

UNCITRAL Model Law on Automated Contracting with Guide to Enactment



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UNITED NATIONS COMMISSION ON INTERNATIONAL TRADE LAW

UNCITRAL Model Law on
Automated Contracting
with
Guide to Enactment



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Resolution adopted by the General Assembly on 4 December 2024

79/119. Model Law on Automated Contracting

The General Assembly,

Recalling its resolution [2205 \(XXI\)](#) of 17 December 1966, by which it established the United Nations Commission on International Trade Law with a mandate to further the progressive harmonization and unification of the law of international trade and in that respect to bear in mind the interests of all peoples, in particular those of developing countries, in the extensive development of international trade,

Recalling also its resolution [60/21](#) of 23 November 2005, by which it adopted the United Nations Convention on the Use of Electronic Communications in International Contracts and called upon all Governments to consider becoming party to the Convention, and its resolutions [51/162](#) of 16 December 1996, [56/80](#) of 12 December 2001, [72/114](#) of 7 December 2017 and [77/101](#) of 7 December 2022, in which it recommended that all States give favourable consideration to the Model Law on Electronic Commerce, the Model Law on Electronic Signatures, the Model Law on Electronic Transferable Records and the Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services of the Commission, respectively,

Mindful that the Convention, the Model Law on Electronic Commerce, the Model Law on Electronic Signatures, the Model Law on Electronic Transferable Records and the Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services are of significant assistance to States in enabling and facilitating electronic commerce in international trade,

Mindful also of the importance of providing a legal foundation to promote confidence in electronic commerce, including across borders, and of the increasing relevance of automation in contracting, including through the deployment of artificial intelligence systems,

Considering that uncertainty as to the legal effect of automation in contracting can create an obstacle to harnessing the full potential of digital trade,

Convinced that legal certainty and commercial predictability in electronic commerce, including across borders, will be enhanced by the harmonization of certain rules on the use of automation in contracting on a technologically neutral basis,

Recalling that the Commission placed the topic of automated contracting on its work programme at its fifty-fourth session, in 2021,¹ and referred the topic to its Working Group IV (Electronic Commerce) at its fifty-fifth session, in 2022,²

Noting that the Working Group devoted three sessions, in 2022 and 2023, to that work, and that the Commission considered at its fifty-seventh session, in 2024, draft provisions on automated contracting prepared at the request of the Working Group,³

Believing that a model law on automated contracting will constitute a useful addition to existing Commission texts in the area of electronic commerce by assisting States in enhancing their legislation governing the use of automation in contracting, or in formulating such legislation where none exists,

1. *Expresses its appreciation* to the United Nations Commission on International Trade Law for completing and adopting the Model Law on Automated Contracting;⁴

2. *Requests* the Secretary-General to publish the Model Law together with a guide to the enactment thereof, including electronically, in the six official languages of the United Nations, and to disseminate it broadly to Governments and other interested bodies;

3. *Recommends* that all States give favourable consideration to the Model Law when revising or adopting legislation on electronic commerce, and invites States that have used the Model Law to advise the Commission accordingly;

4. *Also recommends* that States continue to consider becoming parties to the United Nations Convention on the Use of Electronic Communications in International Contracts⁵ and to give favourable consideration to the Model Law on Electronic Commerce,⁶ the Model Law on Electronic Signatures,⁷ the Model

¹ *Official Records of the General Assembly, Seventy-sixth Session, Supplement No. 17 (A/76/17)*, paras. 25 (e) and 236.

² *Ibid.*, *Seventy-seventh Session, Supplement No. 17 (A/77/17)*, para. 22 (d).

³ *Ibid.*, *Seventy-ninth Session, Supplement No. 17 (A/79/17)*, chap. VII.

⁴ *Ibid.*, annex IV.

⁵ United Nations, *Treaty Series*, vol. 2898, No. 50525.

⁶ Resolution 51/162, annex.

⁷ Resolution 56/80, annex.

Law on Electronic Transferable Records⁸ and the Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services⁹ when revising or adopting legislation on electronic commerce;

5. *Appeals* to the relevant bodies of the United Nations system and other relevant international and regional organizations to coordinate their legal activities in the area of electronic commerce with those of the Commission, to avoid duplication of efforts and to promote efficiency, consistency and coherence in the modernization and harmonization of legislation on electronic commerce.

*47th plenary meeting
4 December 2024*

⁸Official Records of the General Assembly, Seventy-second Session, Supplement No. 17 (A/72/17), annex I.

⁹Ibid., Seventy-seventh Session, Supplement No. 17 (A/77/17), annex II.

Decision of the United Nations Commission on International Trade Law

The United Nations Commission on International Trade Law,

Recalling its mandate under General Assembly resolution [2205 \(XXI\)](#) of 17 December 1966 to further the progressive harmonization and unification of the law of international trade and in that respect to bear in mind the interests of all peoples, in particular those of developing countries, in the extensive development of international trade,

Recalling also its decision at the fifty-fourth session, in 2021, to place the topic of automated contracting on its work programme,¹ and its decision at the fifty-fifth session, in 2022, to refer work on automated contracting to Working Group IV (Electronic Commerce), namely, as a first stage, to compile provisions of UNCITRAL texts that apply to automated contracting, and revise those provisions, as appropriate, and, as a second stage, to identify and develop possible new provisions,²

Mindful that the UNCITRAL Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services (2022),³ the UNCITRAL Model Law on Electronic Transferable Records (2017),⁴ the Electronic Communications Convention (2005),⁵ the UNCITRAL Model Law on Electronic Signatures (2001)⁶ and the UNCITRAL Model Law on Electronic Commerce (1996)⁷ are of significant assistance to States in enabling and facilitating electronic commerce in international trade,

Mindful also of the importance of providing a legal foundation for promoting confidence in electronic commerce, including across borders, and of the increasing

¹ *Official Records of the General Assembly, Seventy-sixth Session, Supplement No. 17 (A/76/17)*, paras. 25 (e) and 236.

² *Ibid.*, *Seventy-seventh Session, Supplement No. 17 (A/77/17)*, para. 22 (d).

³ *Ibid.*, annex II.

⁴ *Ibid.*, *Seventy-second Session, Supplement No. 17 (A/72/17)*, annex I.

⁵ General Assembly resolution [60/21](#), annex.

⁶ General Assembly resolution [56/80](#), annex.

⁷ General Assembly resolution [51/162](#), annex.

relevance of automation in contracting, including through the deployment of artificial intelligence systems,

Considering that uncertainty as to the legal effect of automation in contracting can create an obstacle to harnessing the full potential of digital trade,

Convinced that legal certainty and commercial predictability in electronic commerce, including across borders, will be enhanced through the harmonization of certain rules on the use of automation in contracting on a technologically neutral basis and, where applied in conjunction with other harmonized rules on electronic contracting, when appropriate, according to the functional equivalence approach,

Having considered, at its fifty-seventh session, in 2024, draft provisions on automated contracting⁸ and an accompanying guide to enactment,⁹

Expressing its appreciation to Working Group IV for its work on automated contracting,

1. *Adopts* the UNCITRAL Model Law on Automated Contracting, as contained in annex IV to the report of the United Nations Commission on International Trade Law on the work of its fifty-seventh session;¹⁰

2. *Approves* in principle the draft guide to enactment of the UNCITRAL Model Law on Automated Contracting, and requests the secretariat to finalize it by reflecting deliberations and decisions at the fifty-seventh session of the Commission, and authorizes Working Group IV (Electronic Commerce) to review the guide at its sixty-seventh session, in 2024;

3. *Requests* the Secretary-General to publish the UNCITRAL Model Law on Automated Contracting together with a guide to enactment, including electronically, in the six official languages of the United Nations, and to disseminate it broadly to Governments and other interested bodies;

4. *Recommends* that all States give favourable consideration to the UNCITRAL Model Law on Automated Contracting when revising or adopting legislation relevant to electronic contracting, and invites States that have used the Model Law to advise the Commission accordingly.

