The Australia Group and the prevention of the re-emergence of chemical and biological weapons – Ongoing challenges

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SOMMAIRE

Preface

The European Union Non-Proliferation and Disarmament Consortium held its 11th Consultative Meeting in Brussels on 15 and 16 September 2022. Its central theme was the "Topicality of multilateral export control regimes". On the second day, one of the four breakout sessions addressed the Australia Group, an informal arrangement coordinating technology transfer controls relating to dual-use agents and equipment with potential relevance for developing and producing chemical and biological weapons.

Introducers were Ms Esmée de Bruin (Netherlands), Dr Mónica Chinchilla (Spain) and Ms Élisande Nexon, PharmD (France). I had the honour of moderating the session.

The three speakers have different backgrounds, thus giving the session a distinct multidisciplinary flavour. Ms de Bruin, focusing on the effectiveness of export control regimes in general, approached the Australia Group from economic and international law angles. Dr Chinchilla, an expert in international law, saw in the practice of the Australia Group the emergence of soft law complementing the Chemical Weapons Convention (CWC), a near-universal global disarmament treaty. Ms Nexon, a Doctor of Pharmacy with expertise in biosecurity and biosafety and arms control and disarmament, addressed challenges to the Biological and Toxin Weapons Convention (BTWC) posed by the rapid advances in life sciences and biotechnology industries and how the Australia Group can help mitigating possible security risks. Their introductions engaged the approximately twenty session participants in rich discussions.

The present publication is the direct result of this breakout session. The different angles to the analysis of the Australia Group with reference to the BTWC and the CWC revealed interesting viewpoints about how an informal arrangement relates to formal and quasi-universal treaties comprehensively banning two discrete weapon categories. Other export control arrangements are either standalone initiatives (*e.g.* the Missile Technology Control Regime or the Wassenaar Arrangement) or, in the case of the Nuclear Suppliers Group, linked to a non-proliferation rather than disarmament treaty. One of the central questions that came to the fore was whether to try and achieve greater integration and coordination among the four export control arrangements. If so, how might this intent affect the Australia Group that had adjusted its mission to support both global disarmament treaties? The BTWC and the CWC each have an article on international cooperation, development and scientific and technology exchanges for peaceful purposes. During the 1990s and 2000s, many developing countries came to view the Australia Group's activities as incompatible with the disarmament objectives.

The chapters in this publication are not the presentations made in September 2022. Instead, the authors reviewed their introductions in light of the discussions. They addressed how the Australia Group blends with the broader practice of responsible trade in dual-use commodities to prevent weapon proliferation while supporting the core disarmament goals of the BTWC and the CWC. The question relates to regime development, which in turn implies how the

Australia Group can address challenges to its internal decision-making, future objectives and the ambition of global standard-setting concerning the adaptability of both conventions to emerging issues, on the one hand, and the work and experiences of the other export control arrangements given convergences in security matters, on the other hand.

An introductory chapter sets the stage for this discussion by describing the origin of the Australia Group, how its practices evolved, and how with the end of the Cold War the recasting of weapon control problems in terms of proliferation affected the CWC during the negotiation end game and its early implementation.

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Table of Abbreviations

AG	Australia Group
BTWC	Biological and Toxin Weapons Convention
BW	Biological weapons
CBRN	Chemical, biological, radiological and nuclear
CBW	Chemical and biological weapons
CoE	Centre(s) of Excellence
CW	Chemical weapons
CWC	Chemical Weapons Convention
EC	European Community
EPC	European Political Cooperation
EU	European Union
FATF	Financial Action Task Force
GPC	General Purpose Criterion
IBI	Ishan Barbouti International
MTCR	Missile Technology Control Regime
NAM	Non-Aligned Movement
NIEO	New International Economic Order
NPT	Non-Proliferation Treaty
NSG	Nuclear Suppliers Group
OCDE	Organisation for Economic Cooperation and Development
OP	Operative paragraphs
OPCW	Organisation for the Prohibition of Chemical Weapons
UNSC	UN Security Council

On the early relationship between the Australia Group and the Chemical Weapons Convention

Jean Pascal Zanders

The Australia Group (AG) is an informal consultative body that aims to limit the transfer of chemical warfare agents and their precursors, biological agents, and equipment used to produce chemical and biological weapons (CBW). Participating states exchange intelligence, agree on control lists with dual-use technologies, and coordinate export control measures. They also accept to apply collective decisions through their national export control systems.

The arrangement originated in the confirmed use of chemical weapons (CW) during the 1980-88 Iran-Iraq war. However, in the final year of negotiating the Chemical Weapons Convention (CWC), the AG became highly controversial as many developing countries saw it as a significant obstacle to implementing Article XI on international cooperation and economic development. Export controls initially advanced as temporary non-proliferation measures pending conclusion of the CWC acquired greater permanency. Changes in global security after the end of the Cold War led to a paradigm shift from arms control and disarmament to non-proliferation as Western states came to view so-called rogue states and later terrorists with an interest in non- conventional weaponry as the primary threats. However, with the growing focus on state-level implementation of the CWC and later also the Biological and Toxin Weapons Convention (BTWC), the AG became increasingly accepted as an instrument supporting the objectives of both disarmament treaties. Its guidelines and CBW-relevant control lists set now widely accepted standards for controlling dual-use technology transfers.

This chapter traces the AG's origins during the first Gulf War and how the arrangement matured through the international crisis brought on by Western involvement in constructing a CW production facility in Libya. It next discusses the end of the Cold War and the shift from disarmament to non-proliferation as the CWC negotiations entered their end phase and AG participants were increasingly pressed to justify the plurilateral export control arrangement in the context of future disarmament obligations. After the CWC opened for signature in January 1993, the Preparatory Commission (PrepCom) of the Organisation for the Prohibition of Chemical Weapons (OPCW) deadlocked on the practical implementation of the CWC. Nevertheless, state parties agreed on some early measures following the entry into force of the treaty, allowing the gradual emergence of cooperation and economic development actions supported by all state parties. A similar pattern arose in the BTWC context in the 2000s.

1. The emergence of coordinated CBW export controls

The export control approach originated in the United States early in 1984. A steady stream of reports, eventually confirmed by a UN investigative team in March, pointed to the systematic CW use in the Iran-Iraq war.[1] The US took the lead in a two-pronged initiative. First, the Reagan administration submitted five chemicals to export control and started consultations with its allies to establish a plurilateral non-proliferation mechanism.[2] This initiative led to the creation of the Australia Group by an informal group of Organisation for Economic Cooperation and Development (OECDE) members in 1985. The fifteen original participants were the European Community (EC) members (Germany, France, Greece, Italy, the Netherlands, Belgium, Luxembourg, Denmark, Ireland, and the United Kingdom) and Australia, Canada, Japan, New Zealand, and the United States. Before the decade's end, the two new EC members, Portugal and Spain, as well as Norway and Switzerland joined. The AG also gradually expanded the list of chemicals, moved into the area of biological weapons, and began to occupy itself with technologies needed for CBW development and production. Second, Vice-President George H. W. Bush submitted a draft CW disarmament treaty based on stringent verification procedures in April 1984 to revitalise the flagging negotiations at the UN Conference on Disarmament in Geneva.[3] The document laid the foundations for the CWC.

The Communist countries began moving in the same direction. In March 1985, Mikhail Gorbachev became General Secretary of the Communist Party of the Soviet Union. He and US President Ronald Reagan met for a three-day summit in Geneva in November. The final declaration on 21 November recorded their agreement on concluding "*an effective and verifiable international convention*" and "*to initiate a dialogue on preventing the proliferation of chemical weapons*".[4] The phrasing was weaker than the idea of drafting an international accord on CW non-proliferation that Gorbachev had mooted in an address to French parliamentarians in Paris on 3 October,[5] reflecting US resistance to it.

The Geneva summit and subsequent interactions also helped align the two superpowers' longer-term objectives. On 23 January 1986, the Soviet Union adopted a decree governing the export of dual-use chemicals for peaceful purposes. Under it, the Soviet Union required guarantees from importing countries that they would not use those chemicals for CW development and production. Moreover, the decree also required the Soviet Trade Association's authorisation for re-exportation. Other members of the Council of Mutual

[1] UN Security Council, "Note by the Secretary-General, Report of the Specialists Appointed by the Secretary-general to Investigate Allegations by the Islamic Republic of Iran Concerning the Use of Chemical Weapons", Document S/16433, 26 March 1984.

[2] Elisa Harris, "Stemming the Spread of Chemical Weapons", *Brookings Review*, vol. 8, n° 1, 1990, p. 43.

[3] "United States of America: Draft Convention on the Prohibition of Chemical Weapons", Conference on Disarmament, Document CD/500, 18 April 1984.

[4] UN General Assembly, "Letter dated 16 December 1985 from the Permanent Representatives of the United States of America and the Union of Soviet Socialist Republics to the United Nations addressed to the Secretary-General", Document A/40/1070, 17 December 1985, p. 4.

[5] Perry Robinson, Julian Perry, "Chemical and Biological Warfare Developments: 1985*", SIPRI Chemical & Biological Warfare Studies No. 6*, Oxford University Press, Oxford, 1986, p. 51.

Economic Assistance (Comecon) followed suit. In 1987, they started coordinating their export controls in the Leipzig Group.[6]

Still, in a speech several months after the Geneva summit, Gorbachev revisited the idea of a CW non-proliferation treaty similar to the 1968 Nuclear Non-Proliferation Treaty (NPT), proposing it as an interim measure until the elimination of all CW under the future CWC. This time, the US rejected the suggestion explicitly, arguing that the best tool for preventing proliferation is the global abolishment of CW. US officials feared that while a non-proliferation treaty would raise the economic costs for a state seeking such weaponry, it would not be an insurmountable barrier to CW acquisition or to a domestic development and production programme. Given the experience with the NPT, there was a real risk that developing countries would oppose such a proposal. In their view, a new non-proliferation treaty might lead to another discriminatory regime dividing the world into haves and have-nots.[7]

The cautious rapprochement between the Soviet Union and the US on the future CWC translated into a joint position issued by Gorbachev and Reagan at the Moscow summit meeting on 1 June 1988. Noting the initial efforts to control the export of chemicals used in manufacturing CW, they "*called on all nations with the capability of producing such chemicals to institute stringent export controls to inhibit the proliferation of chemical weapons*".[8] The intensifying diplomatic interaction on CW between Moscow and Washington would yield the Wyoming Agreement that paved the way for joint verification and CW elimination.[9]

While both superpowers were interested in controlling CW, neither moved for altruistic reasons. In the mid-1980s, the US was on the verge of commencing production of binary CW. In contrast, Gorbachev, realising the Soviet Union's dire economic condition, wanted to avoid a new armaments competition while developing and implementing economic reform.[10] Notwithstanding, the central point is that during the late 1980s, neither superpower viewed CW non- proliferation as a standalone initiative. Export controls, whether or not coordinated with other states, were a national concern. Their overarching objective was the achievement of comprehensive and global disarmament *via* the future CWC.

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[6] Thomas Bernauer, *The Projected Chemical Weapons Convention: A Guide to the Negotiations in the Conference on Disarmament,* UNIDIR and United Nations, New York, 1990, p. 46.

[7] Elisa Harris, *op. cit.*, p. 44.

[8] Conference on Disarmament, "Letter Dated 25 July 1988 from the Representative of the United States of America Addressed to the President of the Conference on Disarmament Transmitting the Text of A Document Entitled 'Joint Statement Between the United States and the Union of Soviet Socialist Republics Issued Following Meetings in Moscow, USSR - 29 May to 1 June 1988'", Document CD/846 (Reissued), 29 July 1988, p. 8.

[9] "Memorandum of Understanding Between the Government of the Union of Soviet Socialist Republics and the Government of the United States of America Regarding A Bilateral Verification Experiment and Data Exchange Related to Prohibition of Chemical Weapons", signed at Jackson Hole, Wyoming, 23 September 1989. Available from The Trench: https://www.the-trench.org/wp-content/uploads/2021/03/19890923-Wyoming-agreement.pdf

[10] Roy Allison, "Gorbachev's Arms-Control Offensive: Unilateral, Bilateral and Multilateral Initiatives", *in* Carl G. Jacobsen (ed.), *Soviet Foreign Policy: New Dynamics, New Themes,* Macmillan, Basingstoke, 1989, pp. 79-80.

2. The Rabta crisis and the strengthening of AG procedures

From 1984 on, AG participants started adopting export control regulations. These, however, varied considerably in the range of dual-use chemicals covered and modalities. In many instances, they appended lists and requirements to existing legislation on arms exports without specifying provisions criminalising or penalising violations. This approach left significant gaps; more specifically, concrete enforcement required dedicated national legislation. Moreover, some states displayed lax attitudes towards the urgency and diligence needed for effective implementation.

A crisis brewing since the early 1980s became public in 1988.[11] It blew up on 2 January 1989. In an opinion piece for the *New York Times*, William Safire severely criticised German Chancellor Helmut Kohl and Foreign Minister Hans-Dietrich Genscher for ignoring German companies sending experts and exporting technologies for a CW production plant at Rabta, Libya. Fearing that chemical-tipped ballistic missiles might gas Israelis, he purposefully called the site "*Auschwitz-in-the-sand*".[12] West Germany had already acquired sizeable notoriety for the large-scale involvement of its industry in Iraq's CW programmes.

After Western governments began enacting export control measures in response to the UN's determination of CW use in the Iran-Iraq war, proliferators set up complex international networks to circumvent them and conceal the true nature of their transactions. On the one hand, supplying companies subcontracted other firms for specific project parts, thereby hiding their real intent from the business partners. They also set up false companies abroad as shipping addresses to deceive customs. On the other hand, the proliferator placed its orders with companies in different countries to limit the number of people knowing the ultimate purpose.

Reconstruction of the network that Libya had set up for building its factory at Rabta showed that it sought expertise and technology from firms worldwide.[13] At the centre of the web sat the exiled Iraqi businessman Ishan Barbouti. He owned companies in several countries with the same name, Ishan Barbouti International (IBI). The London Branch was but a letterbox; the one in Frankfurt took the orders, and IBI Zürich made the payments. He set up the web's frame and spokes and subsequently spun, where necessary, the filaments interlinking the various contracted companies. Barbouti infused capital into local companies to arrange the shipments.[14] According to court judgements in Belgium and Germany, Barbouti began to set up his purchasing network in May or June 1984.[15]

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[11] For instance, Michael R. Gordon, "US Fears Japan Aids Libya on Chemical Arms", *New York Times*, Section 1, 15, 18 September 1988.
[12] William Safire, "The German Problem", *New York Times*, Section 1, 23, 2 January 1989.

[13] For more details on the Imhausen-Rabta case: Joachim Badelt, "After the Imhausen/Rabta Case", *in* Jean Pascal Zanders, Eric Remacle (eds.), *Chemical Weapons Proliferation. Policy Issues Pending an International Treaty,* Proceedings of the 2nd Annual Conference on Chemical Warfare, Brussels, Centrum voor Polemologie, Vrije Universiteit Brussel, 1991; Jean Pascal Zanders, *Chemical Weapons Proliferation: Mechanisms Behind the Imhausen/Rabta Affair (*Vredesonderzoek, n° 4), Brussels, Interfacultair Overlegorgaan voor Vredesonderzoek, Vrije Universiteit Brussel, 1990; Jean Pascal Zanders, "Belgium as a Transiting Country in the Imhausen-Rabta Affair", *in* Jean Pascal Zanders, Eric Remacle (eds.), *op. cit*.

[14] Rechtbank van Eerste Aanleg, Gerechtelijk Arrondissement Antwerpen, 28e bis kamer, rechtdoende in correctionele zaken, "Vonnis nr. 2192", F14, 8 May 1992.

[15] Landgericht Mannheim, 23, Große Strafkammer (Wirtschaftsstrafkammer 3), "Urteil in der Strafsache gegen Jürgen Hippenstiel-Imhausen", 27 June 1990, p. 9.

A sketch suffices to illustrate the global web's intricacy. The Japanese Steel Works (Nihon Seijo) supplied lathes and air guns for an equipment factory and Toshiba an electrical power station in the belief the Libyans were constructing a desalination plant. VEB Stahlbau Plauen in the German Democratic Republic furnished steel constructions. A computer was obtained from the Florida-based Harris Company. Thyssen and Karl Kolb, two West German firms at the time already being investigated for their part in Iraq's CW programme, also participated.

However, Imhausen Chemie played a pivotal role in installing the production system. It placed important orders with other firms that, in some cases, were apparently unaware of the final destination. Salzgitter Industriebau GmbH, a state-owned enterprise, initially denied having drawn up the plans for Rabta but admitted to having delivered pipes and electrical equipment for a pharmaceutical production unit between 1984 and 1987. Imhausen had ordered the equipment for a subsidiary in Hong Kong. Later it emerged both companies had held several meetings discussing the construction work in Libya as early as December 1984.[16] Teves GmbH, a subsidiary of the American multinational ITT, which had supplied cooling equipment, also claimed Hong Kong was the final destination. So did many other firms involved.

Imhausen had set up parallel projects in Hong Kong and Rabta, both called Pharma 150. The German company actually built a factory on the Yeun Long Industrial Estate in Hong Kong, although it only served as a cover end destination for other activities. It shipped the materials to Rabta via Zeebrugge, Antwerp, La Spezia and Marseille.[17] Especially in Belgium, weak transit regulations meant that Imhausen and its associates could easily defeat German customs by involving Antwerp-based shippers.

