Weapons Convention and victim assistance in humanitarian disarmament, with trustees noting the timeliness, relevance and potential of this research.

70. At the June meeting, trustees heard a briefing on the Director's visit to Japan for the eightieth anniversary of the atomic bombings of Hiroshima and Nagasaki; the 2025 Cyber Stability Conference and inaugural Geneva Cyber Week; the successful first edition of the Global Conference on AI, Security and Ethics; the graduation of a second cohort from the UNIDIR Women in AI Fellowship; and a tailored disarmament seminar for Sri Lankan diplomats, made possible by the regular budget subvention. Unfortunately, a proposed 20 per cent cut in that subvention, part of which goes towards the holding of three seminars in countries that are not members of the Organisation for Economic Co-operation and Development (OECD), has obliged the Institute to postpone another major event scheduled to be held in another non-OECD country. The Director also provided an update on the Institute's knowledge-exchange and research-based capacity-building activities around the world, particularly on cyberlaw and the Biological Weapons Convention. He then outlined activities planned for the commemoration of the forty-fifth anniversary of UNIDIR, including a panel discussion on security challenges over the next 45 years, a photo exhibition and a reception for stakeholders, interlocutors and members of the diplomatic community in Geneva.

71. Trustees noted the engaging and empowering activities created by UNIDIR for young people in 2025, including a debate, a video competition and a participatory photography project. Trustees welcomed the further expansion of the UNIDIR Global Disarmament Research Network through new subnetworks on space security and on international law and ICT security, underlining the particular importance of the Network as a means of engaging meaningfully with experts from the global South.

72. Trustees heard a briefing on the Secretary-General's UN80 Initiative, the task force for which has grouped UNIDIR with other research and training organizations. While trustees recognized the need for greater visibility for United Nations research and training, they also foresaw detrimental impacts from any merger into a single institution. Given the Institute's key role within the disarmament machinery and the sensitive nature of its thematic focus and activities, trustees reiterated the Institute's need for autonomy, echoing the emphasis placed by the General Assembly on the importance of the Institute as a stand-alone, autonomous institution that contributed

to progress in disarmament and a more secure world (resolution 79/73). The autonomy and agility afforded by close cooperation with the Office for Disarmament Affairs, under the guidance of the Advisory Board, is vital to the Institute's ability to respond to the evolving needs of partners, fulfil its unique mandate and help States to address intensifying global security issues.

73. Lastly, the Board heard briefings on partnerships for space security; trends in science and technology for disarmament; data dashboards that help in managing exits from armed conflict; and nuclear issues in the Middle East and their potential impacts on the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons.

Financial and human resources

74. The Director noted that demand for the Institute's work had continued on its recent growth trajectory. Donor revenue rose from $12.6 million in 2023 to an all-time high of $13.9 million in 2024, with contributions from a record 46 donors. Despite significant resource mobilization efforts, donor numbers from some regions remained low in 2024. That was also the third consecutive year in which all five permanent members of the Security Council funded the Institute. The partial reversal of the suspension by the United States of America of all funding in early 2025 means that the Institute expects to enjoy support from all five States for a fourth consecutive year. The net loss of $1.3 million remained significant, however, leading to the abolishment of three positions, adjustments to three others and reduced capacity for important work on the Biological Weapons Convention. That loss has been offset by multi-year memorandum of understandings with the European Union and the United Kingdom of Great Britain and Northern Ireland, although the overall revenue outlook for 2025 and 2026 is showing a downward trend. By midyear in 2025, UNIDIR had received contributions worth $7.8 million from 21 donors, as compared with $9.9 million from 28 donors in 2024.

75. Increased activity saw expenditures rise from $10 million in 2023 to $13.4 million in 2024. While programme delivery has intensified, institutional functions have consciously been kept lean. The Board welcomed an associated reduction in institutional expenses from 20 per cent of spending in 2020 to an all-time low of 10 per cent in 2024. UNIDIR continued to face a doubling of rental costs from July 2025. According to the United Nations Office at Geneva, the current level of rent was unsustainable because it failed to take into account changes in inflation, exchange rates and commercial rates for office space since the calculation was originally carried out (on the basis of 2019 data). Maintaining the current level of rent would therefore require a reduction in workstations, which were already shared at a ratio of 2:1 in order to lower costs. The suitability of that strategy, and of increased telecommuting, would be analysed as the UN80 Initiative process unfolded.