1231st meeting
11 July 2024

⁸A/CN.9/1178.

⁹A/CN.9/1179.

¹⁰Official Records of the General Assembly, Seventy-ninth Session, Supplement No. 17 (A/79/17), annex IV.

Part One

UNCITRAL Model Law on Automated Contracting

Article 1. Definitions

1. For the purposes of this Law:

(a) “Automated system” means a computer system that is capable of carrying out actions without the necessary review or intervention of a natural person;

(b) “Data message” means information generated, sent, received or stored by electronic, magnetic, optical or similar means.

2. An automated system may be programmed to operate in a deterministic or non-deterministic manner.

Article 2. Scope of application

1. This Law applies to the use of automated systems to form or to perform contracts, including by:

(a) Generating or otherwise processing data messages that constitute an action in connection with the formation of contracts, such as an offer or acceptance of an offer;

(b) Generating or otherwise processing data messages that constitute an action in connection with the performance of a contract, such as its modification or termination.

2. Nothing in this Law affects the application of any rule of law that may govern the design, commissioning, operation or use of automated systems.

Article 3. Interpretation

1. In the interpretation of this Law, regard is to be had to its international origin and to the need to promote uniformity in its application and the observance of good faith.
2. Questions concerning matters governed by this Law which are not expressly settled in it are to be settled in conformity with the general principles on which this Law is based.

Article 4. Technology neutrality

Nothing in this Law requires the use of an automated system or a particular method in automated systems to form or perform contracts.

Article 5. Legal recognition of automated contracting

1. A contract formed using an automated system shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in any action carried out in connection with the formation of the contract.
- [2. A contract performed using an automated system shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in any action carried out in connection with the performance of the contract.]¹
3. An action carried out by an automated system in connection with the formation or performance of a contract shall not be denied legal effect, validity or enforceability on the sole ground that no natural person reviewed or intervened in the action.

Article 6. Legal recognition of contracts in computer code and use of dynamic information in automated contracting

1. A contract shall not be denied validity or enforceability on the sole ground that the terms of the contract are contained in data messages in the form of computer code.

¹States that wish to extend the scope of article 5 to cover contracts that are performed using an automated system may wish to enact this provision.

2. A contract shall not be denied validity or enforceability on the sole ground that the terms of the contract incorporate information from a data source that provides information that changes periodically or continuously.

3. An action in connection with the formation of a contract shall not be denied legal effect, validity or enforceability on the sole ground that the action involves processing data messages containing information from a source that provides information that changes periodically or continuously.

Article 7. Attribution of actions carried out by automated systems

1. As between the parties to a contract, an action carried out by an automated system is attributed in accordance with a procedure agreed to by the parties.

2. If paragraph 1 does not apply, an action carried out by an automated system is attributed to the person who uses the system for that purpose.

3. Attribution of an action carried out by an automated system shall not be denied on the sole ground that the outcome was unexpected.

4. Nothing in this article affects the application of any rule of law that may govern the legal consequences of attributing an action carried out by an automated system to a person.

[Article 8. Unexpected actions carried out by automated systems

1. Unless otherwise agreed by the parties, where an action carried out by an automated system is attributed to a party to a contract, the other party to the contract is not entitled to rely on that action if, in the light of all the circumstances:

(a) The party to which the action is attributed could not reasonably have expected the action; and

(b) The other party knew or could reasonably be expected to have known that the party to which the action is attributed did not expect the action.

2. Nothing in this article affects the application of any rule of law or agreement of the parties that may govern the legal consequences of an action carried out by an automated system.]²

Article 9. Information requirements

Nothing in this Law affects the application of any rule of law that may require a person to disclose information on the design, operation or use of an automated system, or provides legal consequences for failing to do so or for disclosing inaccurate, incomplete or false information.

Article 10. Non-avoidance

Unless otherwise provided by law, a party shall not be relieved from the legal consequences of its failure to comply with a rule of law on the sole ground that it used an automated system.

²This provision is included for States wishing to enact one or more specific provisions addressing unexpected actions carried out by automated systems.

Part Two

Guide to Enactment of the UNCITRAL Model Law on Automated Contracting

I. Introduction

A. Purpose of this Guide

1. The purpose of this Guide is to assist those interested in enacting the Model Law on Automated Contracting (hereinafter referred to as “the Model Law”) and in applying and interpreting its provisions once enacted. It is addressed to policy-makers and lawmakers, as well as to academics, practitioners, judges and other adjudicators. It is also addressed to those who deploy, operate or use automated systems in their trade-related activities.
2. The Guide draws on the preparatory work of the Model Law carried out by the United Nations Commission on International Trade Law (UNCITRAL) and was approved in principle by the Commission when it adopted the Model Law at its fifty-seventh session, in 2024.

B. Objectives

3. Automation has long been seen as a tool to enhance trade through its potential to reduce transaction costs, increase efficiencies and produce economic benefits in connection with various trade-related activities. In the digital economy, the quality and availability of data and improvements in computational power have led to the deployment of automated systems to support a range of decision-making processes, including those producing legal effects. One area where this is happening is commercial contracting. Like in other trade-related activities, automation in commercial contracting is increasingly deploying techniques associated with artificial intelligence (AI), such as machine learning or rules-based approaches.

4. Contracts are formed by expressions of will that are communicated between the parties (e.g. offer and acceptance). For almost 30 years, UNCITRAL texts on electronic commerce have enabled the use of electronic means to communicate expressions of will, to conclude contracts in electronic form and to carry out other actions throughout the contract life cycle – a practice which is sometimes referred to as “electronic contracting”. The present Model Law goes one step further by facilitating the use of automation – specifically, the use of automated systems to communicate and to perform other actions without immediate human intervention – for electronic contracting.

5. Automated systems are designed and programmed to operate with varying degrees of human intervention. For automated systems deploying AI techniques in particular, it may be difficult to explain the actions carried out by the system (“explainability”) and to trace that output to the will of a particular party (“traceability”). This concern has, in turn, raised questions as to the validity of contracts formed and performed using automated systems and, more broadly, the applicability of existing law, notably the rules of contract law.

6. The Model Law responds to these questions by establishing a legal framework to facilitate automated contracting. It is intended to complement and supplement laws on electronic transactions, in particular those based on other UNCITRAL texts on electronic commerce, and to signal potential intersections with other laws, including an emerging body of law regulating the ethical use and governance of automated systems deploying AI techniques.

C. Scope

7. The Model Law applies to the use of automated systems, including AI systems, in a contractual setting. It does not seek to establish a complete code for automated contracting, but rather it assumes that existing law can be applied to automated contracting and establishes a set of legislative provisions to overcome potential obstacles to applying that law and to address legal issues of particular significance for automated contracting. It does not seek to address legal issues related to the use of automation and AI beyond the contractual setting. Nevertheless, the concepts and principles on which the Model Law is based, which draw on the work of other international forums, may offer guidance to States on addressing these issues, including in the application of other laws governing extracontractual obligations or in implementing standards on the ethical use of AI, thus promoting coherence in the legal treatment of automated systems. Moreover, its substantive provisions may offer guidance to contracting parties in setting the conditions on which automated systems are used in their contractual relations, including as part of agreed frameworks for automated transactions between them.

D. Key concepts and principles

1. Automated contracting

8. Automated systems are used in trade for transactions throughout the contract life cycle, namely in the formation and performance of contracts. At UNCITRAL, this practice is generally referred to as “automated contracting”. Another term in use is “algorithmic contracting”, which not only emphasizes the role of software components in the automation process, but also evokes the use of algorithmic processes powered by AI or other technologies. Automated contracting is distinguished from contracting for the supply of automated systems or AI-enabled goods and services.