Striking in the Imhausen-Rabta case was that most of the transactions were not illegal initially. For instance, according to an official account released early in 1989, the German government already received reports in 1980 that German companies might be implicated in constructing a CW facility at Rabta. Five years later, the West German ambassador to the Soviet Union named Imhausen Chemie and other firms in a confidential report.[18] Later, during the court proceedings against Imhausen Chemie GmbH in Germany and the shipping firm Crosslink NV in Belgium, it emerged that the German and Belgian intelligence services, together with an American colleague at the US embassy in Brussels, were already shadowing the shipments in February 1985. Despite their awareness of the CW proliferation activities early in the dealings, they could not intervene because neither company was violating then-existing national laws.[19]

The Imhausen-Rabta case highlighted many problems with CW export controls in the late 1980s. Private companies supplied individual components, technology, and expertise rather than chemical munitions or complete production and filling plants. Government enforcement of export legislation came second to maximising industry profits through foreign sales. Even so, the quality of then-existing export control legislation was wanting. Officials also

[16] Landgericht Mannheim, 27 June 1990, p. 21.

[17] *Ibid.*, p. 28.

[18] Steven Dickman, "West Germany cracks down on exports of weapons gas", *Nature,* n° 337, 23 February 1989, p. 678.

[19] Unterrichtung durch die Bundesregierung, "*Bericht der Bundesregierung an den Deutschen Bundestag über eine mögliche Beteiligung deutscher Firmen an einer C-Waffen-Produktion in Libyen*", 15 February 1989, pp. 5-6; Hof van Beroep zetelende te Antwerpen, 21e kamer, rechtdoende in correctionele zaken, "Vonnis nr. 519", 26 April 1994, pp. 32-33.

underappreciated the role of transit countries and the quality or the lack of specific regulatory provisions for CW-related technology transfers in such countries.

While the Imhausen-Rabta case began unfolding, the AG added a ninth precursor chemical to its core control list in 1988. It also itemised more than twenty potential CW precursors in a warning list. Their submission to licencing requirements, however, was uneven. For example, just after the Rabta scandal broke, the UK required export licences for the nine compounds in the core list. Three other precursors required licences only for certain countries, including Iran, Iraq, Libya and Syria. In the US, only five core-list chemicals were subjected to authorisation; seventeen other precursors needed a licence for certain countries only. West Germany had just expanded its licencing requirements to include all nine core-list chemicals, and the chemical industry had agreed to register exports of items in the warning list voluntarily. Germany was also planning to require licences for the first time for proliferation-sensitive regions like the Middle East. France had licence requirements for seven compounds in the core list and planned to add the remaining two.[20]

The EC also became involved in controlling the trade in chemicals with dual-use potential.[21] It is worth remembering that when the AG saw the light, it had ten members and expanded to twelve by the decade's end. The single European market abolishing internal customs controls between members would not come into being until 1993. Afterwards, enforcement of export controls would happen at the external EC borders or the site preparing a shipment. In other words, Imhausen had to clear the commodities to transfer them to Belgium, where the transhipment took place. Belgium then still had the end-user option "Open sea" to allow for rerouting as a consequence of changes of destination or customer. Furthermore, the EC had no competencies concerning arms exports, which many members considered to belong to their national sovereignty. Entry into force of the CWC (April 1997) with its own export control regime lay a decade into the future, so its inclusion in a shared European foreign and security policy was still far off.

The 1984 UN report on CW use in the Iran-Iraq war gave the pretext for consideration of export controls on dual-use chemicals. The then ten foreign ministers examined a first proposal by the Commission, which they rejected because some countries denied the EC competency in the matter. Nevertheless, they moved the issue to the European Political Cooperation (EPC), a body concerned with harmonising foreign affairs policies among the EC members. The EPC could thus assess topics not covered by the founding Treaty of Rome. The EC members thus reached a political compromise not to export five core chemical precursors with commercial use to Iran or Iraq. They agreed to impose national export regulations, in most instances an export licencing system.

The Rabta crisis shook up things. After Safire's scathing opinion piece, German Foreign Minister Genscher requested on 31 January Commission Chairman Jacques Delors and the President of the Council of Ministers to revive the 1984 Commission proposal. Within two weeks, on 14 February, the now twelve EC foreign ministers approved a draft regulation prepared by the Commission. On the 20th, the Council of European Ministers adopted the text

[20] Steven Dickman, *op. cit.*, p. 678.

[21] The section on early export control steps by the European Community is summarised from Bernard Adam, "European Community Policy Initiatives for the Prevention of Chemical Weapons Proliferation", *in* Jean Pascal Zanders, Eric Remacle (eds.), *op. cit.*, pp. 106-107.

and published it in the Official Journal two days later.[22] The annex listed eight chemical products, whereas the AG core list already held nine potential CW precursors.

This document represented a watershed moment for several reasons. First, upon publication in the Official Journal, the regulation became binding and directly applicable to all EC members (Article 3). It signified the first harmonisation among multiple states of export control law concerning chemicals with potential use in warfare agent production. Second, the measure was no longer limited to Iran and Iraq but applied whenever reason exists to suspect that the compounds might be used for CW development or production or delivered directly or indirectly to belligerent countries or areas of serious international tension (Article 2). Finally, the regulation laid down a mandatory refusal of export authorisation if any of the above conditions applied.

Did the EC regulation strengthen the AG? Probably, yes. It set a longer-term vision for harmonisation and closer cooperation among AG participants. As Bernard Adam observed, the decision reflected then-existing AG views. However, some EC members still maintained that the AG was better placed to address CW-related export regulations, especially in the absence of a convention delegitimising CW. Furthermore, individual members were still responsible for effectively implementing their respective regulations. Significant differences remained, for example, in the number of chemicals in the AG's core and warning lists that a country would submit to export control regulations.

For the broader group of AG participants, it would appear that the EC regulation exerted positive pressure on so-called minimalist countries to improve the quality and execution of their export control regulations. In contrast, some other countries viewed the AG as an alibi to avoid stricter commitments or integration represented by the EC regulation.[23]

3. The AG facing the CWC

As the Rabta case was unfolding, the Cold War ended. Mass protests in East European countries during the late autumn of 1989 led to the lifting of the Iron Curtain. The Soviet Union dissolved in 1991, and the fifteen constituent republics became independent states. Meanwhile, a mere two years after the cease-fire with Iran, Iraq occupied neighbouring Kuwait in August 1990. While tensions were building up during the spring, the country's leader Saddam Hussein made barely veiled CW threats against Israel. Although a US-led coalition evicted Iraq from the emirate merely seven months after the invasion, the events had significant implications.

With Iraq, the "weapon state" seeking non-conventional arms and undermining the post-Cold War international security order became the principal focus of international security. Internal instability, economic collapse and weak security at military installations in Russia and other former Soviet republics also raised the spectre of theft or unauthorised diversion of CBW and

[22] "Council Regulation (EEC) No 428/89 of 20 February 1989 concerning the export of certain chemical products", *Official Journal of the European Communities*, 22 February 1989, L 50/ 1 - L 50/2.

[23] Bernard Adam, *op. cit.*, p. 111.

nuclear weapons and their delivery systems to the Middle East and other areas of instability. Possible migration by former Soviet weapon scientists, engineers and technicians, who had lost their special social status and without income, to well-paying regimes also fed proliferation fears. The recasting of security threats from the armament competition between the US and the USSR to the spread of weapon technologies signified a paradigmatic shift from arms control and disarmament to non-proliferation. Put differently, the focus of weapon control policies moved from weapon technologies to the possessor of such technologies. During the ensuing years, "weapon states" were to become "rogue" or "outlaw" states, and non-proliferation was supplemented with counter-proliferation and other active measures, including enhanced export controls, technology denials, and sanctions in retaliation for undesired behaviour.[24] This transition was well underway when the CWC negotiations entered the final stage. It also influenced how participants reframed the AG's purpose, which was the sole CW-related export control arrangement of the 1980s to survive the end of the Cold War.

CWC Article XI did not begin to acquire its final structure until August 1991, just over one year before the finalisation of the negotiations.[25] The exchanges between the Western European and Others Group members and those of the Non-Aligned Movement (NAM) were fierce. From the NAM's perspective, the superpower armaments competition depleted the resources of all nations. Rapid technological developments exacerbated the discrimination against lesser powers by making them defenceless against the latest generations of weaponry. In the 1970s, the UN General Assembly sought to modify the global economy in such a way that developing countries might gain fairer access to the markets in the North and more equitable benefits from international trade in raw materials and manufactured goods through the New International Economic Order (NIEO) and the Charter of Economic Rights and Duties of States.[26] The NIEO stated as one of its principles that developing countries would benefit from (a) access to the achievements of modern science and technology, (b) promotion of the transfer of technology, and (c) the creation of indigenous technology.[27]

The CWC echoes these aspirations in its penultimate preambular paragraph by expressing the common desire "*to promote free trade in chemicals as well as international cooperation and exchange of scientific and technical information in the field of chemical activities for purposes not prohibited under this Convention in order to enhance the economic and technological development of all States Parties*".[28] Article XI's direct antecedents are NPT Articles IV and V and BTWC Article X, but its second paragraph comprises five subparagraphs, including three seemingly aiming to constrain the AG:

- "*Not maintain among themselves any restrictions, including those in any international agreements, incompatible with the obligations undertaken under this Convention, which would restrict or impede trade and the development and promotion of scientific and technological knowledge in the field of chemistry for*

[24] David Mutimer, *The Weapons State,* Lynne Rienner, Boulder (CO), 2000, pp. 92-93.

[25] For a detailed discussion of the negotiation of CWC Article XI, see Jean Pascal Zanders, "Chemical Weapons Convention (CWC) Article XI and the future of the CWC", *in* Oliver Meier (ed.), *Technology Transfers and Non-Proliferation: Between Control and Cooperation,* London, Routledge, 2014, pp. 176-203.

[26] UN General Assembly, "Resolution 3202(S-6)", 1 May 1974; UN General Assembly, "Resolution 3281 (XXIX)", 12 December 1974; and UN General Assembly, "Resolution 3362(S-VII)", 16 September 1975.

[27] UN General Assembly, "Resolution 3201 (S-6)", 1 May 1974.

[28] CWC, Preamble, www.opcw.org/chemical-weapons-convention/

industrial, agricultural, research, medical, pharmaceutical or other peaceful purposes;

- ➥ *Not use this Convention as grounds for applying any measures other than those provided for, or permitted, under this Convention nor use any other international agreement for pursuing an objective inconsistent with this Convention;*
- ➥ *Undertake to review their existing national regulations in the field of trade in chemicals in order to render them consistent with the object and purpose of this Convention*".[29]

When concluding the CWC negotiations on 3 September 1992, Ambassador Adolf Ritter von Wagner, Chairman of the Ad Hoc Committee on Chemical Weapons, viewed Article XI as embodying an evolutionary concept for economic and technological development that, in conjunction with the equally evolving confidence-building regime of verification in the chemical industry, would open the door to expanded international trade and economic cooperation in the chemical sector. To resolve the tension between the disarmament treaty objectives and the AG, negotiators had adopted a flexible and dynamic approach encouraging the progressive removal of existing trade restrictions in parallel with the implementation of chemical industry verification.[30] Earlier members of the AG had formally committed themselves "*to review, in the light of the implementation of the convention, the measures that they take to prevent the spread of chemical substances and equipment for purposes contrary to the objectives of the convention, with the aim of removing such measures for the benefit of States parties to the convention acting in full compliance with their obligations under the convention. They intend thus to contribute actively to an increase in commercial and technological exchanges between States and to the universal and full implementation of the convention on the prohibition of chemical weapons*".[31]

Wagner's statement strongly suggested that the removal of export control restrictions would not coincide with the entry into force of the CWC but rather take place gradually as state party confidence grew in the OPCW's industry verification. It left open how much confidence would satisfy the AG partners and at what treaty implementation stage they would commence or complete the removal of trade restrictions. Furthermore, the AG assurance, which helped to break the deadlock in the final weeks of negotiations, hinted that such a removal would not be a blanket move: it would be undertaken, case by case, for parties "*acting in full compliance with their obligations under the convention*". It did not specify who was to judge compliance.

4. The institutionalisation of the AG and growing cooperation

The AG controversy was part of a much wider debate on the place of export controls in the post-Cold War security context. Plurilateral weapon-related export control coordination was

[29] CWC, Article XI - Economic and Technological Development.

[30] Adolf R. von Wagner, "The Draft Chemical Weapons Convention", Statement to the Conference on Disarmament, 3 September 1992, text as reproduced in *Chemical Weapons Convention Bulletin*, n° 17, September 1992.

[31] Remarks by Paul O'Sullivan, Representative of Australia, 629th Plenary Meeting of the Conference on Disarmament, Document CD /1164, 7 August 1992.

then a highly concentrated activity, with a mere 33 states participating in one or more of the six principal mechanisms in 1994.[32]

Even as AG participants reviewed their national export control legislation concerning toxic chemicals and CW-relevant equipment, it was rapidly becoming clear that the arrangement would not be abolished. This development contributed to a complete blockage of preparations for implementing Article XI in the OPCW PrepCom established by the Paris Resolution adopted after the convention's opening for signature in January 1993.[33] Efforts at the end of 1994 to develop practical measures to move the Article XI agenda item forward eventually stalled too one year later. The deep divisions meant that after June 1996, the PrepCom Expert Group on Technical Cooperation and Assistance could no longer issue meaningful official reports on its activities.[34] After the CWC entered into force in April 1997, the First Conference of the States Parties adopted an initial package of international cooperation and assistance measures essentially drawn from non-controversial proposals developed during the PrepCom phase. Its approval in May 1997 was facilitated by the failure of some key protagonists in the Article XI debate, notably Cuba, Iran and Pakistan, to ratify the CWC in time to become original state parties. It set a formal, if an initially modest process in motion.

In the early 1990s, parties to the BTWC also began exploring the feasibility of verifying the BTWC. They mandated an Ad Hoc Group to negotiate a legally binding protocol after the 1996 Review Conference. However, the AG came to overshadow any discourse on development and technology transfers. Geneva positions obviously influenced the OPCW debates through decision-making in capitals and *vice versa*. In hindsight, perhaps one of the more significant benefits of the collapse of the Ad Hoc Group negotiations in 2001 was the disruption of the continuous debate on the AG. The new process of annual expert meetings in between review conferences required states to focus on other BTWC-specific implementation issues. When addressing development, assistance and technology transfers in dedicated sessions, individual countries expressed their concrete needs and explored bilateral, interregional or multilateral cooperation opportunities. The recognition of the specificity of the needs and the willingness of AG participants to meet such requests diluted the impact of the NAM political statements.

A similar cooperative atmosphere also grew gradually in the CWC context. While sharing the overall concern about free trade and non-discrimination, most NAM members did not necessarily subscribe to the hard-line positions. Several of them had close economic relations or historical ties with industrialised countries. Consequently, they held more nuanced views on the nature of international cooperation under Article XI and the connection or possible contribution of national export control measures to the CWC. They had voiced similar types of more specific desires at PrepCom meetings. Thus, cooperation that would enable a developing country to fully implement the CWC and participate in the various functions of the OPCW (*e.g.* having nationals qualified as inspectors, developing advanced national laboratory capacity,

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[32] Ian Anthony, Susanna Eckstein, Jean Pascal Zanders, "Multilateral Military-Related Export Control Measures", *in SIPRI Yearbook 1997: Armaments, Disarmaments and International Security,* Oxford University Press, Oxford, 1997, p. 597.

[33] For a more detailed overview, see Jean Pascal Zanders, 2014, *op. cit*.

[34] Ian R Kenyon, Sergey Kisselev, "Cooperation in Peaceful Uses: Article XI", *in* Ian R. Kenyon, Daniel Feakes (eds.), *The Creation of the Organisation for the Prohibition of Chemical Weapons,* T. M. C. Asser Press, The Hague, 2007, p. 255.

acquiring the tools and skills for national implementation, etc.) would enhance both the overall effectiveness of the treaty and confidence in compliance by individual state parties. In turn, it significantly boosted the types of cooperation under Article XI.

Conclusion

The world has changed significantly since the 1980s. Many developing countries have evolved into economic and industrial powerhouses, becoming autonomous centres of advanced chemical production and biotechnology exports. South-South trade and technology transfers complement the erstwhile virtually exclusive North-South transactions. Appreciating their international responsibilities as exporters, some of the new industrial states have joined the AG. Others have adopted corresponding technology transfer control lists, making the informal body less the focus of international controversy.

The OPCW has moved from its initial hesitant projects to an array of programmes, some of which reach into areas adjacent to the convention's core goals. It has also identified stakeholders other than states to cooperate in several activities. Although the BTWC lacks an equivalent setup to the OPCW, state parties managed to develop similar cooperative frameworks to fulfil the expectations under Article X. Due to current opportunities and partnerships, they feel more comfortable with the interconnected pursuit of preventing future armament and development. Maintaining the balance between both tracks is critical to preserving the long-term relevancy of the BTWC and CWC for the global community.

The Australia Group: dilemmas, challenges, and opportunities

Esmée de Bruin

Introduction

Unregulated trade in biological, chemical, and related dual-use items and technologies could contribute to human suffering and security threats. In 1984, a UN investigative mission confirmed Iraqi use of mustard agent and the neurotoxicant tabun.[35] Later UN missions and reports by humanitarian organisations documented Iraq's expanding chemical warfare against Iranian forces and Kurdish insurgents.