76. Through an assessment of the financial needs of UNIDIR, performed in January 2025 by the Office for Disarmament Affairs on behalf of the Secretary-General pursuant to resolution 79/73, it was confirmed that a further subvention increase of $1.3 million was needed to support five additional positions within the Institute's "irreducible core":

(a) One position of Deputy Director, for fundraising, quality control, coordination and substantive oversight at the institute level. This position would support the Director in managing cross-programmatic coordination across an ever-wider range of institutional research themes and activities, to identify new and emerging institutional focus areas and to navigate complex thematic interlinkages;

(b) Three positions of Head of Programme, for assured research leadership and expertise in core areas of arms control and disarmament: weapons of mass destruction; conventional arms and ammunition; and security and technology. These permanent UNIDIR functions will always be in demand, and losses in these critical research areas would directly compromise the Institute's ability to serve the international community and deliver on its statutory mandate;

(c) One position of Head of Communications and Partnerships, for reinforcement of the Institute's work on outreach, partnerships and resource mobilization. An increasingly challenging global funding environment makes impactful dissemination of research findings and knowledge vital to the sustainability of the Institute.

77. Trustees unanimously supported the assessment in February 2025, agreeing at the June meeting to keep their endorsement on the record, given the growing demand for the Institute's work in the current challenging global security environment. The proposed increase from $0.7 million to $2.1 million would reinforce the Institute's sustainability by buttressing its finances amid growing volatility. In early 2026, with budgets in preparation for 2027, every effort should be made to present the increased budget for review by the Advisory Committee on Administrative and Budgetary Questions and approval by Fifth Committee during the December 2026 session. According to that timeline, the earliest possible receipt of the increased subvention would be 1 January 2027.

78. The Director noted that, currently, only two of the 78 institutional positions at UNIDIR were covered by the regular budget (Director and Executive Officer), which would likely not be covered from 2026 onward, owing to reforms under the UN80 Initiative. The credibility and impact of the Institute's work depended on its ability to attract and retain diverse, high-quality expertise. That ability had been somewhat weakened by austerity measures that were likely to endure into 2026, including keeping positions vacant and pausing upgrades or salary increases.

79. Trustees welcomed the recent announcement by the Government of Switzerland of multiple funding streams worth over SwF 300 million and its endorsement of UNIDIR as a strategic partner worthy of increased support as part of a cluster of Geneva-based United Nations agencies focused on research and innovation. Recognizing the vital importance of the global diversity of the Institute's staff, whose 78 members represented 42 different countries, trustees encouraged the Institute's efforts to request regulatory adjustments from Swiss authorities (on spousal employment and access to social security contributions for non-European Union personnel on individual contractor agreements), so as to attract a wider international representation of UNIDIR experts. As noted in February, UNIDIR relocated the position of Head of Security and Technology Programme to New York in January 2025, to improve access to key processes and forums, with the incumbent also assuming elements of the vacant New York Liaison Officer role to save costs.

Strategic directions for 2025 to 2030

80. Trustees welcomed the Director's presentation of the Institute's vision for its strategy for 2025 to 2030, through which the consolidated programmes and projects would continue to deliver on the Institute's mandate. Its work will also be presented to relevant audiences as a simplified set of three interconnected areas of excellence, provisionally designated as "people and security", "weapons and disarmament" and "science and technology". The core, substantive work of the Institute will be enabled by specific strategies for management, communications, funding and partnerships.

Programme of work and budget for 2026

81. Trustees heard a briefing by the Director on the continuous delivery of high-quality research from its core research programmes: security and technology; conventional arms and ammunition; space security; weapons of mass destruction; and gender and disarmament. The project on managing exits from armed conflicts and the second (and possibly third) phase of the project on a Middle East zone free of weapons of mass destruction will continue in 2026. That annual programme of work will form part of the Institute's strategic directions for 2025 to 2030.

82. Trustees noted that UNIDIR had begun its annual budgeting process for 2026, leading ultimately to granular cost plans. The Institute will again work on the basis of two budgets: a conservative baseline budget, set at $11.5 million, and an optimal delivery budget, set at $16.5 million. Updated budget figures will be presented at the meeting in January 2026.

83. During the June 2025 session, the Board of Trustees considered and adopted the proposed programme of work and budget estimates of UNIDIR for 2026 (A/80/254), taking into account the Advisory Committee's recommendations on the draft of the report of the Director to the General Assembly.

IV. Future work and other matters

84. The Board of Trustees proposed possible future topics for focus by the Advisory Board, including the following:

(a) Opportunities to strengthen the three pillars of the Non-Proliferation Treaty;

(b) Opportunities to strengthen existing arms control and non-proliferation treaties and frameworks;

(c) Exploring the evolving role of non-State actors in disarmament and non-proliferation, including key challenges and implications;

(d) Assessing challenges and opportunities for promoting compliance with disarmament, arms control and non-proliferation commitments;

(e) Revitalizing the United Nations disarmament agenda and machinery: priorities for 2026 to 2031.

Annex

Members of the Advisory Board on Disarmament Matters, 2025

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