9. In a sense, automated contracting may be regarded as electronic contracting (see para. 4 above) with reduced human involvement. It is essentially the use of automated systems to generate or otherwise process data messages (i.e. “outputs” and “inputs”) that are recognized as communications in connection with the formation of contracts, such as an offer or acceptance of an offer, or other actions in connection with the performance of the contract. In this sense, automated contracting is not a new phenomenon; it is a practice that was expressly recognized by UNCITRAL in 2005 with the inclusion of articles 12 and 14 in the United Nations Convention on the Use of Electronic Communications in International Contracts (the Electronic Communications Convention),¹ and in the domestic law of a number of jurisdictions well before then. Legal issues related to use of electronic data interchange (also known as EDI) to support automation in a contractual setting were raised within UNCITRAL in the 1990s and contemplated in the 1996 Model Law on Electronic Commerce,² but the use of machines in contract formation dates back much further. At the same time, regarding automated contracting simply as electronic contracting with reduced human involvement risks overlooking potential obstacles to applying those existing legal solutions, particularly where AI systems operating in a dynamic setting with a higher level of “autonomy” are used to carry out contractual actions associated with complex decision-making processes.

10. Earlier work at UNCITRAL focused on two main use cases, namely supply contracts formed by electronic communications sent between computers through electronic data interchange and sales contracts formed by a natural person placing

¹United Nations, *Treaty Series*, vol. 2898, No. 50525.

²As discussed in the remarks below on article 7 (para. 59), the Model Law on Electronic Commerce contains a rule regarding the attribution of data messages sent by automated systems and the explanatory note recognizes the use of computers in contract formation. See also *UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with Additional Article 5 bis as Adopted in 1998* (United Nations publication, Sales No. E.99.V.4), para. 76.

an order through a website (in other words, interacting with the automated system operating behind the website).³ Other use cases of contracts deploying electronic data interchange and Internet-based technologies subsequently gained attention, including contracts formed by smart devices placing orders via connected online platforms and contracts formed by Internet bots interacting with websites (e.g. screen-scraping bots and shopping bots).⁴ More recently, advances in AI technology and the deployment of distributed ledger technology have enabled or popularized other use cases involving automated negotiation tools (e.g. interactive chatbots), algorithmic trading platforms and “smart contracts”.⁵

11. During the preparation of the Model Law, it was acknowledged that automated systems were being used for a variety of trade-related activities, including the online sale of goods and services – such as in supply chain management, programmatic advertising, virtual assistants and automated pricing – and algorithmic trading in specific sectors such as renewable energy and foreign exchange.⁶ Automated contracting was being used principally for routine low-risk transactions and transactions carried out under agreed frameworks, such as online platforms and other digital ecosystems. Nevertheless, it was anticipated that AI techniques would eventually be deployed to support tasks associated with increasingly complex decision-making processes, including devising new negotiation strategies and settling more sophisticated contract terms, which would facilitate the use of automated contracting in a broader range of transactions, including transactions carried out in the absence of any pre-existing framework.⁷

References

[A/77/17](#), para. 156; [A/79/17](#), para. 176; [A/CN.9/1093](#), paras. 57–59 and 66; [A/CN.9/1125](#), para. 55; [A/CN.9/1132](#), para. 52.

2. Fundamental principles

12. In order to accommodate the variety of existing use cases of automated contracting, as well as innovations in technology and the development of new trade practices that might not have been foreseen at the time of its development, the Model Law pursues the principle of technology neutrality, as was done with the Model Law on Electronic Commerce, the Electronic Communications Convention

³*United Nations Convention on the Use of Electronic Communications in International Contracts* (United Nations publication, Sales No. E.07.V.2), para. 104.

⁴[A/CN.9/WG.IV/WP.179](#), para. 9.

⁵*Ibid.*, paras. 11–19. In a contractual setting, “smart contracts” are generally understood to refer to computer programs that can be used to automate (in part or in full) the performance of a contract. They are commonly associated with distributed ledger systems, where they can be deployed with no connection to a contract. They can also be deployed in other systems, as well as outside a contractual setting.

⁶See also [A/CN.9/1125](#), para. 15.

⁷[A/CN.9/WG.IV/WP.179](#), para. 20.

and other UNCITRAL texts on electronic commerce, such as the 2017 Model Law on Electronic Transferable Records⁸ and the 2022 Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services.⁹ The principle of technology neutrality dictates that the law should not mandate or favour the use of any specific technology or method, thus making the law compatible with technologies that are not yet foreseen. The principle is enshrined in article 4 of the present Model Law and informed the drafting of its provisions. In particular, the Model Law purposefully does not refer to “smart contracts”, which are commonly associated with distributed ledger technology, and instead refers in more neutral terms to contract automation.¹⁰

13. Like other UNCITRAL texts on electronic commerce, the Model Law pursues the principle of non-discrimination against the use of electronic means, with adjustments to reflect its focus on the use of automation in contracting. In that context, the principle of non-discrimination dictates that transactions throughout the contract life cycle should not be subject to differential treatment based solely on the use of automated systems, thereby avoiding the creation of dual regimes in which different legal requirements apply depending on whether the contract was formed and performed with human involvement. At the same time, it does not preclude other laws that may impose specific requirements or restrictions on the use of automated systems on grounds that are peculiar to automated systems, such as requirements for human-centric design.

14. Because of its focus on the use of automation, the Model Law does not contain any provisions applying a functional equivalence approach, and therefore does not seek to identify the functions of human-centric legal requirements or to prescribe how those requirements might be met by using an automated system (e.g. the use of a “reliable method”). Indeed, it was acknowledged during the preparation of the Model Law that automated contracting does not always have a clear equivalent in “traditional” paper-based or in-person contracting. Nevertheless, as noted above (para. 6), the Model Law is intended to supplement existing laws on electronic transactions, which may apply according to a functional equivalence approach, particularly those based on the Model Law on Electronic Commerce and the Electronic Communications Convention.

15. Another principle that is pursued by the Model Law is party autonomy. In the context of automated contracting, the principle of party autonomy respects the freedom of the parties not only to use – or not to use – automated systems in their contractual relations, but also to regulate that use by agreement, within the limits

⁸UNCITRAL Model Law on Electronic Transferable Records (United Nations publication, 2018).

⁹UNCITRAL Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services (United Nations publication, 2023).

¹⁰On the concept of “smart contract”, see footnote 5 above.

of mandatory law. Such regulation may be contained in a framework contract between the parties (e.g. an electronic data interchange agreement) that sets the conditions for automated transactions between them, or in the rules of a platform operated by a third party to which the parties have assented that set the conditions for automated transactions on the platform and may address matters such as attribution, liability and information disclosure. By doing so, the Model Law seeks to promote technological innovation and the development of new trade practices. The principle of party autonomy is given expression in article 4, which clarifies that the Model Law does not mandate the use of automated systems in contracting (to the exclusion of other forms of electronic contracting or “traditional” paper-based or in-person contracting).

References

[A/CN.9/1093](#), para. 71; [A/CN.9/1125](#), paras. 34, 35, 55 and 78–86; [A/CN.9/1162](#), para. 13.

E. Drafting history

16. The Model Law has its origins in exploratory work carried out by the UNCITRAL secretariat on legal issues related to the digital economy, which had been mandated by the Commission in 2018 at its fifty-first session (New York, 25 June–13 July 2018)¹¹ in the context of a proposal by the Government of Czechia for the secretariat to monitor developments relating to the legal aspects of smart contracts and AI.¹²

17. In 2019, at its fifty-second session (Vienna, 8–19 July 2019), the Commission was informed by the secretariat that its exploratory work had identified several lines of enquiry that might crystallize into more concrete proposals for consideration, including the validity of actions carried out by AI systems and associated liability.¹³ The Commission requested the secretariat to prepare a workplan to address specific legal issues identified in the course of its exploratory work, including recommendations both for dealing with those issues in existing instruments and for the development of specific new instruments, as appropriate.¹⁴ In that connection, it was emphasized that the exploratory work should focus on legal obstacles and that any future work should respect the principle of technology neutrality, be future-proof and focus on the disruptive impact of emerging technologies on commercial transactions.¹⁵

¹¹ *Official Records of the General Assembly, Seventy-third Session, Supplement No. 17 (A/73/17)*, para. 253 (b).