After the first UN report, several states wanted to regulate the trade in chemical warfare agents and their precursors. Realising that export controls would be more effective if exporting countries acted according to the same principles, from 1985 onwards, they started meeting in what came to be known as the Australia Group (AG). As an informal group of countries with similar security interests, the AG began developing harmonised export regulations to prevent the proliferation of chemical weapons (CW). A few years later, they added the non-proliferation of biological weapons (BW) to the AG goals.[36] The AG complements the Chemical Weapons Convention (CWC), the work undertaken by the Organisation for the Prohibition of Chemical Weapons (OPCW) and the Biological and Toxin Weapons Convention (BTWC). AG participants view the arrangement as a means to fulfil their obligations under the treaties. Whereas both disarmament treaties draw on the so-called General Purpose Criterion (GPC) to define their respective scope, the AG works with detailed Common Control Lists. These itemise chemical and biological agents, chemical precursors and dual-use technologies with possible applications in the research, development, production and use of chemical and biological weapons (CBW).[37]

At the time of writing, the AG has existed for 37 years. Therefore, assessing whether the arrangement is still suitable for preventing CBW proliferation is important. The AG is facing multiple structural dilemmas. The arrangement is informal, so participating countries make non-binding decisions.[38] Yet, this informal nature can allow swift responses to scientific and technological developments and changes in the security landscape. In addition, the AG is facing some new challenges caused by (geo)political developments and changes in the fields of life

[35] UNSC S/16433 (1984), "Report of the Specialists appointed by the Secretary-general to investigate allegations by the Islamic Republic of Iran concerning the use of chemical weapons", 26 March 1984.
[36] "The Origins of the Australia Group", The Australia Group (official website).

[37] Seema Gahlaut, *op. cit.*, p. 10.

[38] Michael D. Beck, Seema Gahlaut, *op. cit.*, pp. 1-23.

sciences, biotechnology, chemistry and their industrial and commercial applications. Is the current AG structure still equipped to deal with these developments?[39]

This paper analyses the AG's challenges and opportunities. First, it describes the AG, its characteristics, and its relationship with the CWC and the BTWC. Next, it elaborates on the AG's structural dilemmas and current issues in CBW non-proliferation. The paper then discusses the opportunities to strengthen the AG before offering some conclusions.

1. The Australia Group

The AG aims to reduce risks that may contribute to CBW proliferation.[40] It does this through participants' common decisions, which, although non-binding, guide adjustments to national legislation and regulations. The AG Common Control Lists and Guidelines address the legitimate transfer of biological materials and chemicals, relevant equipment and dual-use technologies, as well as related intangible technologies. The BTWC and the CWC prohibit developing, producing, stockpiling and using CBW. Both formal treaties have almost universal adherence, 185 and 193 state parties, respectively. The AG supports those treaties' disarmament objectives. More specifically, it contributes to the efforts to prevent future armament or rearmament with those weapons.[41]

This section defines CBW and explains the arrangement's relationship with the CWC and the BTWC. Next, it describes the AG's characteristics and briefly discusses the contents of the AG Common Control Lists and the AG Guidelines.

1.1. Chemical and biological weapons

The BTWC and CWC define biological and chemical weapons. A BW can be "*naturally or artificially created or altered microbial and other biological agents and toxins, as well as their components, regardless of their origin and method of production and whether they affect humans, animals or plants, of types and in quantities*"[42] unless intended to be used to prevent disease, in a protective way, or for "*other peaceful purposes*".[43] The "*weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict*" are also seen as BW.[44] Further, it was noted from the third Review Conference

[39] Michael D. Beck, Scott A. Jones, "The Once and Future Multilateral Export Control Regimes: Innovate or Die", *Strategic Trade Review*, vol. 5, n° 8, 2019, p. 55.
[40] The Australia Group, "The Australia Group: An Introduction" (official website).

[41] Seema Gahlaut, "Multilateral Export Control Regimes: Operations, Successes, Failures and the Challenges Ahead", *in* Daniel H. Joyner (ed.), *Non-Proliferation Export Controls: Origins, Challenges, and Proposals for Strengthening*, Routledge, New York, 2006, p. 10.

[42] "Final document of the 8th Review Conference: 8th Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 7-25 November 2016", 25 November 2016.
[43] BTWC Art. I (1).

[44] BTWC Art. I (2).

onwards that "*experimentation involving open-air release of pathogens or toxins*" without a justification as described in the treaty would violate Article 1.[45]

The CWC defines CW as, together or separately, "*toxic chemicals and their precursors*", "*munitions and devices*" intended to release such toxic chemicals, and "*any equipment specifically designed for the use directly in connection with the employment of munitions and devices*".[46] It further specifies that toxic chemicals are those chemicals that can kill people or animals (not plants) or otherwise harm them, such as temporary incapacitation or other permanent consequences.[47] Even though the CWC does not list them, literature often categorises CW according to their physiological effects, for instance irritants, central nervous system-acting agents, choking agents, blood agents, nerve agents, and blister agents.[48]

The GPC defines the scope of application in both conventions. It focuses on the intended use instead of the chemical or biological agent type. The BTWC and the CWC list the non-prohibited purposes: "*prophylactic, protective or other peaceful purposes*".[49] All other uses amount to a violation of the treaties. Consequently, they do not maintain lists of agents and other technologies to define CBW because these may limit the scope of application. As a result, all scientific and technological development and all types of actors fall under the scope of the treaties.

Nevertheless, the CWC includes an Annex on Chemicals containing the three schedules listing certain toxic chemicals and precursors.[50] However, those schedules support the reporting obligations of state parties and verification procedures.[51] The Verification Annex, Parts VI, VII, and VIII specify restrictions and reporting requirements for transferring scheduled chemicals to other state and non-state parties. Also included are types of information a state party must obtain from the recipient of scheduled chemicals to ensure that the recipient does not use those chemicals in violation of the CWC.

The AG reduces the CBW proliferation risk by regulating the trade in products and technologies that could be misused for CBW. Often, items and technologies that pose a proliferation risk also have peaceful applications, meaning their export cannot be restricted entirely. The AG acknowledges the threats of these so-called dual-use items but does not restrain their normal flow.[52] Instead, it encourages responsible trade in CBW-relevant dual-use items and technologies in line with the two treaties. For example, several toxic chemicals and precursors have almost no other than a CW. They are listed in Schedule 1 of the Annex on Chemicals.[53]

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[45] "Final document of the 3rd Review Conference: 3rd Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 9-27 November 1991", 27 November 1991.

[46] CWC Art. II (1).

[47] CWC Art. II (2).

[48] "What is a Chemical Weapon?", OPCW.

[49] BTWC Art. I and CWC Art. II (9).

[50] CWC Annex on chemicals.

[51] CWC Art. VI and Verification Annex.

[52] Michael D. Beck, Seema Gahlaut, "Introduction to Nonproliferation Export Controls", *in* Michael D. Beck, Richard T. Cupitt, Seema Gahlaut, Scott A. Jones (eds.), *To Supply Or To Deny: Comparing Nonproliferation Export Controls in Five Key Countries,* Kluwer Law International, Alphen aan den Rijn, 2003, p. 10.

[53] CWC Annex on Chemicals, Schedule 1.

Their production and trade are severely restricted and only allowed for the purposes in Part VI of the Verification Annex.[54]

1.2. Relationship with the BTWC and CWC

The BTWC and CWC enjoy almost universal coverage. As of July 2023, 185 states are parties to the BTWC.[55] The CWC numbers 193 parties, representing 98 percent of the world population. Only Egypt, North Korea and South Sudan did not sign the CWC, while Israel has signed but not yet ratified it.[56]

Whereas the BTWC and CWC are open to any state, the AG has select participation. Countries taking part in the AG have established national regulations supporting both treaties' objectives. The AG Common Control Lists give precision to the types of agents and technologies covered under the GPC in the BTWC. It is also broader than the items in the CWC schedules because these support specific tasks specified in the CWC.

In general, the AG is an export control arrangement that upholds the BTWC and CWC goals of preserving the life sciences and chemistry exclusively for the benefit of humankind and avoiding assisting anyone under any circumstances in any activity prohibited under either convention.

1.3. Characteristics

The AG shares several characteristics with other export control arrangements, such as the Nuclear Suppliers Group (NSG), the Missile Technology Control Regime (MTCR), and the Wassenaar Arrangement.[57] First, it is an informal arrangement between a group of countries. This group strives to apply the same national export control principles to the international trade in commodities that might contribute to the development and production of CBW. The Guidelines and the Common Control Lists reflect the participants' decisions at AG meetings. However, those decisions are informal.[58] Participants execute them individually through national legislation and regulations, thus making them binding on natural and legal persons operating on their territory. The European Union (EU) has incorporated and regularly updates the AG decisions in its export control regulation,[59] which is self-executing for all EU members

[54] CWC Verification Annex, Part VI.

[55] "Status of the BTWC", UN Office for Disarmament Affairs.

[56] "OPCW by the Numbers", OPCW.

[57] Michael D. Beck, Seema Gahlaut, *op. cit.*, p. 6; Seema Gahlaut, *op. cit.*, pp. 11-15. The other export control regimes have a different non-proliferation focus. The Nuclear Suppliers Group is aimed at the non-proliferation of nuclear weapons, the Wassenaar Arrangement is aimed at the non-proliferation and the responsible trade in conventional weapons, and the Missile Technology Control Regime focuses on the non-proliferation of long-range delivery systems and delivery systems for non-conventional weapons.

[58] Michael D. Beck, Seema Gahlaut, *op. cit.*, p. 5.

[59] "Regulation (EU) 2021/821 of the European Parliament and of the Council of 20 May 2021 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items (recast)", *Official Journal of the European Union*, L206, 11 June 2021.

and thus applies across the EU territory. National (and EU) measures often exceed the AG recommendations.[60]

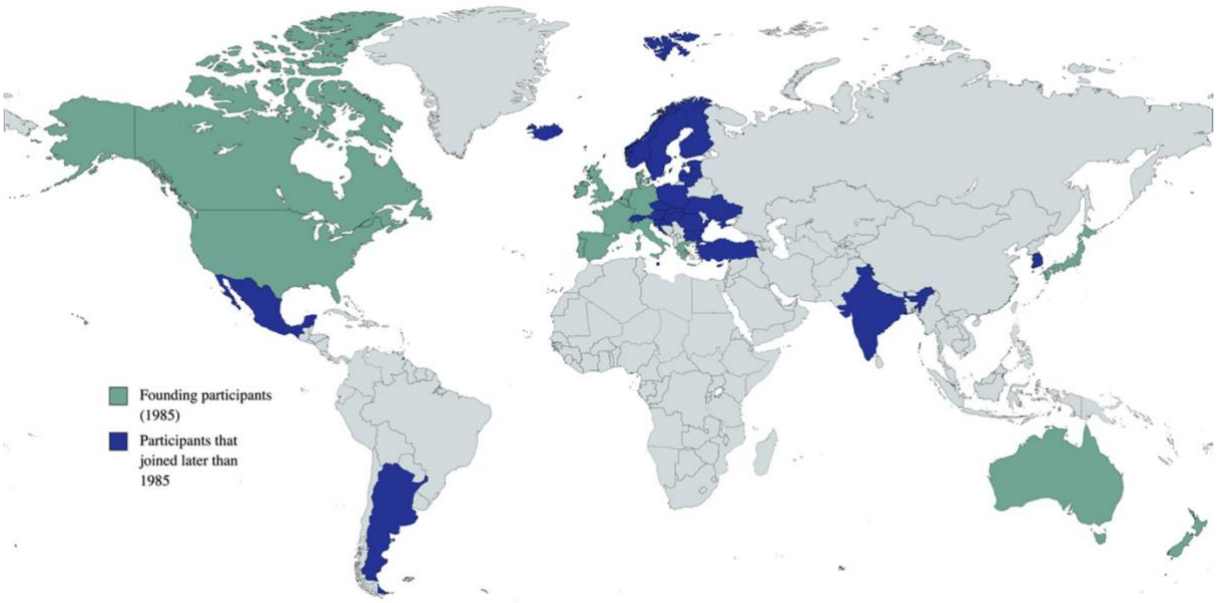

Figure 1: AG Participants (map created with mapchart.net)

Second, the AG has a limited number of participants. The AG was established by eighteen countries in 1985. Since then, it has invited other states to become partners. Twenty-four countries sharing the same security interests have joined the arrangement. Currently, 42 countries and the EU participate in the annual meetings. The AG comprises many European countries, including all EU members, all of North America and select countries in Asia, Oceania and South America (See Figure 1).[61]

Outsiders may view the arrangement as a political instrument against their interests or non-state groups.[62] With progress in implementing the BTWC, the CWC and UN Security Council (UNSC) resolution 1540, the controversy in the early years of the AG's operation has eased. AG outreach activities have also contributed to the broader acceptance of the need for national export control policies among non-participants and the AG guidelines and lists as a helpful tool.

1.4. AG Common Control Lists and Guidelines

The AG participants consider the Guidelines when deciding on a licence application to export items on the Common Control Lists. They retain some national discretion while reviewing the

[60] "The Australia Group at a Glance", Arms Control Association, 2021.

[61] "Australia Group Participants", The Australia Group (official website).

[62] Michael D. Beck, Seema Gahlaut, *op. cit.*, p. 6; Seema Gahlaut, *op. cit.*, pp. 11-15.

application. Further, the guidelines indicate the type of information they need to assess before granting an export licence.[63]

In addition, the guidelines lay out a no-undercut policy and catch-all principle. No-undercut entails that if an AG participant denies an export licence, no other partner will grant it without consulting with the state that initially rejected the application.[64] Such information sharing prevents outsiders from "shopping" in different AG participants until obtaining their export licence. "Consultation" does not exclude a second AG participant issuing the licence after a review of all the information.

The catch-all provision allows participants to deny requests for export licences when items of concern are not on the control lists. It applies whenever suspicion exists that the end user may want to use the requested items in CBW programmes.[65]

The AG Common Control Lists contain the names of CW precursors, pathogens, and toxins. They also identify chemical and biological equipment of concern and related technologies and software.[66] During their yearly plenary meeting, AG participants revise the control lists taking into account the latest scientific and technological developments and intelligence.[67] Further, two Control List Handbooks provide enforcement officers with additional information on the controlled items to enable them to recognise these commodities of concern.[68]

2. Challenges

The AG was established in response to CW use during the 1984 Iran-Iraq war and the realisation that Iraqi chemical agent precursors and technologies came from Western companies.[69] At that time, the CWC still had to be negotiated, and export controls focused exclusively on state threats. Although participants expanded the scope of the AG several times in response to new developments, the security challenges of the mid-1980s clearly influenced the original participants, informal nature and decision-making procedures of the arrangement.[70] Consequently, the AG faces some structural dilemmas today. This section discusses whether it can address them today.

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[63] "Guidelines for Transfers of Sensitive Chemical or Biological Items", The Australia Group (official website).

[64] *Ibid*.

[65] Arms Control Association, *op. cit*.

[66] "Australia Group Common Control Lists", The Australia Group.

[67] Arms Control Association, *op. cit*.

[68] *Australia Group Common Control List Handbook Volume I: Chemical Weapons-Related Common Control Lists,* The Australia Group, 2021; *Australia Group Common Control List Handbook Volume II: Biological Weapons-Related Common Control Lists,* The Australia Group, 2021.

[69] Ali Javed, "Chemical Weapons and the Iran-Iraq War: A Case Study in Noncompliance", *The Nonproliferation Review,* vol. 8, n° 1, 2001, pp. 43-58.

[70] Alyson J. K. Bailes, "The changing role of arms control in historical perspective", *in* Oliver Meier, Christopher Daase (eds.), *Arms control in the 21st century: Between coercion and cooperation,* Routledge, New York, 2013, p. 16.

2.1. Structural dilemmas

2.1.1. Informal nature

Literature often addressed the AG's informal nature.[71] As an arrangement of like-minded countries, it does not make binding decisions and has no enforcement mechanisms. It also gives participants national discretion in interpreting the Guidelines and Common Control Lists. For example, participants can "*determine whether and to what extent to apply expedited licencing measures in the case of transfers to destinations it judges possess consistently excellent non-proliferation credentials*".[72] The expansion of AG participants can put pressure on its informal nature. In the early days, CW use in the Iran-Iraq war aligned participants' interests.[73] With more countries joining, state interests may become more varied, thus complicating consensus.

The informal nature of the arrangement has some advantages as well. First, it allows flexibility in responding to new CBW threats. If a new and urgent security threat emerges and no formal international legal framework exists, states may decide to act through an informal arrangement. Such was the case of the AG after the UN investigative team first confirmed chemical warfare in the Iran-Iraq war.[74] In contrast, international arms control treaties take years to negotiate. For example, after the UN General Assembly adopted in 2006 resolution 61/89 "Towards an Arms Trade Treaty", it took eight more years for the Arms Trade Treaty to enter into force.[75]

The informal groups may cease functioning once a new legal framework takes effect. However, in several instances, they have taken on a degree of permanency despite, or precisely because of, their informal character. For example, the NSG emerged after India detonated a nuclear device in 1974. Although the Nuclear Non-Proliferation Treaty (NPT) had been in force since the start of the decade, the event added urgency to clarifying the treaty's Article III, 2 on the prohibited transfer of unsafeguarded technologies. The NSG explained its operation within the NPT framework and how it complements the various Nuclear Weapon Free Zones. It continues to operate today.[76] The first signs towards permanency for the AG emerged at the end of the 1980s when participants expanded the functions of the arrangement to control transfers of BW and related technologies in support of the BTWC. After finalising the CWC negotiations (September 1992) and the treaty's entry into force (April 1997), the AG restated its objectives in keeping with the CWC obligations.

The second advantage of informality lies in the decision-making process, even though the AG's lack of formal enforcement tools may make it appear weak. Decisions are non-binding, suggesting that participating states can decide whether or not to implement them. However,

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[71] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 65.

[72] "Guidelines for Transfers of Sensitive Chemical or Biological Items", The Australia Group (official website).

[73] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 65.