¹² [A/CN.9/960](#).

¹³ *Official Records of the General Assembly, Seventy-fourth Session, Supplement No. 17 (A/74/17)*, para. 209.

¹⁴ *Ibid.*, para. 211.

¹⁵ *Ibid.*, para. 210.

18. In 2020, at its resumed fifty-third session (Vienna, 14–18 September 2020), the Commission received a progress report from the secretariat which put forward a workplan to address the legal issues identified in its exploratory work.¹⁶ Among other things, the workplan singled out the use of AI and automated systems in the negotiation, formation and performance of contracts as a topic for preparatory work towards a new legislative text. Broad support was expressed in the Commission for work to continue in accordance with the workplan, while a range of points were raised to inform that work. Among other things, the Commission requested the secretariat to organize colloquiums to refine the scope of the topics identified in the workplan and to present proposals for concrete legislative work for consideration by the Commission at its next session, in 2021.¹⁷

19. In 2021, the secretariat convened an expert group meeting (Vienna, 8 and 9 March 2021) to consult on a proposal for legislative work on AI and automated contracting. The Commission considered the proposal¹⁸ at its fifty-fourth session (Vienna, 28 June–16 July 2021), at which broad support was expressed to refer the issues identified therein to UNCITRAL Working Group IV. The Commission mandated the Working Group, which was then finalizing work on the use and cross-border recognition of identity management and trust services, to host a focused conceptual discussion with a view to refining the scope and nature of the work to be conducted.¹⁹

20. That discussion took place at the sixty-third session of the Working Group (New York, 4–8 April 2022), which focused on the distinction between automated and AI systems and the concept of “automated contracting”. The Working Group also exchanged preliminary views on the applicability of the substantive provisions and underlying principles of the Model Law on Electronic Commerce, the Electronic Communications Convention and other UNCITRAL texts on electronic commerce to automated contracting, and on legal issues to be addressed in future work.²⁰ The outcome of that discussion was considered by the Commission at its fifty-fifth session (New York, 27 June–15 July 2022), at which broad support was expressed for the Working Group to continue work on the topic and for such work to proceed incrementally on the basis of a review of business practice and use cases.²¹ The Commission therefore requested the Working Group to deal with the topic in two stages: (a) as a first stage, to compile provisions of UNCITRAL texts that apply to automated contracting and to revise those provisions, as

¹⁶ A/CN.9/1012.

¹⁷ *Official Records of the General Assembly, Seventy-fifth Session, Supplement No. 17 (A/75/17)*, part two, para. 76.

¹⁸ A/CN.9/1065.

¹⁹ *Official Records of the General Assembly, Seventy-sixth Session, Supplement No. 17 (A/76/17)*, paras. 25 (e) and 236.

²⁰ A/CN.9/1093, paras. 49–76.

²¹ *Official Records of the General Assembly, Seventy-seventh Session, Supplement No. 17 (A/77/17)*, paras. 156–159.

appropriate; and (b) as a second stage, to identify and develop possible new provisions to address a broader range of issues.²²

21. At its sixty-fourth session (Vienna, 31 October–4 November 2022), the Working Group started a process of distilling principles from existing UNCITRAL texts and developing additional principles, on the view that those principles could eventually serve as a basis for a set of legislative provisions on automated contracting.²³ By the close of the session, the Working Group had formulated a set of draft principles on the legal recognition of contracts formed or performed using an automated system, compliance of automated systems with applicable laws and attribution of the output of automated systems, and it requested the secretariat to continue developing the set of principles with a view to putting forward proposals for additional principles on other legal issues considered during the session.²⁴

22. Based on a suggestion put forward within the Working Group, the secretariat held an online intersessional event (17 January 2023) in collaboration with the European Law Institute to explore these issues with actors involved in the design, operation and use of automated systems. At its sixty-fifth session (New York, 10–14 April 2023), the Working Group considered a first revision of the principles based on key takeaways from the intersessional event, which included new principles on state of mind and liability.²⁵ At its sixty-sixth session (Vienna, 16–20 October 2023), the Working Group considered a second revision of the principles,²⁶ and requested the secretariat to revise and recast the principles as model legislative provisions.²⁷

23. The revised model legislative provisions,²⁸ accompanied by a draft guide to enactment,²⁹ were submitted to the Commission for consideration at its fifty-seventh session (New York, 24 June–12 July 2024). After discussion,³⁰ the Commission decided by consensus to adopt the provisions as a model law and to approve in principle the guide to enactment.³¹ It also requested the secretariat to finalize the guide to enactment by reflecting the Commission's deliberations and decisions at the session, and authorized the Working Group to review the guide.³²

²²Ibid., para. 159.

²³A/CN.9/1125, para. 16.

²⁴Ibid., paras. 59–90.

²⁵A/CN.9/1132, paras. 52–85.

²⁶A/CN.9/1162, paras. 11–58.

²⁷Ibid., paras. 90–93.

²⁸A/CN.9/1178.

²⁹A/CN.9/1179.

³⁰*Official Records of the General Assembly, Seventy-ninth Session, Supplement No. 17 (A/79/17)*, paras. 171–238.

³¹Ibid., para. 239.

³²Ibid.

The Working Group reviewed the guide accordingly at its sixty-seventh session (Vienna, 18–22 November 2024).³³

F. Techniques for enactment

24. As noted above (para. 9), automated contracting is essentially a form of electronic contracting. A legal framework for automated contracting therefore relies on an enabling legal framework for electronic contracting. The Model Law is intended to apply in conjunction with laws that establish such a framework, in particular laws on electronic transactions that are based on, or influenced by, the provisions of part one of the Model Law on Electronic Commerce and the provisions of chapter III of the Electronic Communications Convention. Accordingly, the Model Law does not reproduce those provisions so as not to affect the standing of those two texts. At the time of the adoption of the Model Law, the Model Law on Electronic Commerce had been enacted in over 90 States and the Electronic Communications Convention was in force in 18 States, while the substantive provisions of the latter had been enacted in more than 30 States. Together, these legislative texts have served as a global standard for laws on electronic transactions.

25. For States that have enacted the Model Law on Electronic Commerce, the present Model Law could be enacted as supplementary provisions to the law enacting the Model Law on Electronic Commerce. When doing so, States may wish to consider revising the existing law to reflect the updated substantive provisions on electronic contracting in chapter III of the Electronic Communications Convention, including article 14 on input errors made by a natural person interacting with an automated system. During the preparation of the Model Law, it was acknowledged that, in addition to including specific provisions on the use of automated systems, the Electronic Communications Convention updates the substantive provisions of the Model Law on Electronic Commerce to take into account the use of Internet-based technologies.³⁴

³³ A/CN.9/1197, paras. 10–28.

³⁴ A/CN.9/1125, paras. 13 and 26.

II. Article-by-article remarks

Article 1. Definitions

1. For the purposes of this Law:

(a) “Automated system” means a computer system that is capable of carrying out actions without the necessary review or intervention of a natural person;

(b) “Data message” means information generated, sent, received or stored by electronic, magnetic, optical or similar means.

2. An automated system may be programmed to operate in a deterministic or non-deterministic manner.

Remarks on article 1

Definition of “automated system” (paragraphs 1(a) and 2)

26. Paragraph 1 (a) of article 1 defines the concept of “automated system”. It builds on the definition of “automated message system” in article 4 (g) of the Electronic Communications Convention and is intended to be consistent with that definition, which remains apt to describe the systems used for automated contracting. Accordingly, the term “automated system” encompasses systems that are programmed to interact with a natural person and systems that are programmed to interact with other automated systems (i.e. with a lesser degree of human intervention on one or both sides of the transaction), and it covers the variety of different use cases contemplated during the development of the Model Law and in earlier work at UNCITRAL on automated contracting (see paras. 10 and 11 above). The use of the broader term “computer system” in the definition (as compared to the term “computer program or an electronic or other automated means” in the Electronic Communications Convention definition) clarifies that the Model Law is concerned with systems that involve the execution of computer programs (in particular those implementing algorithms for performing predefined tasks or objectives) and acknowledges that an automated system may comprise software components (i.e. computer programs) and hardware components (for instance, equipment).

27. Consistent with other UNCITRAL texts,³⁵ the Model Law refers to automated systems carrying out “actions”. The term “action” is used in the definition – and in other provisions of the Model Law – in a general, neutral sense to refer

³⁵See, for example, articles 4 (g) and 12 of the Electronic Communications Convention.

to any operation performed by the automated system on which a party may wish to rely in contracting. It is not necessary for the action to be associated with any physical act or juridical act, or to bear any physical equivalent in paper-based or in-person contracting. An action will ordinarily be constituted by an output generated by the system, but it may also be constituted by an input processed by the system (in other words, an action attributed to a natural person interacting with the system). An action may involve a connected device producing a change in the physical environment (for instance, an actuator operating a valve for a pipeline delivery in response to data messages generated within the system).

28. The words “review or intervention” in the definition are drawn directly from the definition of automated message system in article 4 (g) of the Electronic Communications Convention. The requirement in the definition for such review or intervention to be “necessary” is intended to avoid the implication that an automated system ceases to fall within the definition on the sole ground that the system is subject to human oversight. The Model Law does not itself establish any requirement for an automated system to be subject to human oversight, which might be imposed by regulations implementing standards on the ethical use of AI, whose application is preserved by paragraph 2 of article 2.

29. The definition of automated system is to be read with paragraph 2 of article 1, which states that an automated system may be programmed to operate in a deterministic or non-deterministic manner. The term “deterministic” is intended to denote a system that always generates the same output given the same input, which may also be referred to as a “rule-based system”. Conversely, a “non-deterministic” system may be said to operate in a stochastic manner, generating an output that may not be predicted in a particular case but within a range of probabilities. Paragraph 2 thus clarifies that the term “automated system” encompasses not only AI systems – and, more specifically, “weak” AI systems that are recognized in theory and deployed in practice – but also other systems that do not deploy AI techniques that would not ordinarily be described as exhibiting “intelligence”. It also clarifies that an automated system may comprise components that operate deterministically and components that operate non-deterministically. The Model Law purposefully does not use the term “artificial intelligence”, although the term “automated system” is designed to encompass the concept of “AI system” as defined in other international texts on artificial intelligence that were concluded around the time of its adoption.³⁶

³⁶See, for example, Organisation for Economic Co-operation and Development, Revised Recommendation of the Council on Artificial Intelligence (2024), document C/MIN(2024)16/FINAL; United Nations Educational, Scientific and Cultural Organization, *Records of the General Conference, Forty-first Session, Paris, 9–24 November 2021*, vol. 1, *Resolutions*, resolution 34 and annex VII; Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law, adopted by the Committee of Ministers on 17 May 2024.

30. Paragraph 2 strikes a balance between technology neutrality and acknowledging a key feature that distinguishes an AI system from other automated systems, namely the unpredictability of its operation. In general terms, AI systems allow for the performance of actions to achieve predefined objectives, and not simply the performance of predefined actions. Such systems are sometimes described as “autonomous”, although the Model Law purposefully does not use that term to avoid the implication that they have an independent will.

References

[A/79/17](#), paras. 171–175 and 187; [A/CN.9/1093](#), paras. 53–56; [A/CN.9/1125](#), paras. 28 and 62–65; [A/CN.9/1132](#), paras. 54–60; [A/CN.9/1162](#), paras. 16, 17 and 31; [A/CN.9/1197](#), paras. 13 and 14.

Definition of “data message” (paragraph 1(b))

31. Paragraph 1(b) of article 1 reproduces the definition of “data message” that is established in other UNCITRAL texts. As noted above (para. 9), the Model Law conceptualizes automated contracting as the use of automated systems to generate or otherwise process data messages (i.e. outputs) that constitute actions in connection with the formation or performance of a contract. Consistent with the use of the term in other UNCITRAL texts, data messages may constitute the terms of the contract or a communication in connection with the contract, whether alone or with other data messages that are logically associated or otherwise linked. Moreover, the reference to “similar means” clarifies that, notwithstanding the prevailing use of electronic techniques at the time of the adoption of the Model Law, the term “data message” is intended to encompass other techniques for processing information in essentially paperless form.³⁷

References

[A/79/17](#), paras. 179, 180 and 187; [A/CN.9/1197](#), para. 15.

³⁷See *UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with Additional Article 5 bis as Adopted in 1998*, para. 30.

Article 2. Scope of application

1. This Law applies to the use of automated systems to form or to perform contracts, including by:

(a) Generating or otherwise processing data messages that constitute an action in connection with the formation of contracts, such as an offer or acceptance of an offer;

(b) Generating or otherwise processing data messages that constitute an action in connection with the performance of a contract, such as its modification or termination.

2. Nothing in this Law affects the application of any rule of law that may govern the design, commissioning, operation or use of automated systems.

Remarks on article 2

Matters falling within the scope (paragraph 1)

32. Paragraph 1 of article 2 clarifies the scope of the Model Law and illustrates how automated systems are used to form and perform contracts. Consistent with the concept of automated contracting discussed above (paras. 8–11), it covers cases involving the operation of one or more automated systems.

33. The terms “formation” and “performance” are intended to cover the various stages of the contract life cycle, while the reference to formation “or” performance reflects the understanding that automated systems may be used at a single stage or in multiple stages of the contract life cycle. Consistent with the approach taken in the Electronic Communications Convention, the concept of formation encompasses negotiations in the context of concluding a contract and the conclusion of the contract itself, while the concept of performance encompasses non-performance, modification and termination of the contract and the exercise of agreed remedies. The concept of performance would also cover initiating a dispute resolution process provided for under the contract, but it is not intended to extend to the entire dispute resolution process defined elsewhere. For the avoidance of doubt, subparagraphs (a) and (b) of paragraph 1 provide a non-exhaustive illustration of contractual actions that can be carried out by automated systems.

34. Ordinarily, the term “processing” is a catch-all term that refers to a range of operations carried out by the automated system, including generating or sending data messages (i.e. outputs) and receiving data messages (i.e. inputs). In illustrating

how automated systems are used to form and perform contracts, paragraph 1 purposefully singles out “generating” data messages in acknowledgement that the output of some systems may not necessarily correlate with the inputs processed by the system.

35. Article 2 does not delimit the types of contracts or transactions to which the Model Law applies. It was acknowledged when developing the Model Law that automated contracting was prevalent in consumer transactions and in trading financial instruments. The substantive provisions of the Model Law apply on their own terms to such transactions, subject to any other laws (e.g. consumer protection laws and financial market regulations) that may limit, prohibit or otherwise regulate the use of automated systems for such transactions, whose application is preserved by paragraph 2 of article 2. Moreover, as noted above (para. 6), the Model Law is intended to supplement existing laws on electronic transactions, in particular those based on other UNCITRAL texts on electronic commerce, in which case its substantive provisions would ordinarily reflect any limits contained in those laws.³⁸

References

[A/79/17](#), paras. 182, 185, 187 and 188; [A/CN.9/1093](#), paras. 65 and 66; [A/CN.9/1125](#), para. 14; [A/CN.9/1132](#), paras. 61–64; [A/CN.9/1162](#), para. 17; [A/CN.9/1197](#), paras. 15–17.