[74] "The Origins of the Australia Group", The Australia Group (official website).

[75] Laurence Lustgarten, "The Arms Trade Treaty: Achievements, Failings, Future", *The International and Comparative Law Quarterly,* vol. 64, n° 3, 2015, pp. 569-600.

[76] Isabelle Anstey, "Negotiating Nuclear Control: The Zangger Committee and the Nuclear Suppliers' Group in the 1970s", *International History Review,* vol. 40, n° 5, 2018; William Burr, *The Making of the Nuclear Suppliers Group, 1974-1976*, Wilson Center, Washington, DC, 2014.

the AG decides by consensus. Any problematic item for a state will be removed from decision-making. No participant thus objects to a joint decision, which creates a political and moral obligation to abide by its substance. That obligation translates into the adoption or adjustment of national legislation and regulations. Failure or significant delays in effectuating those decisions would lead to substantial informal political peer pressure forcing the errant government to comply. The same would happen if a government were to fail to implement its national laws and regulations in a specific export control case or take a lax attitude towards its technology transfer obligations. Hence, in practice, countries are relatively compliant with the AG despite its informal character; national export control legislation is often stricter than the control lists.[77] In addition, the AG is seen as a valuable means for constructing shared security values.[78]

A final advantage of informality is engaging with states outside an international treaty that an arrangement complements. The NSG brought France into the broader nuclear non-proliferation regime in 1974, even though the country would not become an NPT party until 1992. Less flexibility is available for the AG because partnership requires being a party to the BTWC and CWC.[79] Notwithstanding, its outreach activities can still engage non-parties like Israel and persuade them to adhere to specific technology transfer standards. UNSC resolution 1540 (2004) also offers a legal framework for such engagement.[80]

2.1.2. Non-universal character and being a group of like-minded countries

The AG balances between having many supplying countries as members and being a group of like-minded countries with the same security interests. On the one hand, the arrangement loses effectiveness if countries outside the AG export items that could contribute to CBW proliferation. Nevertheless, because the CWC and BTWC have almost universal coverage, nearly all countries outside the AG must act in compliance with the conventions. Since the establishment of the AG, CW have been used on several occasions. In 1994 and 1995, a terrorist group released the nerve agent sarin in Matsumoto and the Tokyo subway.[81] After the entry into force of the CWC in 1997, the OPCW Fact-finding Mission "*confirmed with a high degree of confidence*" Syria's repeated use of chlorine and sarin.[82] In 2018, Russian agents attempted to assassinate two persons with a Novichok nerve agent in the United Kingdom.[83] Although these incidents violated the CWC, it makes sense to strengthen the CBW disarmament and non-proliferation efforts even further and convince other possible suppliers

[77] Arms Control Association, *op. cit.*

[78] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 65.

[79] "The Australia Group: An Introduction", The Australia Group (official website).

[80] UN Resolution 1540 (2004), 28 April 2004. This resolution is focused on preventing the proliferation of weapons of mass destruction in the case of non-state actors. As a result, states have the obligation to adopt and enforce national laws and controls to serve this purpose. With the UNSC resolution 1540, transfer controls were extended to natural and legal persons within a country's territory.

[81] "The Sarin Gas Attack in Japan and the Related Forensic Investigation", OPCW, 1 June 2001.

[82] "Report of the OPCW Fact-finding Mission in Syria regarding an alleged incident in Saraqib, Syrian Arab Republic on 4 February 2018", OPCW, Technical Secretariat document S/1626/2018, 15 May 2018; "Report of the OPCW Fact-finding mission in Syria regarding the incident of the alleged use of chemical weapons in Kafr Zeita, Syrian Arab Republic 1 October 2016", OPCW, Technical Secretariat document S/2020/2022, 31 January 2022.

[83] "Summary of the report on activities carried out in support of a request for technical assistance by the United Kingdom of Great Britain and Northern Ireland", OPCW, Technical Secretariat document S/1671/2018, 4 September 2018.

to join the AG or, at a minimum, adhere to its guidelines and control lists as a second line of defence.[84]

In this context, a new partnership may pose its own risks. AG participants share intelligence on threats and developments in the chemical and biological fields in preparing updates for Common Control Lists. These discussions are often highly technical. Newly admitted countries will join these discussions. Should they have malicious intentions, access to sensitive information through their participation could cause proliferation risks. Therefore, it is undesirable to have every state join the AG.[85]

There are other ways to promote export controls in support of the CWC and BTWC. The AG often reaches out to other countries to promote its standards, as reflected in the key outcome of the 2019 plenary session.[86] In the same year, the AG held meetings with Middle Eastern countries. The AG website posits that the Guidelines and Common Control Lists are a "*benchmark for global best practice [in] chemical and biological export controls*". As a result, non-participants, such as Kazakhstan, sometimes adopt them as well.[87] Other countries, such as China and Israel, consult regularly with the AG,[88] or implement export controls in line with the AG recommendations.[89]

2.1.3. Consensus-based decisions

The AG makes its decisions based on consensus. This system feels most comfortable for many countries because the decisions can affect national state security and their industries. For example, tightly implemented CBW export controls can improve the security of supplier countries but may also upset legitimate trade or other economic interests. Forcing through a decision against the dissent by a participant may weaken common cause and internal cohesion. A country pushed to block a decision could hinder development of future measures.[90] Yet, nothing prevents countries from implementing stricter export controls than collectively agreed.

Members of the other four export control arrangements must confront the Russian Federation's membership in the wake of the invasion of Ukraine. Most of them have taken sanctions against Moscow despite being partners with Russia in the same export control arrangements. Russia does not participate in the AG, therefore this is not a problem for this arrangement. It could become problematic if participants were to disagree whether Moscow poses a CBW threat, thereby blocking a common stance. Even though India, one of the most recent AG participants, abstained twice when the UN General Assembly voted on the Russian invasion and its annexation of Ukrainian territory,[91] there is no indication of internal disagreement in the AG.

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[84] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 67.

[85] Arms Control Association, *op. cit.*

[86] "Statement by the Chair of the 2019 Australia Group Plenary", The Australia Group, 15 July 2019.

[87] "Australia Group Adherents", The Australia Group (official website).

[88] The State Council Information Office of the People's Republic of China, *China's Export Controls*, 2021.

[89] Bureau of Industry and Commerce U.S. Department of Commerce, *Israel Export Control Information*, 2020.

[90] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 67.

[91] "UN condemns Russia's annexation move: How did countries vote?", *Al Jazeera*, 13 October 2022.

2.2. Recent challenges

2.2.1. Emerging technologies

Emerging technologies put pressure on the AG in three different ways. First, the pace of technological development dictates the speed at which the Common Control Lists need to be adjusted. Government experts present their analysis of the latest scientific and technical developments. Participating states evaluate the updates. During the 34th Plenary in 2019, they called for increased awareness of emerging technologies and their proliferation risk.[92] They also review the Common Control Lists annually and update them if necessary. For instance, in 2020, they added Novichok precursor chemicals to the Common Control Lists after their listing in Schedule 1 of the CWC.[93]

Second, intangible transfers are becoming more significant and call for an adjusted approach to export controls. Software and designs can be transferred electronically, while higher mobility encourages people to take their skills to different institutions and countries. Even non-physical trade can contribute to CBW proliferation. Bromley and Maletta nuance the threat and argue that CBW production often requires advanced knowledge. From this perspective, intangible transfers by themselves are unlikely to lead to the manufacture of these weapons.[94] The AG is currently sharing good practices to reduce the risk from intangible transfers.[95]

The functions of the export control arrangements become more overlapping because of emerging technologies.[96] Currently, the different export control arrangements focus on a specific category of weapons. However, emerging technologies from various fields converge, combining existing technologies with new ones.[97] For example, additive manufacturing is integrating with biology, opening the door to bioprinting and printing laboratory equipment.[98] Remote production of CBW equipment also becomes a possibility.[99] The MTCR has meanwhile addressed questions about additive manufacturing since 2013,[100] while the Wassenaar Arrangement has already included a specific type of additive manufacturing equipment in its dual-use control lists.[101] Artificial intelligence and robotics also affect different

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[92] "Statement by the Chair of the 2019 Australia Group Plenary", The Australia Group, 15 July 2019.

[93] "Statement by the Australia Group Chair: Addition of Novichok precursor chemicals to the Australia Group Control List", The Australia Group, 28 February 2020; CWC, Annex on Chemicals, Schedule 1.

[94] Mark Bromley, Giovanna Maletta, *The Challenge of Software and Technology Transfers to Non- Proliferation Efforts,* Stockholm International Peace Research Institute, Stockholm, April 2018, p. 7.

[95] "Statement by the Chair of the 2019 Australia Group Plenary", The Australia Group, 15 July 2019.

[96] Kolja Brockmann, Sibylle Bauer, Vincent Boulanin, *BIO PLUS X: Arms Control and the Convergence of Biology and Emerging Technologies,* Stockholm International Peace Research Institute, Stockholm, March 2019, p. 4.

[97] Sibylle Bauer, "New technologies and armament: rethinking arms control", *Clingendael Spectator,* 29 July 2020.

[98] For an explanation of these technologies: Kolja Brockmann, Sibylle Bauer, Vincent Boulanin, *op. cit.*, pp. 5-12.

[99] Kolja Brockmann, "Drafting, Implementing, and Complying with Export Controls: The Challenge Presented by Emerging Technologies", *Strategic Trade Review,* vol. 4, n° 6, 2018, p. 8.

[100] Kolja Brockmann, *Additive Manufacturing for Missiles and Other Uncrewed Delivery Systems: Challenges for the Missile Technology Control Regime,* Stockholm International Peace Research Institute, Stockholm, October 2021.

[101] Kolja Brockman, *The Challenges of Emerging Technologies to Non-Proliferation Efforts: Controlling Additive Manufacturing and Intangible Transfers of Technology,* Stockholm International Peace Research Institute, Stockholm, April 2018.

arrangements. As most export control groupings face similar problems, cooperation would strengthen the non-proliferation efforts.

2.2.2. Increased availability of technology

The AG is facing an increasing availability of CBW-relevant technology in new countries. Brazil and Saudi Arabia have a blossoming chemical industry,[102] and biotech companies from South Africa and Israel are among the 100 largest in the world.[103] The expanding South-South trading patterns mean that more sources for certain types of technology become available. Further, higher education and skill levels swell the numbers of qualified scientists, engineers and technicians able to operate some of the most advanced equipment. For example, the private sector and individuals primarily use new technology such as bioprinting.[104] However, not just the most advanced technologies are of proliferation concern. A sophisticated CBW programme could run on mature technologies now available across the planet. These trends challenge the AG because of its limited membership and geographical concentration, primarily in North America and Europe.

Nevertheless, AG participants can stay abreast of possible threats by sharing intelligence. They can also engage other countries with education, training, outreach and other cooperation programmes or through the BTWC and CWC. They may also consult with other state parties using treaty-based mechanisms (BTWC Art. V or CWC Art. IX) in case of compliance concerns.

2.2.3. Threats from states or non-state actors

Threats are changing too. Initially, export controls focused on state-level threats. After 9/11, non-state threats rose to higher importance.[105] In 2018, the AG still focused on terrorist threats with CBW.[106] However, with government-sponsored assassination operations with nerve agents in Malaysia and the United Kingdom, [107] and the current war in Ukraine, the focus has returned to state threats.

The shifting threats require different approaches to technology transfer controls. Export controls help counter state-run CBW programmes that depend on foreign sources of materials and technologies. Terrorists seeking such weapons may rely more on internal markets for technology acquisitions, in which case export and import controls are of limited utility. Domestic or international terrorist preparations involving biological or chemical agents fall under the BTWC and CWC because the GPC qualifies them as prohibited activities. The principal tool to counter this threat is appropriate national criminal and penal legislation and authorisation of relevant state agencies to monitor and, if necessary, take action to counter a non-state actor threat with CBW. The BTWC (Art. IV), CWC (Art. VII) and UNSC Resolution 1540 require states to take such legislative action.

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[102] "2023 Facts and Figures of the European Chemical Industry", Cefic, 2023.
[103] "Largest Biotech companies by Market Cap", Companies Market Cap, 2023.

[104] Kolja Brockmann, Sibylle Bauer, Vincent Boulanin, *op. cit.*, pp. 10-11.

[105] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 58.

[106] "Statement by the Chair of the 2018 Australia Group Plenary", The Australia Group, 8 June 2018.

[107] "Report of the fact-finding mission in Syria regarding an alleged incident in Saraqib, Syrian Arab Republic on 4 February 2018", Document S/1626/2018, OPCW Technical Secretariat, 15 May 2018.

A different challenge is that non-state actors may be less interested in state-of-the-art technology and instead rely on older types of military biological or toxic agents. Most materials and equipment could be readily available from multiple commercial sources. Moreover, terrorists could, depending on their objectives, also have interests in incapacitating or anti-plant agents. Relative to state programmes, the volumes of materials and types of equipment needed by terrorists would be modest in most cases. From a non-proliferation perspective, there will be few cross-border trade flows to monitor unless a terrorist entity acts internationally. The role of the AG in countering domestic terrorism may therefore be limited to exchanging information on different types of threat agents and methods for their preparation. Other intelligence-sharing channels exist in case of acute threats.

The civil war in Syria illustrated how governments might turn to first-generation chemical warfare agents, such as chlorine, or specific industrial toxicants produced, traded or consumed in large volumes. These chemicals do not appear in the CWC Schedules or the AG Common Control Lists, yet the GPC covers them if used as a CW. In such instances, AG participants may decide on coordinated sanctions and, through national legislation or regulation, require companies to apply for a specific authorisation to export the commodities to the targeted country.

Small volumes may pose a risk as well. In the AG Common Control Lists, quantities may determine whether an item is controlled. However, some states or non-state actors may want to procure certain items below the threshold volume. At the time of writing, multiple German firms are suspected of having exported small quantities of dual-use items that could aid CBW production to Russia. While useless for large-scale manufacture, they could assist in checking the quality of Russia's domestic production.[108]

Finally, many legitimate non-state actors facilitate sensitive trade or develop technologies of concern.[109] These private sector companies need to be aware of the proliferation risks. Many high-technology businesses operate internationally and operate divisions or branches in different countries. Communications and technology transfers between subsidiary entities in other countries may run counter to state or security interests.[110]

2.2.4. Disinformation

Disinformation about CBW has reached unparalleled levels since the invasion of Ukraine in February 2022.[111] It follows a rising trend of states trying to manipulate opinion domestically and internationally.[112] In international security, it may make threat assessments more difficult or obscure certain developments. Disinformation targeting the AG or its participants might influence other countries' perceptions of their trustworthiness and commitment to international standards against CBW. It also undermines the value of the AG's non-proliferation work and outreach activities and gives credence to the criticism voiced by certain

[108] Kira Welter, "German firms raided over dual use chemicals sent to Russia", *Chemistry World*, 12 September 2022.

[109] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 56; Kolja Brockmann, Sibylle Bauer, Vincent Boulanin, *op. cit.*, p. 25.

[110] Seema Gahlaut, *op. cit.*, p. 16.

[111] "Statement on Russia's CW-related activities during the war against Ukraine", Permanent Representation of the Federal Republic of Germany to the OPCW, July 2022.

[112] *Disinformation*, Chatham House, 2022.

members of the Non- Aligned Movement. For instance, Russia alleged that the United States was funding a network of BW laboratories in Ukraine.[113] It took its allegations several times to the UNSC in the spring of 2022, then called for a Formal Consultative Meeting of state parties under BTWC Art. V, and finally invoked Art. VI by filing a complaint with the UNSC.[114] At no point did parties to the BTWC support the allegations, but Moscow continues to voice them nonetheless. Opposition groups and conspiracists in AG participants and influencers in different parts of the world continue to propagate the false allegations.

3. Opportunities and strengths

The AG has multiple opportunities to adapt to the new circumstances. It could widen the use of the catch-all mechanism and enhance cooperation with other arrangements, outside countries, industry and academia. It could also review its decision-making given an increasing number of participants.

3.1. Catch-all mechanisms

The GPC in the BTWC and the CWC covers all biological, toxin and chemical substances if they are intended to be used as a method of warfare, and, by extension, as an instrument of terrorism. The definitions of a biological or a chemical weapon also include delivery means and ancillary equipment. The treaties also prohibit preparations for biological or chemical warfare, specifically the development, production and stockpiling of CBW. However, they do not include research into CBW because of the impossibility of verifying the ultimate purpose of early laboratory work.

In contrast to both conventions, the AG can focus on actors, whether states or terrorist and criminal entities. In other words, it can authorise or deny a technology transfer based on an intent assessment of an end user. The AG participants can therefore apply a catch-all mechanism to control the trade in CBW-relevant dual-use technologies and materials based on the end user instead of on the commodities themselves.[115]

Through the catch-all mechanism, AG participants can thus deny sales of materials or technologies with dual-use potential even if they do not feature on export control lists. In this way, they can also prevent the transfer of mature technologies or small volumes of agents if they suspect misuse.

[113] Leanne Quinn, "Russia Calls Meeting of Biological Weapons Convention", Arms Control Association, September 2022.

[114] Jean Pascal Zanders, "Russia's apoplexy over biological research – Implications for the BTWC and its Articles V and VI", *The Trench*, 13 November 2022.

[115] "The Australia Group at a Glance", Arms Control Association, 2021.