Matters falling outside the scope (paragraph 2)

36. Paragraph 2 of article 2 is modelled on article 2, paragraph 4, of the Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services and operates as a “give way” clause in the event of conflict between the provisions of the Model Law and other laws. It is intended primarily to clarify that the Model Law does not affect the application of rules of mandatory law. Such rules may limit, prohibit or otherwise regulate the deployment of particular methods in AI systems or the operation and use of AI systems for particular transactions, and may oblige a person deploying an AI system for a particular transaction to disclose information regarding the use or operation of the system (article 9 deals specifically with preserving the application of information disclosure requirements under other laws). Paragraph 2 would also cover laws regulating the automated processing of personal data, laws regulating the ethical use and governance of AI, and laws regulating transactions with consumers or other weaker parties.

37. The term “rule of law” carries the same meaning as in other UNCITRAL texts on electronic commerce, and is therefore intended to encompass statutory,

³⁸For example, footnote ** to article 1 of the Model Law on Electronic Commerce contemplates that a State enacting that model law may expressly preserve “any rule of law intended for the protection of consumers”.

regulatory and judicially created laws as well as procedural laws. While the term does not cover rules under agreed frameworks (as discussed in paragraph 15 above), consistent with the principle of party autonomy, the Model Law is not intended to displace any agreement of the parties governing the use of automated systems in their contractual relations. The term “commissioning” is intended to cover the configuring, training, testing and tuning of the automated system.

References

[A/79/17](#), paras. 186–189; [A/CN.9/1162](#), para. 47.

Article 3. Interpretation

1. In the interpretation of this Law, regard is to be had to its international origin and to the need to promote uniformity in its application and the observance of good faith.
2. Questions concerning matters governed by this Law which are not expressly settled in it are to be settled in conformity with the general principles on which this Law is based.

Remarks on article 3

38. Article 3 reproduces article 3 of the Model Law on Electronic Commerce, which in turn reflects a provision that is commonly found in other UNCITRAL texts on electronic commerce and beyond (see, for example, article 7 of the United Nations Convention on Contracts for the International Sale of Goods³⁹). It aims to promote uniform interpretation of the Model Law across enacting jurisdictions and to limit the extent to which its provisions, once enacted, are interpreted solely by reference to domestic law concepts.

39. Paragraph 1 draws the attention of judges and other adjudicators to the international origin of the provisions of the Model Law as enacted. Decisions originating from other enacting jurisdictions may therefore be particularly relevant.

40. Paragraph 2 requires any gaps in the provisions of the Model Law as enacted to be filled by reference to the “general principles” on which the Model Law is based, including the fundamental principles of non-discrimination, technology neutrality and party autonomy discussed above (paras. 12–15). As with other UNICTRAL texts on electronic commerce, the exact content and operation of the notion of “general principles” referred to in paragraph 2 may be clarified

³⁹United Nations, *Treaty Series*, vol. 1489, No. 25567.

progressively in light of the increased application of the Model Law as use cases of automated contracting expand and evolve.

References

[A/79/17](#), para. 238; [A/CN.9/1197](#), para. 18.

Article 4. Technology neutrality

Nothing in this Law requires the use of an automated system or a particular method in automated systems to form or perform contracts.

Remarks on article 4

41. Article 4 combines a rule on technology neutrality with a rule on the voluntary use of automated systems. It is concerned with automated systems used to form or to perform contracts and therefore applies throughout the contract life cycle.

42. The first part of article 4 clarifies that the Model Law does not mandate the use of automated systems in contracting. As noted above (para. 15), it gives expression to the principle of party autonomy and, specifically, reaffirms the freedom of the parties not to use automated systems in their contractual relations (but rather to use other forms of electronic contracting or “traditional” paper-based or in-person contracting). While it may be regarded as unnecessary, various jurisdictions have found value in including such a rule in their laws on electronic transactions, which is also included in other UNCITRAL texts on electronic commerce (e.g. art. 8, para. 2 of the Electronic Communications Convention and art. 3 of the Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services).

43. The second part of article 4 clarifies that the Model Law does not mandate the use of a particular method in automated contracting. As noted above (para. 12), it restates the principle of technology neutrality as it applies to automated systems used in contracting and reinforces the technology-neutral definition of “automated system”. It does not preclude the application of other laws requiring a particular method to be used (or not to be used) in the operation of automated systems (see remarks on art. 2, para. 2 in paragraph 36 above). Nor does it affect the freedom of the parties to agree to use a particular automated system or software product for automated transactions between them. The term “method” is used in other UNCITRAL texts and is intended to encompass not only the various technologies and products used for automated contracting, but also the different models that may

be used, including the involvement of third-party service providers (e.g. a third-party platform operator offering an automated system for use as a service).

References

[A/79/17](#), paras. 190–193; [A/CN.9/1125](#), para. 79; [A/CN.9/1132](#), para. 65 (d); [A/CN.9/1162](#), paras. 25 and 26.

Article 5. Legal recognition of automated contracting

1. A contract formed using an automated system shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in any action carried out in connection with the formation of the contract.

[2. A contract performed using an automated system shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in any action carried out in connection with the performance of the contract.]¹

3. An action carried out by an automated system in connection with the formation or performance of a contract shall not be denied legal effect, validity or enforceability on the sole ground that no natural person reviewed or intervened in the action.

¹States that wish to extend the scope of article 5 to cover contracts that are performed using an automated system may wish to enact this provision.

Remarks on article 5

General remarks

44. Article 5 sets forth a set of non-discrimination provisions using a formulation that has become standard in UNCITRAL texts on electronic commerce. It is concerned with the validity and enforceability of contracts formed or performed using automated systems and with the validity, enforceability and legal effect of actions in connection with such contracts, thereby refining and expanding the legal recognition rule in article 12 of the Electronic Communications Convention. It sends an important signal that the use of an automated system does not preclude the application of rules of contract law relating to the formation and performance of contracts, which is reinforced in article 10 of the Model Law. The Model Law does not define the term “enforceability”, which, notwithstanding article 5, may carry different meanings across the various enacting jurisdictions by reference to domestic law concepts.

45. Article 5 is not concerned with the lawfulness of the content of a particular data message, nor does it preclude the application of other law that may deny legal effect, validity or enforceability on other grounds (such as a contractual requirement for an action to be carried out with human involvement) or other law that may limit, prohibit or otherwise regulate the use of automated systems (including a law covered by article 2, paragraph 2). Rather, it is aimed at overcoming obstacles to applying existing legal requirements to contracts formed and performed using an automated system. As such, article 5 complements article 11 of the Model Law on Electronic Commerce (and article 8 of the Electronic Communications Convention); while article 11 of the Model Law on Electronic Commerce gives legal recognition to contracts and contractual actions in the form of data messages, article 5 of the present Model Law maintains that legal recognition where no human is involved in forming the contract or carrying out the action.

Contract formation (paragraph 1)

46. Like article 12 of the Electronic Communications Convention, paragraph 1 of article 5 of the Model Law applies to contracts formed by the interaction of an automated system and a natural person and to contracts formed by the interaction of automated systems. Article 5 does not presuppose that the automated system is operated by a party to the contract, and therefore applies equally to contracts formed using an automated system operated by a third party. In that scenario, the attribution rule set forth in paragraph 1 of article 7 will be particularly relevant in determining the parties to the contract.

Contract performance (optional paragraph 2)

47. In some legal systems, questions may arise regarding the validity and enforceability of a contract that is performed (but not necessarily formed) using an automated system. During the preparation of the Model Law, it was felt that formulating a rule specifically giving legal recognition to such contracts could be useful, particularly in the case of “smart contracts” where performance of a contract is automated through the execution of computer code. However, it was also pointed out that, in other legal systems, such a rule may be unnecessary, and might even be undesirable if understood to imply that, but for the rule, a contract performed using an automated system would be invalid or unenforceable.

48. As a compromise, paragraph 2 of article 5 is placed in square brackets to indicate it as an optional provision. The accompanying footnote invites States enacting the Model Law to incorporate the provision into their domestic law if they consider that such a rule is needed.

Contractual actions (paragraph 3)

49. Paragraph 3 of article 5 applies the legal recognition rule to actions that are carried out by automated systems in connection with the formation or performance of a contract. Consistent with article 2, article 5 applies to actions throughout the contract life cycle.