3.2. Cooperation, information sharing and good practices

The different export control arrangements are facing similar issues in several areas. Therefore, cooperation among them could help their response to emerging technologies[116] and proliferation threats.[117] However, their complete merger is unlikely because they have different participating states. For political and security reasons, countries are not working together regarding the different types of weaponry. The respective control lists are updated based on intelligence; hence, governments are unwilling to share information with countries outside one of the arrangements. Beck and Jones suggest they could still share data during a joint assembly, which might become a birthplace for new export control measures and international arrangements for emerging technologies.[118] It could also help responses to technologies threatening the efforts of all arrangements. The joint assembly could be where officials and representatives from the industry, academia and non-governmental organisations discuss proliferation and disarmament developments. The stakeholder groups could significantly encourage other countries to adopt export controls in line with the guidelines of the different arrangements.

Such cooperation with other non-participating states and stakeholder facilitators could also advance the AG's goals in a changing international context.[119] In this respect, the AG guidelines should optimise the balance between adequate export controls and the facilitation of regular trade and technology transfers in the fields of chemistry and biotechnologies.[120] Continuing outreach and increasing the practice of sharing good practices with non-participants would also contribute to the effectiveness of the AG's non-proliferation efforts. Such interactions could also address emerging technologies and the increasing amount of disinformation. Given that all AG participants are parties to the BTWC and the CWC, the respective meetings of state parties and review conferences offer opportunities to reach out and discuss non-proliferation policies.

The Financial Action Task Force (FATF) could also serve as an example to spread the AG standards. The FATF sets international standards to counter global money laundering and terrorist financing. It has 39 members, but around 200 countries implement its recommendations.[121] Nine regional bodies promote the FATF's non-binding recommendations. The watchdog has succeeded in remaining a group of like-minded countries while achieving an almost universal implementation of its norms.[122] The AG's outreach could likewise benefit from more formalised regional cooperation. These regional subgroups can address CBW proliferation issues particular to countries from a region. However, one significant difference between the FATF and the AG is that diverging from the

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[116] Kolja Brockmann, 2018, *op. cit.*, p. 23.

[117] Michael C. Horowitz, Neil Narang, "Poor Man's Atomic Bomb? Exploring the Relationship between 'Weapons of Mass Destruction'", *Journal of Conflict Resolution,* vol. 58, n° 3, 2014, p. 510.

[118] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 75.

[119] *Ibid.*, p. 65.

[120] *Ibid.*

[121] "Countries", Financial Action Task Force, 2022.

[122] There has been critique that the FATF is non-democratic (see Ben Hayes, *Counter-Terrorism, 'Policy Laundering' and the FATF: Legalising Surveillance Regulating Civil Society,* Transnational Institute / Statewatch, Amsterdam, February 2012).

FATF Recommendations may have direct and severe consequences. Other countries are likely to apply countermeasures and due diligence, affecting the economic situation in the deviant country.[123] If applied to the AG, this would mean a violation of the BTWC or CWC followed by likely consequences for the violator, such as sanctions.

3.3. Decision-making

The increasing number of AG participants makes it more likely that participants become less like-minded, making decision-making more difficult. A revision of this process can speed up decision-making. However, it is difficult to completely reform the decision-making process based on consensus because these decisions can affect a state's security and industry. Gahlaut and Zaborsky propose a "contract-like agreement" that allows for bargaining between countries. According to these authors, this system is more suitable for a large group of countries with diverging interests. With the proposed system, governments can still stand up for essential matters through exchanges with other participants. For example, suppose an AG participant finds it important that all participating states control a specific chemical. In that case, it could exchange its vote on a matter less vital to its interests to gain support from other participants for its proposal. In this system, side payments would also be a possibility.[124]

Conclusion

This chapter discussed whether the AG, in its current configuration, is equipped to deal with challenges such as emerging technologies, evolving threats, widening access to technology, and disinformation. Due to its symbiotic relationship with the CWC and BTWC, the AG has a sharp focus on preventing the re-emergence of CBW. AG participants can address matters concerning tangible and intangible technologies not covered by either convention or its guidelines by applying the catch-all mechanism. Moreover, the arrangement also addresses developments by updating the Common Control Lists and Guidelines. Although the arrangement cannot make binding decisions, its informality has several advantages: participants usually act in line with the common decisions. The AG also allows cooperation with countries outside the arrangement to promote its control lists and guidelines as technology transfer standards.

Several measures can make the AG better equipped for the future. Increased cooperation with the other export control arrangements could enhance the AG's impact. More dialogue with stakeholder communities could further the sharing of good practices. These actions can help to tackle the proliferation challenges of emerging technologies. Expanding participation in the AG could weaken its internal cohesion and vision. One option would be to revise internal decision-making. Another would be to take the example of the FATF to balance cohesion in a like-minded group of countries and the promotion of its guidance and control lists as a desirable global standard.

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[123] "Topic: High-risk and other monitored jurisdictions", Financial Action Task Force.

[124] Seema Gahlaut, Victor Zaborsky, "Do Export Control Regimes Have Members They Really Need?", *Comparative Strategy*, vol. 23, n° 1, 2004, p. 83.

Moving towards an *informal* international law: challenges and opportunities for dual-use export controls

Mónica Chinchilla

In recent decades, relevant transformations have occurred in a rapidly changing international community. Accordingly, the use of traditional international law mechanisms has been called into question to effectively respond to new threats, such as the prominence of violent non-state actors or the influence of emerging technologies. The differing political and economic interests of states make it difficult to represent their interests equitably and thus reach multilateral agreements.

In this context, the debate on the role of soft law mechanisms in the international sphere has resurfaced, especially in the realm of non-proliferation and dual-use export control. Guidelines and non-legally binding recommendations are more straightforward and consistently adapted to the constantly changing international environment.

The situation affects the international transfers of chemical and biological technologies, most of which have dual-use potential for developing and producing chemical and biological weapons (CBW).[125] Non-legally binding instruments have increasingly influenced policy discussions about the content and scope of export controls. The Australia Group (AG) is a clear expression of the trend. It has made a clear, though imperfect, contribution to the continuous adaptation of export control policies in support of the international norm against CBW, as expressed in the 1972 Biological and Toxin Weapons Convention (BTWC) and 1993 Chemical Weapons Convention (CWC).

This study aims to provide a comprehensive insight into the increasing relevance of plurilateral export control arrangements – the AG in particular – and their further contribution to international law development.

[125] "Dual-use" refers to "*technology intended for civilian application [that] can also be used for military purposes (spin-on) or vice versa (spin-off)*". For a more detailed explanation of the concept of "dual-use" and "dual- use technologies", see Jean Pascal Zanders, "A Verification and Transparency Concept for Technology Transfers under the BTWC", *Weapons of Mass Destruction Commission,* Stockholm, 2004, pp. 24-25.

1. A short look into the AG

Generally speaking, plurilateral export control arrangements are groups of like-minded states established to coordinate and align their respective national export control policies with each other. Such arrangements operate for the different categories of non-conventional weaponry and their delivery systems and advanced conventional weapon technologies.[126] They harmonise their national export control measures through exchanges on threat assessments, assessment of emerging technologies and reviewing and updating technical lists with technologies of dual-use concern. In this manner, participating states can monitor the transfer of sensitive strategic materials and prevent or penalise unlawful exports.

The AG first met in 1985 following a UN investigation team's confirmation that Iraq was using chemical weapons (CW) in the war with Iran. Iraq had acquired chemical precursors from the chemical industry, primarily in West Europe and the United States.[127] Participants agreed on a first list of chemical warfare agents and precursors, which expanded with time. They later added lists covering equipment and other technologies relevant to developing and manufacturing warfare agents. With a rising interest in biological weapons (BW) worldwide and the accelerating diffusion of biotechnology, the AG also agreed on lists of biological agents and relevant technologies starting towards the end of the 1980s. Since then, the AG's primary purpose has been to prevent the misuse of dual-use technologies that could contribute to CBW development and production through the coordination and harmonisation of national export controls. Today, 42 states and the EU participate in the annual meetings.[128]

Besides developing the lists, the AG also makes recommendations and formulates good practices to improve participants' evaluation of risks and appropriateness of issuing an export licence. For instance, relevant factors include the capabilities of the receiving country or the potential end-use of transferred materials. However, such guidelines are not very precise or accurate, and the risk assessment of an export request is ultimately the responsibility of the exporting country. In light of this remark, it is reasonable to question the role of soft law in the international realm and its particular significance in achieving non-proliferation goals.

2. Different stances on the overall role of soft law

Soft law instruments – also described as informal,[129] *de facto*,[130] or gentlemen's agreements[131] – establish operating criteria that states voluntarily undertake to act closely in the same direction. Though not legal, these commitments have political and moral significance

[126] Besides the AG, other multilateral export control regimes are the Nuclear Suppliers Group (1974), the Missile Technology Control Regime (1987) and the Wassenaar Arrangement (1995).
[127] "The Origins of the Australia Group", The Australia Group (official website).
[128] Australia Group, "Australia Group Participants", The Australia Group (official website).

[129] Charles Lipson, "Why Are Some International Agreements Informal?", *International Organization,* vol. 45, n° 4, 1991, pp. 495-538.

[130] Frieder Roessler, "Law, de Facto Agreements and Declarations of Principle in International Economic Relations", *German Yearbook of International Law,* vol. 21, 1978, pp. 27-59.

[131] Oscar Schachter, "The Twilight Existence of Nonbinding International Agreements", *American Journal of International Law,* vol. 71, n° 2, 1977, pp. 296-304.

and are strongly determined by their purpose and intention. Non-legally binding instruments have sometimes been categorised as an independent and different field in law studies, claiming that "*a separate category of politically binding agreements, apart from legally binding agreements, is not possible*".[132] It is unquestionable, however, that soft law instruments really influence international society and how states relate to each other. As Professor Alan Boyle recently affirmed, "*once soft law begins to interact with binding instruments its non-binding character may be lost or altered*".[133] He highlighted the close relationship between legally binding agreements and non-legally binding recommendations and expectations. Some international scholars believe in this regard that a state will commit to agreed international objectives and guidelines, whether legally binding or not. Even though soft law standards differ from binding norms, they still create expectations and influence state conduct. And such influence may sometimes be more significant than multilateral treaties or customary law.[134] It is worth recalling Ahlström's words in this sense: "*Not every agreement among states constitutes a legally binding treaty. While lacking the quality of legal bindingness they may nevertheless possess a normative quality in that they are held to establish politically or morally 'binding' ties*".[135]

In the international security and non-proliferation realm, the diverse international legal frameworks explain the coexistence between international legally binding agreements, such as the BTWC and CWC, and other moral or political international instruments. Nevertheless, many international law scholars have questioned the effectiveness of soft law export control mechanisms. They have extensively criticised the impact of informal forums, arguing that they are discriminatory, lack international legitimacy and might be counterproductive.[136] In their view, the informal arrangements are unable to effectively achieve their objectives,[137] and may diminish the legitimacy of formal disarmament, arms control and non-proliferation treaties. Chayes and Chayes affirmed that: *"Conceptually, supplier controls represent an attempt by a self-selected group of 'have' nations, meeting in private, to develop and impose their own views of appropriate security policy by virtue of their technological and economic superiority. The inherently discriminatory character of supplier regimes is exacerbated by restrictions that are over inclusive and methods of control that are overreaching*".[138]

By contrast, other authors have shown support for plurilateral export control arrangements like the AG. Professor Daniel Joyner, for instance, strongly argues that export control arrangements "*have the potential to contribute significantly to the maintenance of a more harmonised and efficient overall non-proliferation regime*", although his research has been

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[132] Friedrich Kratochwil, "How Do Norms Matter", *in* Michael Byers (ed.), *The Role of Law in International Politics,* Oxford University Press, Oxford, 2001, p. 61.

[133] Alan Boyle, "Soft Law in International Law-Making", *in* Malcolm Evans (ed.), *International Law*, Fifth Edition, Oxford University Press, Oxford, 2018, p. 122.

[134] Prosper Weil, "Towards Normative Relativity in International Law?", *American Journal of International Law,* vol. 77, n° 3, 1983, p. 415.

[135] Christer Ahlström, *The status of multilateral export control regimes. An examination of legal and non-legal agreements in international co-operation,* Iustus Förlag, Uppsala, 1999, p. 51.

[136] *Ibid*., p. 308.

[137] Andrew Latham, Brian Bow, "Multilateral Export Control Regimes: Bridging the North-South Divide", *International Journal,* vol. 53, n° 3, 1998.

[138] Abram Chayes, Antonia Handler Chayes, *The New Sovereignty: Compliance with International Regulatory Agreements,* Harvard University Press, Cambridge, MA, 1995, p. 72.

more commonly focused on nuclear issues.[139] In this same vein, Dr Sibylle Bauer has argued that soft law instruments in the non-proliferation realm have "*a norm setting function beyond the membership of the regimes*", which is reflected in the influence of guidelines and export control lists in geographically dispersed countries.[140]

Depending on myriad factors – such as protected interests, prior agreements, or the subject matter under consideration –, states will be prone to start different kinds of negotiations. Flexibility, celerity and confidentiality characterise informal arrangements as a result of their non-legally binding nature.[141] Such characteristics may not necessarily be incompatible with legally binding agreements, and may even be preferable under specific circumstances.[142] Professor Wolfrum identified international law as a critical source of legitimacy, but recognised that "*authority can also be legitimised if the decisions in question are taken in the course of procedures considered to be adequate or fair*".[143] In this sense, the terminology – hard or soft law – used to refer to such agreements is not as relevant as their content and the states' intent. Beyond the form, recommendations and good practices may be perfectly consistent with states' needs and interests and thus benefit from a substantial degree of authority and legitimacy.[144]

3. Managing the salient sovereign power of states: national implementation of guidelines and export control lists

In the case of plurilateral export control arrangements such as the AG, states' implementation of guidelines and control lists is mainly subject to the exercise of state sovereignty. Participants voluntarily commit to non-binding recommendations, so further effectiveness highly depends on the willingness of participating states to cooperate and share confidential information. According to a study conducted by the University of Georgia between 2003 and 2004, the implementation or enforcement of informal guidelines was highly uneven among participating states. Considering this, some scholars have argued that there is a weak institutional framework within informal arrangements,[145] since they lack a verification or monitoring

[139] Daniel Joyner, "Restructuring the Multilateral Export Control Regime System", *Journal of Conflict & Security Law,* vol. 9, n° 2, 2004, p. 182.

[140] Sibylle Bauer, *Main Developments and Discussions in the Export Control Regimes, Literature review for the Policy and Operations Evaluations Department of the Dutch Ministry of Foreign Affairs* (Final Report), Stockholm International Peace Research Institute, Stockholm, 2017, p. 60.

[141] Christer Ahlström, *op. cit.*, pp. 66-69.

[142] Richard. L. Williamson Jr., "Hard Law, Soft Law, and Non-Law in Multilateral Arms Control: Some Compliance Hypotheses", *Chicago Journal of International Law*, vol. 4, n° 1, 2003, pp. 77-78; Prosper Weil, "Towards Relative Normativity in International Law?", *American Journal of International Law,* vol. 77, n° 3, 1983, p. 415.

[143] Rüdiger Wolfrum, "Legitimacy of International Law from a Legal Perspective", *in* Rüdiger Wolfrum, Volker Röben (eds.), *Legitimacy in International Law,* Springer, Berlin, 2008, p. 6; Iris Hunger, Oliver Meier, *Between Control and Cooperation: Dual-Use, Technology Transfers and the Non-Proliferation of Weapons of Mass Destruction,* Deutsche Stiftung Friedensforschung, Osnabrück, 2014, p. 12.

[144] Marcel Brus, "Soft Law in Public International Law: A Pragmatic or a Principled Choice? Comparing the Sustainable Development Goals and the Paris Agreement", *in* Pauline Westerman *et al*. (eds.), *Legal Validity and Soft Law,* Springer, Cham, 2018, pp. 262-263.

[145] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 65.

mechanism, and do not provide for punitive measures or sanctions to participating states in case of non-compliance.

This is certainly an inherent constraint that results from the very nature of international law. Since 2015, annual plenary meetings of the AG have gathered guidelines that states should consider before transferring tangible or intangible biological and chemical dual-use materials. The AG guidelines establish, in general terms, that "*national export control legislation, including enforcement and sanctions for violations, plays an important role*".[146] This is in line with both the BTWC and the CWC, which demand that parties have national implementation legislation, including criminal and penal law, to make international law applicable to natural and legal persons operating on that state's territory. Even for formal disarmament treaties, implementation is in accordance with states' domestic laws and constitutions. The implementation of export control requirements in the BTWC (Article IV) is a national responsibility, just like in the CWC (Article VII). Both non-proliferation legally binding obligations of the BTWC and the CWC and non-legally binding guidelines of the AG are implemented considering the imperatives of national legislations, so the final decision to transfer or deny a transfer of any item is, in the end, the sole responsibility of states.

It is important to recall that the AG can only function within the parameters set out in Article I of the CWC and Articles I and III of the BTWC, which impose obligations on states to never acquire CBW respectively, and to never assist anybody with their acquisition. Considering such non-proliferation obligations, any serious issue in the AG would likely entail a non-compliance matter with at least one of the conventions. In this sense, besides the regular contacts and exchanges among AG partners, the BTWC (Article V) and CWC (Article IX) provide for consultative procedures in case of compliance concerns with the treaty provisions.

The BTWC has been strongly criticised in this respect for not having a legally binding verification and enforcement mechanism. But the fact is that any violation of the treaty would constitute a breach of international law, thus holding states responsible for their actions. Meanwhile, BTWC verification discussions continue.[147] The continued lack of proven BW use demonstrates that the BTWC is meeting its objectives, while the peaceful exchange of related equipment, materials and scientific and technological information is also taking place.[148] For its part, the CWC accountability mechanism has not been entirely capable of holding perpetrators responsible, and in spite of this, the treaty is regarded as one of the most successful disarmament treaties.[149] While some violations inevitably still take place,[150] as of July 2023, all of the world's declared stockpiles were destroyed under OPCW supervision.