50. The term “action”, which is discussed above (para. 27), covers a “communication” within the meaning of the Electronic Communications Convention (i.e. any statement, declaration, demand, notice or request, including an offer and the acceptance of an offer) or other outcome of a decision-making process for which an automated system might be used in a contractual setting. An action “in connection with” the performance of a contract covers not only the communications or other actions provided for under the contract but also the exercise of rights under the contract and remedies agreed in the contract (see para. 33 above). Accordingly, paragraph 3 would give legal recognition to a rejection of a claim under a contract for insurance or a designation of a place, time, object or amount under a contract for the sale of goods, where that communication is generated and sent by an automated system. Article 5 purposefully does not use the term “decision” to avoid the implication that automated systems have an independent will capable of making decisions (as opposed to generating the outcome of a decision-making process deployed by the decision maker).

51. In some legal systems, the use of an automated system to perform a contract may be regarded as a function of party autonomy (in other words, a matter for the agreement of the parties), such that a specific rule giving legal recognition to that use may be unnecessary. In other legal systems, however, questions may arise regarding the legal effect, validity or enforceability of automated performance, in which case such a rule may be useful. For that reason, paragraph 3 applies not only to actions in connection with the formation of contracts but also to actions in connection with the performance of contracts.

References

[A/79/17](#), paras. 194–200; [A/CN.9/1125](#), paras. 36–39 and 80–83; [A/CN.9/1132](#), para. 65 (a)–(c); [A/CN.9/1162](#), para. 18; [A/CN.9/1197](#), paras. 19 and 20.

Article 6. *Legal recognition of contracts in computer code and the use of dynamic information in automated contracting*

1. A contract shall not be denied validity or enforceability on the sole ground that the terms of the contract are contained in data messages in the form of computer code.
2. A contract shall not be denied validity or enforceability on the sole ground that the terms of the contract incorporate information from a data source that provides information that changes periodically or continuously.
3. An action in connection with the formation of a contract shall not be denied legal effect, validity or enforceability on the sole ground that the action involves processing data messages containing information from a source that provides information that changes periodically or continuously.

Remarks on article 6

General remarks

52. Article 6 addresses two issues that are not unique to automated contracting but which have been raised in legal doctrine in some legal systems as issues of particular significance for contracts that are formed or performed by automated systems.

Contracts in computer code (paragraph 1)

53. Paragraph 1 of article 6 deals with contracts whose terms are expressed (in whole or in part) in computer code. In that context, computer coding translates those terms into machine-readable instructions that can be executed by automated systems. Contracts in the form of computer code thus lend themselves to automated performance without further human intervention, and are sometimes described – in a manner somewhat apt to lead to confusion in some legal systems – as “self-executing”. This does not mean, however, that computer code executed by an automated system in performance of a contract will always express the terms of the contract. In many cases, the code will simply express the actions carried out in performance of a contract whose terms are expressed elsewhere, in which case paragraph 1 is not applicable.

54. A data message as defined in paragraph 1 (b) of article 1 can include a data message comprising computer code. In some legal systems, contracts in the form of computer code may already be covered by laws that give legal recognition to contracts in electronic form (i.e. formed by data messages), including laws enacting

article 11 of the Model Law on Electronic Commerce. Nevertheless, the analysis of “smart contracts” in legal doctrine has raised questions about the ability of law to recognize and to make sense of contracts in the form of computer code, insofar as their terms are not expressed in natural language and may not be accessible to natural persons (in the sense of being readable and interpretable by a human without special expertise). Paragraph 1 of article 6 is intended to clarify that legal recognition of contracts in electronic form extends to contracts in the form of computer code. However, it is not intended to displace rules of evidence or other law relating to the determination and interpretation of contract terms.

Use of dynamic information (paragraphs 2 and 3)

55. Paragraphs 2 and 3 of article 6 deal with the use of dynamic information in the formation of a contract. Dynamic information refers to information from a data source that changes periodically or continuously (such as information on market price or on the location of an object). The source may be external to the system (e.g. an oracle) or internal.

56. Consistent with article 2, and as reflected in the heading of article 6, paragraphs 2 and 3 of article 6 apply only in the context of automated contracting. A variety of the use cases of automated contracting, including those contemplated during the development of the Model Law (see para. 11 above), rely on dynamic information, which may form part of the terms of the contract (i.e. terms that change periodically or continuously) or may trigger an automated action carried out in the formation or performance of a contract. Paragraph 2 deals with the former issue, which concerns the incorporation of terms, while paragraph 3 deals with the latter issue, which concerns actions performed on the basis of dynamic information which need not form part of the terms of the contract.

57. Paragraphs 2 and 3 generally reflect the language and structure of paragraphs 1 and 3 of article 5; however, unlike paragraph 3 of article 5, paragraph 3 of article 6 is concerned only with actions in connection with contract formation, which, as noted above (para. 33), encompasses negotiations in the context of concluding a contract and the conclusion of the contract itself. While the practice of using dynamic information in the performance of a contract was acknowledged, it was felt during the preparation of the Model Law that it was unnecessary to formulate a rule giving legal recognition to that practice.

58. The concepts and terminology in paragraphs 2 and 3 draw on article 5 bis of the Model Law on Electronic Commerce (which deals with the incorporation of information into a data message by reference), article 13 of the Electronic Communications Convention (which deals with the availability of contract terms in the form of data messages), and article 6 of the Model Law on Electronic

Transferable Records (which deals with the inclusion of additional information in an electronic record).⁴⁰ Neither paragraph precludes the application of other law that may deny validity, enforceability or legal effect on other grounds (for instance, legal requirements regarding the incorporation and certainty of terms, and prohibitions on unfair or unconscionable trade practices).

References

[A/79/17](#), paras. 201–207; [A/CN.9/1125](#), paras. 22 and 84; [A/CN.9/1162](#), paras. 19–24.

Article 7. Attribution of actions carried out by automated systems

1. As between the parties to a contract, an action carried out by an automated system is attributed in accordance with a procedure agreed to by the parties.
2. If paragraph 1 does not apply, an action carried out by an automated system is attributed to the person who uses the system for that purpose.
3. Attribution of an action carried out by an automated system shall not be denied on the sole ground that the outcome was unexpected.
4. Nothing in this article affects the application of any rule of law that may govern the legal consequences of attributing an action carried out by an automated system to a person.

Remarks on article 7

The concept of attribution

59. Article 7 deals with the attribution of actions carried out by automated systems. The term “attribution” can carry different meanings, even within the context of electronic transactions. For instance, article 13 of the Model Law on Electronic Commerce contains rules on the attribution of data messages that are intended to apply where there is a question as to whether a data message was really sent by the person who is indicated as being the originator.⁴¹ Those rules are concerned with linking a data message to a person to the exclusion of another person (e.g. a

⁴⁰The explanatory note to the Model Law on Electronic Transferable Records states that such additional information could consist of dynamic information, i.e. information that may change periodically or continuously, based on an external source. See *UNCITRAL Model Law on Electronic Transferable Records*, para. 58.

⁴¹See *UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with Additional Article 5 bis as Adopted in 1998*, para. 83.

person acting under the authority of the originator, or a person fraudulently passing off as the purported originator). Accordingly, article 13, paragraph 2, of the Model Law on Electronic Commerce contains a rule attributing to the originator a data message sent by another person acting under the authority of the originator, while paragraph 3 of that article entitles a party to the electronic transaction to rely on a data message as having been sent by the originator, even if the message is proven in fact to have been sent by another, unauthorized person. While the rules in article 13 of the Model Law on Electronic Commerce do not deal with liability for data messages, they have the practical effect of allocating risk associated with the use of data messages between the parties to an electronic transaction, and thus deal to some extent with matters of substantive law.