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[146] "Guidelines for transfers of sensitive chemical or biological items", para. 3, The Australia Group. The AG grants states discretionary powers to apply guidelines and recommendations: i) whenever considered necessary; ii) to items not included on control lists; and iii) for other reasons of public policy in line with treaty obligations (*Idem*, para. 8).

[147] VERTIC, *Addressing misconceptions about biological and chemical weapons and related legal frameworks*, VERTIC, London, 2023, p. 19.

[148] *Ibid.*, pp. 47-48.

[149] *Ibid.*, p. 47.

[150] "*The use of chemical weapons or prohibited chemicals in the Syrian Arab Republic, Malaysia, Iraq, the United Kingdom and the Russian Federation has threatened the norms embedded in the Chemical Weapons Convention*" (Izumi Nakamitsu, Keynote Statement at ASEAN Defense Ministers' Meeting–Plus Chemical, Biological and Radiological (CBR) Conference *A Holistic Approach to Addressing CBR Threats*, UN Office for Disarmament Affairs, 11 October 2022, p. 3).

Therefore, claims regarding an insufficient institutional framework in the AG are not well founded.

This is quite different from the nuclear field. This has had no disarmament treaty delegitimising nuclear weapons until the fairly recent entry into force of the 2017 Treaty for the Prohibition of Nuclear Weapons, which lacks universal support.[151] The CWC and the BTWC are the centrepiece of the ban on CBW and, as disarmament treaties, they delegitimise those weapons in peace and wartime by banning their acquisition and possession under all circumstances. The so-called non-proliferation clauses in both treaties support this central prohibition. Contrary to nuclear non-proliferation instruments such as the Nuclear Suppliers Group (NSG) and the Missile Technology Control Regime (MTCR), the AG functions *in support* of the BTWC and CWC, which means that there are definitions of the respective weapon category and hence far greater shared understanding of what technologies are controlled. Therefore, the AG and the treaty regime work hand in hand and are complementary to each other.

4. The complementary fit between hard law and soft law

A close connection between international disarmament treaties and export control guidelines is clearly evidenced in the particular case of the AG. As previously argued in the section above, export controls are applied in accordance with general biological and chemical disarmament obligations as established in Articles I – III of the BTWC and Article I of the CWC, respectively. Indeed, the AG has shown express support to disarmament treaties as a reflection of complementarity between the treaty regime and informal forums.[152] Such a connection can also be perceived in other international legally binding instruments, such as the United Nations Security Council (UNSC) Resolution 1540 (2004) and the European Union (EU) Regulation 2021/821.

4.1. UNSC Resolution 1540 (2004)

UNSC Resolution 1540 (2004)[153] – recently reaffirmed by UNSC resolution 2663 (2022)[154] – recognises nuclear, biological and chemical proliferation as a threat to international peace and security in light of the risk posed by non-state actors. Its relevant operative paragraphs (OP) draw on both the BTWC and the CWC, which precede UNSC resolutions by many years. While Resolution 1540 requires all UN members to act accordingly regardless of whether they are parties to the BTWC and the CWC or not, it also recognises the primacy of both treaties –

[151] Stuart Casey-Maslen, "The Impact of the TPNW on the Nuclear Non-Proliferation Regime", *in* Jonathan L. Black-Branch, Dieter Fleck (eds.), *Nuclear Non-Proliferation in International Law, Volume VI. Nuclear Disarmament and Security at Risk – Legal Challenges in a Shifting Nuclear World,* TMC Asser Press, The Hague, 2021, pp. 385-409.

[152] "Objectives of the Group", The Australia Group (official website).

[153] UN Security Council, Resolution 1540 (2004), Document S/RES/1540 (2004), adopted on 28 April 2004.

[154] UN Security Council, Resolution 2663 (2022), Document S/RES/2663 (2022), adopted on 30 November 2022.

together with the NPT and the safeguards by the International Atomic Energy Agency accompanying it – (OP 5).

By 2004, the UNSC used the term "*related materials*" instead of "*dual-use goods*",[155] opting for a broader and less controversial term to reach consensus among states. The AG was still a highly controversial forum internationally at that time, pitting Western states and members of the Non-Aligned Movement against each other.[156] Proof of this was Pakistan's concerns during Resolution 1540 negotiations, when it argued that "*the list prepared by closed regimes such as the Missile Technology Control Regime (MTCR), the NSG or the AG cannot automatically be accepted by or imposed upon States that are not parties to these regimes*".[157] Thus, not surprisingly, the UNSC referred to "*relevant multilateral treaties and arrangements*",[158] but avoided an explicit mention of the AG, or any other plurilateral export control arrangement.

Still, Resolution 1540 (2004) highlights the added value of soft law mechanisms to achieve non-proliferation objectives: the UNSC calls upon states to "*take cooperative action to prevent illicit trafficking in nuclear, chemical or biological weapons, their means of delivery, and related materials*" (OP 10). Despite its focus on non-acquisition by non-state actors, and even though such obligations mainly concern domestic security measures, states are also compelled to secure relevant technologies both onsite and during "*transfers*", which is a broader concept than exports, and includes, for instance, transhipments (OP 3 d). Hence, the UNSC reaffirms that non-proliferation is not just about trade, but all forms of illicit technology transfers. Accordingly, the guidelines of the AG have been progressively adapted to new logistics services. Since 2004, the AG has extended its scope of action to cover not only exporting states, but also states that take part in transhipments, in line with UNSC Resolution 1540. With this measure, the AG aims at controlling strategic trade from exporting to recipient states, and in third states where transit and transhipments take place. In this way, it aims at preventing commercial networks through shell corporations.

Similarly, the AG also updated its guidelines in 2012 to expressly cover the control of brokering services, as required in UNSC Resolution 1540 (OP 3c). The AG further recognised the guideline's importance when declaring that brokering services "*could play a key role in curtailing the activities of intermediaries and front companies*".[159] Therefore, to fulfil the export control objectives, the AG guidelines establish that risk assessments should consider, among other things, "*the role of distributors, brokers or other intermediaries in the transfer, including, where appropriate, their ability to provide an authenticated end-user certificate*".[160]

These examples show that recommendations and good practices established by participating states in the AG are certainly appealing guidelines towards the implementation of treaty obligations. Now that the AG lists have become less controversial internationally thanks to Resolution 1540 and the emphasis on national implementation of both conventions, the AG

[155] UNSC Resolution 1540 (2004), preamble.

[156] Regarding such confrontation, see below.

[157] "Non-proliferation of weapons of mass destruction", UN Security Council, 4950th meeting, Document S/PV.4950, 22 April 2004, p. 15.

[158] UNSC Resolution 1540 (2004), preamble.

[159] 2004 Australia Group Plenary, The Australia Group, 7-10 June 2004.

[160] "Media Release 2012 Australia Group Plenary", The Australia Group, 15 June 2012.

has become more influential even among non-participating states. For instance, it is worth recalling that, in 2014, the AG recognised Kazakhstan's formal voluntary commitment to its Guidelines and Common Control Lists and any subsequent changes, thus making this country the first and only state to date categorised as "*adherent*" to the AG. Later in 2017, the AG organised a series of outreach activities in Kazakhstan and incorporated states such as India, Malaysia, Pakistan, or Singapore,[161] which proves the two-sided interest in strengthening dual-use export controls in the Asian continent. In this respect, it is interesting that on the opening day of the BTWC Ninth Review Conference, which took place from 28 November to 16 December 2022 in Geneva, Kazakhstan announced the promulgation of a new export control law and reaffirmed the incorporation of the AG lists in its national legislation.[162] In other words, the AG has shaped national implementation of the treaty-based non-proliferation obligations.

4.2. EU Regulation 2021/821

The EU Regulation 2021/821 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items (dual-use export control regulation) incorporates the AG decisions, as well as other decisions taken in the informal export control realm, such as the Wassenaar Arrangement or the MTCR.[163] In this manner, the European legal framework is seen as a guiding light by countries outside the AG such as China, India, or, particularly interesting, Kazakhstan.

The EU has various projects in place within the framework of the EU Centres of Excellence (CoE) for chemical, biological, radiological and nuclear (CBRN) risk mitigation and the EU P2P Export Control Programmes, which encourage third states to reinforce national legislations to comply with international obligations as established in UNSC Resolution 1540 (2004). The joint *EU CBRN CoE Project 38* aims at enhancing the effectiveness of dual-use trade control systems with a regional perspective, and it was firstly implemented in Kazakhstan – and Jordan – (2015-2017). Indeed, since 1996, Kazakhstan has successfully adopted export control lists, later modified on several occasions according to EU standards.[164]

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[161] Sibylle Bauer *et al.*, "The Export Control Regimes", *in SIPRI Yearbook 2018: Armament, Disarmament and International Security,* SIPRI, Oxford University Press, Oxford, 2018, p. 427 and p. 429.

[162] "Statement by H.E. Mr. Kairat Umarov, First Deputy Minister of Foreign Affairs of the Republic of Kazakhstan at the Ninth Review Conference of the Biological Weapons Convention (BWC)", Geneva, 28 November 2022.

[163] Regulation (EU) 2021/821 of the European Parliament and of the Council of 20 May 2021 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items (recast), Article 15.1., *Official Journal of the European Union*, L 206, 11 June 2021. For the latest version, see Commission Delegated Regulation (EU) 2023/66 of 21 October 2022 amending Regulation (EU) 2021/821 of the European Parliament and of the Council as regards the list of dual-use items, *Official Journal of the European Union*, L 9, 11 January 2023.

[164] To date, Act No. 300 of 21 July 2007 on export control is in force in Kazakhstan. Successive modifications introduced catch-all clauses and procedures for the export, re-export, import and transit of dual-use and military items. See S/AC.44/2019/19, "Annex to the note verbale dated 27 December 2019 from the Permanent Mission of Kazakhstan to the United Nations addressed to the Chair of the Committee", Report of Kazakhstan on the implementation of Security Council Resolution 1540 (2004), 30 December 2019, p. 3.

Previous studies have evidenced the porous borders in Central Asian states, where drug trafficking and movements of Islamic terrorists have taken place on a regular basis.[165] Places like the Vozrozhdeniya Island – between Kazakhstan and Uzbekistan – were used as research centres to develop BW during the Cold War. Hence, it is certainly not trivial that EU dual-use export controls serve as a reference model for third states to reinforce and implement national legislations.[166]

The AG as an informal tool exerts influence over national implementation of treaty obligations. Preserving and further nurturing bilateral relations between the EU and third states, as well as relations between the EU and the AG and other arrangements, is essential. Already in 2014, the Commission found it convenient to "*promote the global convergence of export controls with a view to facilitating trade in dual-use items. This could include actions to promote coherent, comprehensive and unified EU representation in the arrangements as a reflection of its role in counter-proliferation and trade*".[167] The EU participates in the AG, and acts as an observer in the NSG. However, it lacks a formal status in the Wassenaar Arrangement or the MTCR. Furthermore, not all EU members participate in all four export control instruments. Considering the EU contribution to international non-proliferation objectives and its close relationship with dual-use export control lists, Bauer and Bromley noted that the EU's further engagement and active contribution to the plurilateral export control arrangements in line with the 2014 Commission Communication may require fine-tuning of the EU's internal decision-making processes.[168]

The AG functions in an environment characterised by a strong and quasi-universal prohibitory norm, as expressed through the BTWC and CWC, and reinforces national treaty obligations on the practical level, just like Resolution 1540 does. It has been wisely affirmed in this sense that "*export controls alone will not prevent a determined state with even modest industrial and technological capabilities from obtaining, for example, missiles or nuclear weapons*".[169] Such an idea becomes even more evident nowadays as international trade grows and technology develops. And also clearer in the case of the AG: with the BTWC and the CWC, the weapon categories are prohibited; with the EU Regulation 2021/821 dual-use items are more tightly controlled. And these are major forces in preventing the proliferation of related weapon-relevant technologies. Thus, biological and chemical informal export control measures must be appropriately coordinated with other existing international law instruments, and non-proliferation supports the weapon elimination objectives, which include the prevention of future armament or rearmament.

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[165] Togzhan Kassenova, "Central Asia: Regional Security and WMD Proliferation Threats", *Disarmament Forum*, n° 4, UN Institute for Disarmament Research, Geneva, 2007, p. 14; "Violence and Corruption in Central Asia", *SOC ACE Research Paper*, n° 7, 2022 (Birmingham, UK: University of Birmingham).

[166] Kamshat Saginbekova, "National Control Lists in Central Asian Countries", *in* Quentin Michel *et al*., *A Decade of Evolution of Dual-Use Trade Control Concepts: Strengthening or Weakening Non-Proliferation of WMD,* European Studies Unit, University of Liège, 2020, p. 82 and p. 90.

[167] Communication From the Commission to the Council and the European Parliament, "The Review of Export Control Policy: Ensuring Security and Competitiveness in A Changing World", Document Com/2014/0244 Final, 24 April 2014, p. 9.

[168] Sibylle Bauer, Mark Bromley, "The Dual-Use Export Control Policy Review: Balancing Security, Trade and Academic Freedom in a Changing World", *Non-Proliferation Papers*, n° 48, EU Non-Proliferation Consortium, Stockholm, 2016, pp. 13-14.

[169] Kolja Brockmann, *Challenges to Multilateral Export Controls. The Case for Inter-Regime Dialogue and Coordination,* Stockholm International Peace Research Institute, Stockholm, 2019, p. 5.

5. The struggle between non-discrimination and effectiveness

Multilateral disarmament treaties, such as the BTWC and the CWC, present all state parties with equal obligations and rights. Many countries in the Global South, especially the ones already under sanctions and other trade restrictions, objected to the continuing role of the AG during the final stages of the CWC negotiation (1989-1992). The controversy between the disarmament treaties and the AG became a salient issue during the preparations for the entry into force of the CWC (1993-1997)[170] and remained present in the deliberations of the BTWC Ad Hoc Group (1995-2001).[171] The full implementation of the so-called "non-security clauses" regarding the economic or technological development of state parties was the main issue at stake, especially for NAM members that viewed the existence of an informal institution outside both conventions as a direct challenge to their right to access technology, scientific advances and international cooperation as guaranteed by both treaties.

With the end of the Cold War, Western countries also shifted their focus away from disarmament to non-proliferation, which further exacerbated the confrontation with NAM countries.[172] As a result, some non-participating states considered the AG activities as "*an operation of a restricted and secretive multilateral cooperation among certain parties to a multilateral convention in relation to other states parties*".[173]

Debates about economic or technological development have been more recently focused on issues of public health[174] and the notion of justice.[175] The controversy between disarmament and non-proliferation (and the AG in particular) is no longer part of the general rhetoric in biological and chemical discussion forums, except for particular countries, like Venezuela or Cuba.[176] However, such debates still put into question the issue of participation in the AG as both developed and developing states progressively become suppliers of biological and chemical dual-use products.[177] Particularly remarkable is the rapid growth of the chemical and biotechnological industries in Southeast Asia. This region is a crucial sea passage for the

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[170] Jean Pascal Zanders, 2013, *op. cit.*, pp. 190-91.

[171] Anna Zmorzynska, Gunnar Jeremias, "Managing Technology Transfers Under the Biological and Toxin Weapons Convention", *Non-Proliferation Papers,* n° 21, EU Non-Proliferation Consortium, Stockholm, 2012, pp. 5-6.

[172] Jean Pascal Zanders, 2013, *op. cit.*, p. 176.

[173] Christer Ahlström, *op. cit.*, p. 375.

[174] Anna Zmorzynska, Gunnar Jeremias, *op. cit.*, p. 3.

[175] Una Becker-Jakob, "Notions of Justice in the Biological Weapons Control Regime", *Working Paper,* n° 9, Peace Research Institute Frankfurt, 2011.

[176] For instance, at the BTWC Eighth Review Conference (2016), Venezuela presented a declaration on behalf of the NAM countries and others calling on states parties to act as follows: "*Not establish, maintain or take either individually or collectively any discriminatory measures, including those in any international agreements contrary to the obligations undertaken in the Convention, which would hamper the economic and technological development of states parties to the Convention or international co-operation in the field of peaceful bacteriological (biological) activities in accordance with the provisions of the Convention*", Bolivarian Republic of Venezuela on behalf of the Group of the Non-Aligned Movement and Other States, "BTWC Article X Compliance Mechanism for the Eighth Review Conference", Eighth Review Conference of the States Parties to the BTWC, Document BWC/CONF.VIII/WP.23, 9 August 2016, para 11(a). The government of Cuba, for its part, declared, during the BTWC Ninth Review Conference (2022), that "*we oppose to those export control regimes created by some states that restrict or unreasonably limit the transfer of scientific knowledge, technology, equipment or any other material for pacific purposes between states*".

[177] Anna Zmorzynska, Gunnar Jeremias, *op. cit.*, p. 7.

transport of goods and, in addition, the presence of terrorist groups like Al-Qaeda or Jemaah Islamiyah has become increasingly prominent. Even though some countries demonstrate significant progress in the implementation of international non-proliferation obligations, others show worrying signs of deficiencies.[178]

By way of example, the latest 1540 Committee matrix on the Philippines reveals multiple shortcomings in the national biological and chemical export control regime compared to that of Singapore, both approved on December 9, 2022. While the Philippines lacks a national legislation prohibiting the manufacture, acquisition, possession, development, transport or transfer of CBW (OP 2), Singapore's matrix exhibits a precise and comprehensive legislation to impede biological and chemical proliferation.[179] At the same time, the Philippines published a National Strategic Goods List in 2018 and confirmed its annual revision according to the latest version of the EU's Common Military List and Dual-Use Goods List, in compliance with UNSC Resolution 1540 (OP 6).[180] In other words, the Philippines manages biological and chemical export controls in line with the EU dual-use regulation, hence in line with the AG guidelines and lists. However, the absence of national implementation legislations regarding the manufacture, acquisition, possession, and development of CBW also violates Article IV of the BTWC and Article VII of the CWC, so further commitment in the Philippines is still pending.

It is worth recalling in this sense that India became an AG participant in 2018, since the AG considered that "*India [had] demonstrated the will to implement rigorous controls of high standards in international trade, and its capacity to adapt its national regulatory system to meet the necessities of its expanding economy*".[181] In close relation to this issue, the AG affirmed after the 2019 plenary session, that "*the Group welcomed current and potential future membership applications from several countries and undertook to engage with them further*".[182]

Working in this line, the category of "adherents" – which is different from that of "participants" – was created, which allows new ways for third states to be involved.[183] While adherent states do not take part in the decision-making process of the AG, they take on a political commitment to act according to guidelines, recommendations and export control lists, just like any other participating state. The truth is that non-participant and non-adherent states also consult with the AG and generally follow its guidelines and recommendations.

As previously mentioned, some violations inevitably take place, but they are rare relative to the immense volumes of traded toxic chemicals. It is worth recalling the case of Q. C. Chen, a Chinese entity that was sanctioned by the United States in 2001 for providing assistance to Iran's CBW programme.[184] National implementation of measures is complicated considering

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[178] Togzhan Kassenova, "1540 in Practice: Challenges and Opportunities for Southeast Asia", *Policy Analysis Briefs*, The Stanley Foundation, 2011, p. 4 and pp. 9-10.

[179] "1540 Committee Matrix of Philippines", 1540 Committee, 9 December 2020.

[180] "Philippine National Implementation Report", 2018-2019, 1540 Committee, 5 March 2020, p. 3.

[181] "Press Release: India Joins the Australia Group", The Australia Group, 19 January 2018.

[182] "Statement by the Chair of the 2019 Australia Group Plenary", The Australia Group, 15 July 2019.

[183] Currently, as was previously mentioned, Kazakhstan is the only adherent state. As such, it commits itself to making use of guidelines, recommendations and export controls lists as a code of good practice for dual-use biological and chemical export controls (see "Australia Group Adherents", The Australia Group – official website).

[184] Seth Brugger, "China Sanctioned for Chem, Bio Transfers to Iran", *Arms Control Today*, March 2020.

the size of the Chinese chemical industry, and Chinese authorities have shown their reluctance to investigate or prosecute large and influential state-owned enterprises.[185] Nonetheless, according to Chinese officials, since 2006 the country has held six rounds of consultation with the AG, and China's CW-related export controls are in line with AG control lists. Indeed, China also recognises its contribution and commitment to international biological and chemical non-proliferation and disarmament obligations as established in the BTWC, the CWC and UNSC Resolution 1540.[186] Such recognition is not to be underestimated since the AG operates in support of both treaties and in close coordination with other international obligations.

The acceptance of new participating states and the establishment of different "categories" – like adherents – might help overcoming the discriminatory appearance sometimes attributed to the AG and other export control arrangements.[187] However, the case of China shows that the number of participants or adherents is not as relevant as the willingness and intention of states to cooperate towards a common goal. As a matter of fact, some scholars have argued in favour of a reduced participation of states in plurilateral export control arrangements whenever trust among participants is to be enhanced and states share common interests.[188] Or, as Arthur Stein stated, "*regimes are maintained as long as the patterns of interest that gave rise to them remain*".[189]

Besides, as previously mentioned, the AG operates in support of other international instruments. For the sake of common interests, states are encouraged to apply for assistance and capacity-building in case of difficulties regarding the development and implementation of export controls.[190] In May 2018, for instance, the Government of Iraq presented a public request for assistance to the 1540 Committee. Iraq, which does not participate in the AG, revealed its willingness to improve the management of chemical risks and strengthen border controls, including developing guidelines to deter illegal transboundary shipments of dual-use materials, training of customs control officers or law enforcement, among others.[191] Also, in 2019, the 1540 Committee considered the Mexican application for assistance to improve the implementation of dual-use export control measures,[192] despite its rigorous adaptation of national non-proliferation obligations to international standards and its participation in the AG since 2013. In a similar vein, the BTWC and the CWC encourage state parties to consult one another and cooperate to reach the pursued objectives (Article V BTWC and Article IX CWC). Therefore, assistance towards enhancing implementation of national measures can be provided bilaterally, interregionally or *via* treaties or international organisations, regardless

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[185] Chin-Hao Huang, "Bridging the Gap: Analysis of China's Export Controls Against International Standards", Final Project Report to the Foreign and Commonwealth Office Counter-Proliferation Programme, April 2012, p. 14.

[186] *China's Export Controls,* First Edition, State Council Information Office of the People's Republic of China, December 2021.

[187] Iris Hunger, Oliver Meier, *op. cit.*, p. 41.

[188] Richard. L. Williamson Jr., *op. cit.*, p. 78; Kolja Brockmann, *op. cit.*, p. 9.

[189] Arthur A. Stein, "Coordination and Collaboration: Regimes in an Anarchic World", *International Organization,* vol. 36, n° 2, 1982, pp. 299-324.

[190] According to Resolution 1540, the UNSC "*invites States in a position to do so to offer assistance as appropriate in response to specific requests to the States lacking the legal and regulatory infrastructure, implementation experience and/or resources*" (OP 7).

[191] "Requests for assistance", 1540 Committee.

[192] *Ibid.*

states' participation in plurilateral export control arrangements, but must be individually required by states concerned.

Considering recent events, doubts arise regarding the convenience of further enlarged AG. Although it is true that strategically relevant states could remain outside export control guidelines and recommendations, the participation of certain states could be controversial, considering states' reluctance to exchange confidential information on sensitive matters. Particularly significant is Russia's absence from the AG, despite its participation in the MTCR and WA. Since the Russian invasion of Ukraine in February 2022, the Government of Russia has been responsible for the failure of the Tenth NPT Review Conference that took place in August 2022, where Russia opposed consensus in isolation because of "*objections on key points which have a political dimension and are known to all*".[193] So did the country in December 2022 when it blocked the approval of diverse text elements in the final document of the Ninth BTWC Review Conference. Therefore, in the light of the war in Ukraine and of the breakdown in multilateral cooperation, Russia's participation in the AG would merely result in a constant blockade of decision-making.

In view of the current geopolitical situation, it should be borne in mind that the AG was initially established as a group of like-minded states. And it might be essential that it remains as such in pursuit of biological and chemical disarmament and non-proliferation objectives. But if non-like-minded states are to be considered, Beck and Jones suggest that the AG – and plurilateral export control arrangements as a whole – "*must continue to focus on norm creation and convergence, with the more liberal and cooperative members working hard and devoting significant resources to instilling these norms in the newcomers*".[194]

6. Building bridges between export controls and cooperation for peaceful purposes

In the current globalised context, it is certainly a challenging task to ensure that all interests are equitable. Unlike nuclear weapons, the dual-use nature of most of the CBW components com- plicates preventing the spread of dangerous technologies, further hindered by rapid advances in the biological and chemical industries. As civilian applications coexist with increasingly available legitimate suppliers operating in e-commerce platforms, legality, accountability and effectiveness of dual-use transfer regulations and guidelines become increasingly important features.[195] It is then worth considering how stakeholders participate in securing dual-use transfers – accountability or inclusiveness – on the one hand, and how states cooperate to promote economic or technological development for peaceful purposes, on the other hand.

[193] Heather Foye, "UN Member State Reactions at the Close of the 2022 NPT Review Conference", *Arms Control Association*, 6 September 2022.

[194] Michael D. Beck, Scott A. Jones, *op. cit.*, p. 67.

[195] Iris Hunger, Oliver Meier, *op. cit.,* p. 13.

6.1. Cooperation with stakeholders

In view of potentially ineffective national laws and regulations, there is an increasing need of cooperation between governments and industries to ensure that biological and chemical companies do not contribute, neither intentionally or accidentally, to the spread of sensitive dual-use technologies. Mauer and Fischer wisely affirmed in this sense that "*the old treaty-and-regulation model is outmoded*".[196]

Thus, states increasingly encourage industry to engage in setting voluntary security standards. This is particularly the case of emerging fields such as the gene synthesis industry, where universal standards seem feasible. While governmental agencies may establish lower standards than companies, companies may be willing to impose self-restrictions and reinforce security in the entire industry.[197] Precisely because of the BTWC and CWC, all stakeholders share the same interest: the prevention of CBW proliferation. The respective industry communities participate actively in many forums of the OPCW and the BTWC, and have interactions with the AG and governments in the development of national legislation and regulations.

Such engagement among stakeholders was also suggested by Jean Pascal Zanders based on the technology transfer model and the idea of accreditation. In this model, a national authority, an international organisation, and suppliers and end-users work together to monitor and control technology transfers. Licences are granted to end-users according to national export regulations on a case-by-case basis; an international organisation carries out inspections in case of non-accreditation; suppliers and end-users share an equal burden in terms of transparency in exchange for trade benefits.[198]

A third suggestion is enhancing transparency in the biotechnology industry by closely monitoring trade – imports and exports – with various UN and EU databases or the World Customs Organisation Harmonised System in a sort of "*system of passive technology transfer monitoring*".[199] Even though all these proposals may face complexities, they also move away from traditional export controls. By reducing tensions between the participants and non-participants in plurilateral export control arrangements, the international community also works towards a more transparent and inclusive system when dealing with dual-use trade.[200] In this sense, "*there is no denying that globalisation has weakened traditional regulation and treaty methods. The good news is that it also has given industry standards a worldwide reach*".[201]

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[196] Stephen M. Maurer, Markus Fischer, "How to Control Dual-Use Technologies in the Age of Global Commerce", *Bulletin of the Atomic Scientist*, vol. 66, n° 1, 2010, p. 41.

[197] *Ibid*.; Anna Zmorzynska, Gunnar Jeremias, *op. cit*.

[198] Jean Pascal Zanders, "A Verification and Transparency Concept for Technology Transfers under the BTWC", *Weapons of Mass Destruction Commission,* Stockholm, 2004, p. 28.

[199] Anna Zmorzynska, Gunnar Jeremias, *op. cit*., p. 8.

[200] *Ibid.*, p. 7.

[201] Stephen M. Maurer, Markus Fischer, *op. cit.,* p. 46.

6.2. The role of BTWC and CWC

Despite the potentially divergent political and economic interests regarding their national biological and chemical industries, state activities are regulated by the BTWC and CWC, as transposed in national implementation legislation. Ultimately, the whole purpose of the AG is to cooperate and achieve common objectives, which is something that participating states have committed to as sovereign entities. Indeed, a considerable amount of resources is being invested by advanced countries to comply with Article XI of the CWC and Article X of the BTWC, to enhance the development of capacities – legal and technological – and to improve safety, security and preparedness.

State parties are putting enormous efforts in the implementation of measures to facilitate the fullest possible exchange of chemicals, equipment, and scientific and technical information relating to the development and application of chemistry, in accordance with the provisions of the convention (Article XI of the CWC). The report produced by the OPCW Secretariat for the 101st session of the OPCW Executive Council bears this out.[202] By way of example, from 26 August 2021 to 25 August 2022, the Secretariat organised 25 capacity-building programmes, including training activities, seminars, and workshops, with a total of 641 participants from 91 state parties (para. 5). With the support of the EU, it launched the first edition of the Education and Training Programme for Youth on Peaceful Uses of Chemistry to enhance the capacities of young people in respect of peaceful uses of chemistry towards the prevention of diversion of chemicals for malicious use (para. 8). In this manner, state parties are informed about programmes, activities, and outcomes relating to the CWC, and informal papers and reports are shared among them in order to enhance the dissemination of knowledge and information (para. 91).

The partner countries of the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction also showed their commitment towards full implementation of BTWC Article X, which requires state parties to facilitate the fullest possible exchange of biological agents and toxins and related material for peaceful purposes.[203] At the Ninth BTWC Review Conference, the Global Partnership reported 311 projects conducted or funded by twenty of its partners and implemented in dozens of countries from 2017 until 2022.[204] For instance, the EU and Canada present various projects in support of the implementation of export controls and border security measures to prevent the proliferation and trafficking of weapons of mass destruction in Latin America and the Caribbean, in line with international non-proliferation obligations.[205]

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[202] Progress Made and Review of the Status of Implementation of Article XI of the Chemical Weapons Convention, Report by the Director-General, Document EC-101/DG.9, OPCW, 31 August 2022.

[203] The Global Partnership Against the Spread of Weapons and Materials of Mass Destruction comprises: Australia, Belgium, Canada, Chile, Czech Republic, Denmark, the European Union, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Japan, Jordan, Kazakhstan, the Republic of Korea, Mexico, the Netherlands, New Zealand, Norway, the Philippines, Poland, Portugal, Spain, Sweden, Switzerland, Ukraine, the UK, and the US.

[204] Canada, "International Activities of Global Partnership Member Countries related to Article X of the Biological and Toxin Weapons Convention (2017-2022)", Ninth Review Conference of the States Parties to the BTWC, Document BWC/CONF.IX/WP.51, 6 December 2022, para. 3, UN Office for Disarmament Affairs.

[205] *Ibid.*, pp. 46-47.

Export controls and cooperation for peaceful purposes are thus not "*opposing*" but "*interlinked*" activities and are likely to reinforce each other.[206] As state parties cooperate for the sake of the economic or technological development of members, biological and chemical non-proliferation objectives "*democratise*" and bring disarmament treaties – the BTWC and the CWC – closer to informal arrangements like the AG.

Concluding remarks and future directions

In the present context, technological and scientific development, economic prosperity and national security become increasingly important. Globalisation has changed the way international trade is understood. Still, this cannot happen at the expense of international security, and the international community must constantly adapt to the evolving international situation. A more flexible approach to international law making is demanded – an approach that moves away from a binary system of hard law and soft law towards a system where both work together.[207]

CBW – unlike nuclear weapons, missile technology, or conventional weaponry – are primarily governed by the CWC and the BTWC, respectively, which define the meaning of legitimate uses of potential CBW technologies. UNSC Resolution 1540 reinforces disarmament objectives – focusing on the role of non-state actors – and obliges all UN members to adopt national measures to control domestic and international nuclear, biological and chemical transfers. Reporting requirements under the BTWC and CWC and Resolution 1540 work together towards compliance with disarmament and non-proliferation international obligations in general, and biological and chemical dual-use export controls in particular, in the context of their respective functions and duties. The combination of the treaties, the UNSC Resolution and the AG means that many countries align with the soft law recommendations put forward by the AG even though they do not participate in the arrangement. As a result, the goal of the AG is to support the disarmament objectives, namely zero weapon possession.

The legal nature of soft law instruments is still uncertain, but their evolving nature is undeniable. The influence – and even prominence – of soft law is real, especially in rapidly changing environments and fields, like biotechnology. For that matter, informal mechanisms frame the normative agenda in the strategic or dual-use export controls realm. In view of new threats and challenges, soft law instruments might be regarded as new "sources" of international law, as clearly perceived from the relationship between the AG and EU Dual-Use Regulation. Their export control lists have become *de facto* international standard in this framework, spreading lists, guidelines and practices to non-participants and non-member states. Therefore, the existence of hard law and soft law mutually reinforce each other and actually contribute to far greater engagement in international cooperation in areas defined by dual-use risks.

There have been several proposals to bridge the linkage between legally binding mechanisms and informal arrangements that boost security and promote international commerce in potentially dual-use goods, especially in the biological and chemical industries. The growing

[206] Iris Hunger, Oliver Meier, *op. cit.,* p. 25.

[207] Marcel Brus, *op. cit.*, p. 246.

significance and further integration of soft law into the non-proliferation domain requires a constant learning scenario in which states – and stakeholders as a whole – are prepared to engage in dialogue and negotiations. The role of soft law for international non-proliferation purposes is under continuous construction, and many unknowns remain. What kind of new risks and threats does the future hold and how can international law better respond? Should plurilateral export control arrangements consider suspending or expelling non-complying states? Would it be reasonable – and necessary – to create a new export control arrangement in line with the current reality? Recent events such as the Covid-19 pandemic or the Russian invasion of Ukraine certainly pose new challenges for dual-use export controls. Now, a more consolidated impact of non-legally binding export control arrangements is yet to be seen.

The Australia Group: Life sciences and export control challenges

Élisande Nexon

Recent health, climate, and geopolitical crises have helped to heighten awareness of the urgent need to develop innovative solutions to meet major contemporary challenges such as emerging disease epidemics, resource scarcity, food insecurity, and CBRN threats. Emerging and disruptive technologies provide new opportunities to tackle them.[208] In this respect, the Covid-19 pandemic yielded some lessons. However, such advances and trends also pose security and proliferation concerns. Participants in the Australia Group (AG), must thus take into account those concerns when considering adjustments to export controls.

1. Dual-use applied to life sciences and export controls

Generally describing commodities, including physical goods, technologies and software or research that may have civilian and military applications, the dual-use concept is highly relevant in the life sciences when considering non-conventional weapon proliferation threats. In this field, dual-use experiments may include, for example:

- *de novo* synthesis of pathogens,
- manipulations that intentionally or accidentally result in enhanced virulence or transmissibility,
- altering the host range of pathogens,
- evasion or suppression of host immunity,
- enabling diagnostic or detection,
- inducing resistance to antibiotics or antivirals, or
- rendering a vaccine ineffective.

[208] Various understandings of "disruptive technologies" coexist. The term often refers to innovations that have the potential to replace existing technologies, products and services, significantly transforming the way businesses, customers, and industries operate. Applied to the realm of defence and security, disruptive technology for defence may be defined as "*an enhanced or completely new technology that brings about a radical change, including a paradigm shift in the concept and conduct of defence affairs such as by replacing existing defence technologies or rendering them obsolete*" ("Regulation (EU) 2021/697 of the European Parliament and of the Council of 29 April 2021 establishing the European Defence Fund and repealing Regulation (EU) 2018/1092", *Official Journal of the European Union*, L170, Art. 2(13), 12 May 2021). Disruptive technologies relevant when considering dual-use challenges include, for example, artificial intelligence, big data analytics, quantum-enabled technologies, and biotechnology.

But the scope of activities that may raise dual-use concerns is much broader. It encompasses, among other things, gene drive applications, research on targeted delivery of pharmacologically active compounds, gain-of-function experiments in vectors, or biologically mediated processes to produce toxic compounds.[209]

Under Article III of the Biological and Toxin Weapons Convention (BTWC), a state party cannot transfer or in any way assist, encourage, or induce any entity to manufacture or acquire biological agents, toxins and weapons, and related equipment and means of delivery. Export controls are among the key instruments to prevent the proliferation of biological weapons (BW), next to national criminal and penal legislation, biosafety and biosecurity management, professional codes of conduct and ethical codes. With UN Security Council Resolution 1540 (2004), UN members must also prevent BW technology transfers to non-state actors, including terrorists and criminal entities. The AG supports the objectives of the BTWC and Resolution 1540 by reviewing and exchanging information on emerging challenges posed by scientific and technological advances and harmonising national technology transfer controls.

In the life sciences, export controls apply to listed human, animal and plant biological agents (bacteria, viruses and fungi) and genetic elements.[210] They also cover genetically-modified organisms and human and animal toxins and their sub-units. The export controls also address dual-use biological equipment with specific characteristics, related technology and software. They include components such as cross-flow filtration equipment, fermenters, spray- or freeze-drying equipment, nucleic acid assemblers and synthesisers, and associated software that can design and build functional genetic elements from digital sequence data.

The scientific and technical landscape changes constantly. Maintaining the relevance of export control mechanisms entails detecting emerging trends or technologies that may become game changers. Keeping abreast of developments also requires dynamic assessment of their threat potential while avoiding determinism. The increasingly interdisciplinary dimension adds to the complexity of the matter.

2. Contemporary and emerging challenges shaping the life sciences and biotechnology landscape

Representing tremendous innovation potential, biotechnology is a rapidly growing market. Investment policies for biotechnology and the bioeconomy put in place by powers such as the United States or China, among others, already reflect the importance attached to this sector in tackling major contemporary challenges, including those related to industrial sovereignty. These include scarcity of natural resources, effects of climate change, food security, health and well-being issues related to demographic ageing, or emerging infectious diseases. If these

[209] George J. Annas, Chase L. Beisel, Kendell Klement *et al.*, "A Code of Ethics for Gene Drive Re- search", *CRISPR Journal*, vol. 1, n° 4, 2021, pp. 19-24; *Emerging technologies and dual-use concerns: A horizon scan for global public health,* World Health Organisation, Geneva, 2021.

[210] According to the AG technical notes, genetic elements "*include, inter alia: chromosomes, genomes, plasmids, transposons, vectors, and inactivated organisms containing recoverable nucleic acid fragments, whether genetically modified or unmodified, or chemically synthesized in whole or in part*".

issues were already well identified before, a confluence of major crises since 2020 has exacerbated the urgency to act globally. Biotechnologies may offer innovative solutions.

The magnitude of the Covid-19 public health threat triggered an unprecedented level of international collaboration within the scientific community and industry. In this context, fostering research and fuelling innovation, open science based on digital and collaborative technology proved a game changer. This movement removed barriers to information sharing and accelerated knowledge dissemination. New possible biotechnology contributions in the medical and pharmaceutical sectors also arose. The convergence of biotechnology with artificial intelligence and big data, among others, will surely expand the field of possibilities. These developments will have a lasting economic, social and political impact.

More than previous public health crises, the Covid-19 pandemic has highlighted the transfers of advanced technologies and associated challenges. Such transfers accelerate the accumulation of knowledge and expertise. Coupled with the acquisition of appropriate equipment, they generate economic development and stimulate advanced and innovative industrial processes in different parts of the world. For instance, emerging economies and middle-income countries have developed sophisticated pharmaceutical industries over the past years.[211]

The effects of the multiplication of extreme climatic phenomena, including record-breaking heat waves, drought, wildfires, flooding, and storms, have also been more acutely felt in societies already economically and socially affected by the pandemic. There is mounting evidence to link some of these effects to human-induced climate change.[212] Molecular biology and biotechnology can help address challenges such as global warming, loss of biodiversity, biogeochemical flows, and pollution fuelled by manufacturing by better understanding the determinants underpinning them and proposing innovative solutions.[213]

While these events impacted production capacities and commercial transfers, new geopolitical instabilities as expressed by the war in Ukraine and increasing Indo-Pacific tensions reveal additional vulnerabilities in global supply chains in specific strategic sectors. These include supply disruption in the medical, food and energy industries. China is, for example, one of the leading suppliers of active pharmaceutical ingredients (APIs), while Ukraine and Russia are major exporters of cereals.[214] Exports of fertilisers are also affected as Russia is a top supplier.[215] These crises act as incentives to seek more actively alternative sources of supply to achieve greater industrial autonomy, including through the development of the biotechnology sector.

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[211] "Technology Transfer: A Collaborative Approach to Improve Global Health", Position Paper, Geneva, International Federation of Pharmaceutical Manufacturers and Associations (IFPMA), November 2021.

[212] "State of Climate in 2021: Extreme events and major impacts", Report, Geneva, World Meteorological Organization (WMO), 31 October 2021.

[213] "Harnessing molecular biology to accelerate the Green Recovery", White Paper, Heiderlberg, European Molecular Biology Laboratory (EMBL), October 2021.

[214] Henry Miller, John Cohrssen, "China's Coronavirus-Induced Paralysis Threatens U.S. Drug Sup- ply Chain", *Missouri Medicine*, vol. 117, n° 2, 2020, pp. 86-88.

[215] *The impacts and policy implications of Russia's aggression against Ukraine on agricultural markets*, Organisation for Economic Co-operation and Development (OECD), Paris, 5 August 2022.

These events and trends contribute to shaping the international scientific and technological landscape. They will lead to an expanding base of skilled professionals and a geographic redistribution of global scientific and industrial capacities. As emerging enabling technologies, life sciences and biotechnology will benefit from increasing investments. Their growing stakes will serve as a driving force for research and development, thus fuel economic and scientific competition. Governments will seek to support innovation and to structure key sectors to promote the development of domestic capacities. In this highly competitive context, strategies aiming at acquiring technology and knowledge through joint ventures, purchasing foreign assets, or recruiting high-level foreign scientists will require increased attention to prevent intellectual property theft or inadvertent contribution and deliberate efforts at weapon proliferation.

Considering both tangible and intangible dimensions, the fast-evolving international scientific and technological landscape challenges traditional export control mechanisms. The exponential growth in potential providers, users and consumers of dual-use technologies may significantly erode their effectiveness because some will lack awareness of security issues. States may also lack stringent export control measures such as the ones set out by the AG or EU regulations to prevent the diversion of such technologies for developing weapon technologies prohibited under international law.

3. An ever-evolving scientific and technological landscape

The earliest BTWC review conferences in the 1980s already identified the potential impact of molecular biology and biotechnology developments on biological threats. Since then, advances in, for example, synthetic biology and gene editing have transformed the scientific and technological landscape, overcoming some earlier identified barriers to developing BW. These advances have made it possible to carry out manipulations that were previously only conceivable from a theoretical point of view. By speeding up analytical and engineering processes, they have also simplified experiments and procedures that only a very small number of scientists with access to state-of-the-art laboratories had previously been able to master. Improved performance, reduced size and lower equipment prices also helped to make these technologies more accessible. In the past decade, the cost of assembling ever larger DNA clones has dropped significantly.

For example, next-generation sequencing has drastically reduced the costs and time of genome analyses, thus transforming the use of DNA sequencing in biomedical research and infectious disease surveillance.[216] High-throughput technologies combined with bioinformatics have accelerated the identification and characterisation of pathogens with ever greater precision. They also provide insights into properties such as virulence and antimicrobial resistance.[217] Another milestone involved the breakthrough stemming from the discovery that

[216] Sanjay Gautam *et al.*, “A step-by-step beginner’s protocol for whole genome sequencing of human bacterial pathogens”, *Journal of Biological Methods*, vol. 6, n° 1, 2019, e110.

[217] Duncan MacCannell, Marta Gwinn, Gregory Armstrong, “Next-Generation Sequencing of Infectious Pathogens”, *JAMA Insights*, vol. 321, n° 9, 2019, pp. 893-94.

a defence system found in bacteria, CRISPR-Cas9,[218] could be converted into a versatile genome editing tool more effective than the existing ones. This has been followed by subsequent development in CRISPR-based technologies and applications.[219] While not the first method for modifying DNA, the simplicity and efficiency of CRISPR-Cas9 made it into a game-changing tool that laboratories worldwide have rapidly adopted.

Such developments in science and technology increase the potential for BW development and production misuse. But the problem goes beyond the context of research laboratories. It has long been possible to buy pathogen strains and, more recently, DNA sequences from commercial suppliers. Today, individuals can search the internet for protocols and DNA sequences and purchase equipment, primers, reagents, and other materials online.[220] A thriving second-hand market exists for biological process equipment such as fermenters, cross-flow filtration equipment, and freeze- or spray-dryers. Some, usually small, companies outside AG partnering countries offer AG-listed items. Internet trading and online marketplaces such as Alibaba challenge export control regulations by providing means of circumventing them.[221] Second-hand sellers may, in some cases, not even know about export control requirements. Similarly, researchers who sell or pass on (*e.g.* free gifts) such equipment may also be unaware of these requirements and instead focus more on safety-related issues.[222] The fact remains that an ever-increasing number of actors have easy access to dual-use materials, equipment and products.

Moreover, new challenges to controlling the technology flows arise on the horizon. Creating a pathogen from scratch still seems impossible for individuals without the requisite expertise and access to a well-equipped laboratory. Viral synthesis and even more bacterial synthesis remain technically challenging.[223] However, as past experiences suggest, the situation may evolve rapidly in a non-linear way. It is therefore necessary to detect and monitor trends and technological advances with the potential to alter the current state of affairs, as well as to design and implement timely measures to forestall potential misuse. In this respect, export controls are one of the tools in the box.

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[218] CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats and CRISPR-associated protein 9) was adapted from a naturally occurring adaptive immune system that provides bacteria protection against invading genetic elements, including bacteriophages (viruses that infect bacteria).

[219] Gavin Knott, Jennifer Doudna, "CRISPR-Cas guides the future of genetic engineering", *Science*, vol. 361, n° 6405, 2018, pp. 866-869.

[220] Karl Gruber, "Biohackers", *EMBO Reports*, vol. 20, n° 6, 2019, e48397.

[221] Raymond Zilinskas, Philippe Mauger, "E-commerce and biological weapons non-proliferation: Online marketplaces challenge export controls to reduce the risk that rogue states or terrorists could acquire the capacity to produce biological weapons", *EMBO Reports*, vol. 16, n° 11, 2015, pp. 1415-1420.

[222] Amanda Sayre, Thomas Gray, "Used Goods, New Risks: Mitigating Proliferation Impacts of the Global Secondary Market", *Strategic Trade Review*, vol. 6, n° 9, 2020, pp. 5-30.

[223] Laura DeFrancesco, "Synthetic virology: the experts speak", *Nature Biotechnology*, n° 39, 2021, pp. 1185-1193. National Academies of Sciences, Engineering, and Medicine; Division on Earth and Life Studies; Board on Life Sciences; Board on Chemical Sciences and Technology; Committee on Strategies for Identifying and Addressing Potential Biodefense Vulnerabilities Posed by Synthetic Biology, "Assessment of Concerns Related to Pathogens", *in Biodefense in the Age of Synthetic Biology,* National Academies Press, Washington, DC, 2018.

4. Keeping the AG relevant and tackling non-proliferation challenges

Emerging and converging technologies test the existing non-proliferation and export control multilateral frameworks. This is especially the case in the biological field, with an impact on the functioning of the BTWC and the AG. Combining high-throughput screening and computational approaches could, for example, enhance the development of more stable biological agents with improved resistance to environmental stress factors. Convergences between life sciences and digital technologies open new horizons. In this respect, the most relevant technological fields include biotechnology, nanotechnology, additive manufacturing, artificial intelligence, and machine learning. While they help overcome hurdles more rapidly and drive innovation, they create new security and non-proliferation challenges too.[224] They generate a highly complex web of interactions between disciplines and stakeholders.

Considering the sometimes-conflicting public health, economic and security issues at stake, it is necessary to balance security concerns and sustainable development goals. Export controls should not hinder legitimate trade and economic development.

Ensuring compliance and avoiding unintentional violations of export control regulations, including those incorporating the AG Common Control Lists, requires solid knowledge and understanding of international and national obligations. In this respect, adopting an efficient compliance programme is vital for companies and research organisms. The demand may prove more challenging for some academic and research institutions, as this requires the commitment of resources to monitor evolving laws and regulations. In addition, given their areas of activities (*e.g.* public health), many life science industrial and academic entities may operate in sensitive countries or cooperate with foreign research institutes. Engaging with them to increase awareness and help them navigate the complexity of export controls and trade sanctions is essential.[225]

Especially emerging and disruptive technologies, such as biotechnologies, may contribute to increase the biological threat. Keeping pace with rapidly evolving dual-use technologies is thus essential. The regular revisions of the AG control lists reflect this need. For example, the AG decided in May 2021 to add nucleic acid assembler and synthesiser "software" to the list of Dual-use Biological Equipment and Related Technology and Software.[226] In this respect, the statement after the 2022 Plenary stressed "*the value of engagement with and outreach to industry and academia for enhancing understanding of the impact and pace of new scientific and technological developments*".[227]

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[224] John O'Brien, Cassidy Nelson, "Assessing the Risks Posed by the Convergence of Artificial Intelligence and Biotechnology", *Health Security*, vol. 18, n° 3, 2020, pp. 219-227; Kolja Brockmann, Sibylle Bauer, Vincent Boulanin, *Cover Bio Plus X: Arms Control and the Convergence of Biology and Emerging Technologies*, Stockholm International Peace Research Institute, Stockholm, March 2019.

[225] Mirko Himmel, "Emerging dual-use technologies in the life sciences: challenges and policy recommendations on export control", *Non-Proliferation and Disarmament Papers* n° 64, EU Non-Proliferation and Disarmament Consortium, Stockholm, September 2019.

[226] Decision made at the Australia Group (AG) Virtual Implementation Meeting session in May 2021 and subsequently adopted pursuant to the AG silence procedure.

[227] "Statement by the Chair of the 2022 Australia Group Plenary", The Australia Group, 8 July 2022.

The oversight of dual-use research and intangible technology transfers, encompassing the transfer of knowledge and technical data, are other complex issues. In October 2022, the prepublication of results from an experiment involving modifying a strain of SARS-CoV2 reignited the debate about the gain-of-function research.[228] A decade ago, controversy erupted around the publication of results of H5N1 experiments in ferrets, demonstrating that airborne transmission of the avian influenza virus is possible among mammals after specific mutations in the strain. Dealing with the issue in a different way to the American authorities, the Dutch licencing authority proceeded to use export control legislation to assess whether the publication of the research methodology and data might pose a proliferation risk. Drawing on the EU export control regulations for dual-use goods, which requires export authorisation for applied research, the route of an export licence was the only tool available for the Dutch authority to assess the proliferation risk from the research report. It eventually granted the export licence. However, the intervention by the Dutch government fuelled the debate about the free exchange of scientific knowledge when human and animal health may be at stake.[229] The university took the case to court, but from a legal viewpoint, the matter was never fully resolved because the issuance of the export licence removed the case's merit. Other questions concern transparency in research and who should be allowed access to unpublished data should a policy enabling the redaction of sensitive data in a submitted manuscript under specific circumstances be adopted.

Conclusion

Global changes in the security landscape, the redistribution of scientific and industrial activities across continents, and the emergence of new categories of stakeholders and security actors continuously bring into question the adequacy of the existing international weapon control treaties and export control measures. The rise of internet trading (together with the possibility of illicit trafficking through the darknet) may contribute to the inadvertent or deliberate circumvention of export controls. Trends such as open science and cloud laboratories enabling multiple research institutes to conduct joint experiments remotely create both scientific opportunities and proliferation vulnerabilities. The latter pose new export control challenges, not in the least because individual researchers should seek to ascertain the benign intent of other project participants in the context of potentially dual-use research. New stakeholders, such as the do-it-yourself biological community or industrial actors and scientists in countries with more recent development of the life sciences and biotechnology, may have less awareness about export control requirements or be subject to less scrutiny.

As controlling the trade and transfers of dual-use goods becomes increasingly complex, the importance of raising awareness in a bottom-up approach among different actors is growing. Improving awareness about export control requirements and trade compliance in the medical, pharmaceutical and biotechnology sectors is of the essence.

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[228] Ewen Callaway, Max Kozlov, "Which COVID studies pose a biohazard? Lack of clarity hampers research", *Nature*, 21 October 2022.

[229] Christos Charatsis, "Setting the publication of 'dual-use research' under the export authorisation process: the H5N1 case", *Strategic Trade Review*, vol. 1, n° 1, 2015, pp. 56-72.

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