60. Conversely, the concept of “attribution” in article 7 here is concerned with linking the output of an automated system to a person to the exclusion of the system itself. In other words, it is concerned with identifying the person “behind” the output. It is not concerned with the legal consequences flowing from the output (e.g. liability) or with verifying that a data message processed by an automated system was generated or sent by a particular person associated with the system (sometimes referred to as “authentication”). Article 7 is not intended to deal with matters of substantive law.

61. Article 7 is thus of limited scope. Nevertheless, it reaffirms an important element in establishing a legal framework for the use of AI and automation in contracting, which is that automated systems are tools with no independent will or legal personality and that the output of automated systems should be attributed to persons and not to the system itself. Linking the output of an automated system to a natural or legal person is not a novel concept, nor is it unique to a contractual setting. In the context of intellectual property, for instance, linking outputs generated by an AI system to natural or legal persons is ordinarily required to establish the authorship or inventorship of a natural or legal person (although the analysis sometimes engages questions related to creativity, ingenuity or other considerations which are specific to the intellectual property context).

62. Article 7 builds on the approach to attribution that is reflected in earlier UNCITRAL texts. Those texts are based on a paradigm in which automated systems are programmed or operated by or on behalf of one or both parties to the contract.⁴² Conversely, the Model Law is based on a paradigm in which the parties also use systems that are operated by third parties, whose design and commissioning may involve other actors and for which the parties have limited control over programming or operation. Unlike some other UNCITRAL texts on electronic

⁴²Model Law on Electronic Commerce, art. 13 (2) (b); *United Nations Convention on the Use of Electronic Communications in International Contracts*, para. 213.

commerce (such as the 2001 Model Law on Electronic Signatures and the Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services), the present Model Law does not deal with the conduct of third-party service providers and is not concerned with the relationship between persons using an automated system to enter into a contract, on the one hand, and third parties offering the system as a service, on the other hand. Therefore, it does not affect a legal claim that a person using an automated system may have against a third-party service provider with respect to the design, commissioning or operation of the system.

63. Article 7 is concerned with the attribution of “actions”, a term which is discussed above (paras. 27 and 50). Consistent with article 2, it applies only in the context of automated contracts, even though the issue of attribution is not unique to a contractual setting. It applies to actions throughout the contract life cycle (see para. 33 above).

References

[A/79/17](#), para. 208; [A/CN.9/1125](#), paras. 28, 29, 30, 44 and 55; [A/CN.9/1132](#), paras. 67–69 and 70 (a); [A/CN.9/1162](#), paras. 28, 33 and 34.

The primary rule (paragraph 1)

64. Paragraph 1 of article 7 establishes a primary rule according to which the output of an automated system is attributed in accordance with a procedure agreed to by the parties, whether that agreement is expressed in a framework contract between the parties or in the rules of a platform operated by a third party to which both parties have assented for the use of an automated system operated via the platform. Drawing on the terminology of article 13, paragraph 3, of the Model Law on Electronic Commerce, the rule reaffirms the principle of party autonomy and encourages parties using automated systems to address attribution in their agreed frameworks. The term “procedure” is intended to encompass methods. While paragraph 1 presupposes the existence of a contract, it applies to actions carried out in the formation of the contract and thus covers actions carried out prior to its conclusion.

References

[A/79/17](#), paras. 208 and 214; [A/CN.9/1125](#), para. 55; [A/CN.9/1132](#), para. 70 (b) and (c); [A/CN.9/1162](#), paras. 38 and 42–45.

The fallback rule (paragraph 2)

65. Paragraph 2 of article 7 establishes a fallback rule that applies in the absence of any agreed procedure. Unlike paragraph 1, it applies regardless of whether a

contract has been formed, and thus refers to the attribution of actions to a “person” rather than a “party”.

66. Paragraph 2 refers to the use of an automated system for the purpose of carrying out an action. It is intended to attribute the action to the person with the strongest link to that action, and for that attribution to be determined objectively, in the light of all the circumstances. Depending on those circumstances, a range of factors may be relevant in identifying that person, including: (a) the person deploying the automated system; (b) the control exercised over the operational parameters of the system and the action; (c) the benefit or value derived from the action; (d) the nature and purpose of the contract; and (e) trade usages and the practices established between the parties. Paragraph 2 does not require that person to be aware of the individual operations carried out by the system flowing from the person’s interaction with the system, nor does it require a determination of the person’s actual state of mind in interacting with the system.

67. For the reasons outlined above (para. 62), paragraph 2 is not concerned with whether a person is characterized as an operator of the system, which may be a third-party platform operator offering the use of the automated system as a service, nor is it concerned with whether the person is acting on their own behalf or on behalf of another. Article 7 is not intended to displace the law of agency. In practice, the person to which the action is attributed may well be using the system on behalf of another person.

References

[A/79/17](#), paras. 209–215; [A/CN.9/1093](#), para. 73; [A/CN.9/1125](#), paras. 42–46 and 71–77; [A/CN.9/1132](#), paras. 68, 69 and 70 (b); [A/CN.9/1162](#), paras. 32 and 35–41.

Matters relating to state of mind (paragraph 3)

68. Paragraph 3 of article 7 reaffirms the principle that attribution is not concerned with a person’s state of mind. Formulated in similar terms to the legal recognition rules in articles 5 and 6, it clarifies that claims of unexpected outcomes are not to be settled by rules on attribution but rather by other law, in particular rules of contract law that may affect the legal consequences of unintended events, such as rules to avoid a contract in case of mistake or to excuse non-performance, as well as the provisions of article 8 as may be incorporated into applicable law.

69. During the preparation of the Model Law, consideration was given to complementing rules on attribution of actions carried out by automated systems with a stand-alone rule on a party’s state of mind with respect to those actions. Besides a party’s expression of will, the rules of contract law may require the presence of

a party's intention to carry out an action in connection with the formation or performance of a contract, or knowledge of the circumstances in which the action is carried out. Requirements of reasonableness and good faith may also involve an enquiry into a party's state of mind. In the context of automated contracting, questions may arise as to how to determine what a party intends or knows with respect to actions that are, in effect, carried out without human review or intervention by an automated system with no independent will or "mind" of its own.

70. Consistent with the principle of non-discrimination enshrined in article 5, discussions focused on formulating a rule that could provide guidance on applying existing legal requirements in the context of automated contracting by identifying factors that may be relevant in an enquiry into a person's state of mind. Drawing on legal doctrine on the use of automated machines in contracting, it was suggested that the state of mind of a person in respect of actions carried out by an automated system could be manifested in the design of the system (e.g. how it is programmed) and the circumstances in which it is put into operation. Ultimately, it was decided not to include such a rule in the Model Law, particularly given the potential variety of existing legal requirements and circumstances in which they might be applied, but rather to leave it to judges and other adjudicators to identify all relevant factors in a particular case.

References

[A/79/17](#), paras. 216–218, 228 and 229; [A/CN.9/1125](#), paras. 47, 48, 58 and 86; [A/CN.9/1132](#), paras. 71–77; [A/CN.9/1162](#), paras. 46–49.

Attribution and liability (paragraph 4)

71. Paragraph 4 of article 7 reinforces the distinction between attribution and liability and confirms that the rules on attribution are not concerned with allocating liability for the output of automated systems (see para. 60 above). However, it does not deny the connection between attribution and liability, as the application of the rules on attribution in article 7 will ordinarily be a preliminary step to applying rules on liability under other law.

References

[A/79/17](#), para. 215; [A/CN.9/1162](#), paras. 28 and 45.

[Article 8. Unexpected actions carried out by automated systems

1. Unless otherwise agreed by the parties, where an action carried out by an automated system is attributed to a party to a contract, the other party to the contract is not entitled to rely on that action if, in the light of all the circumstances:

(a) The party to which the action is attributed could not reasonably have expected the action; and

(b) The other party knew or could reasonably be expected to have known that the party to which the action is attributed did not expect the action.

2. Nothing in this article affects the application of any rule of law or agreement of the parties that may govern the legal consequences of an action carried out by an automated system.]¹

¹This provision is included for States wishing to enact one or more specific provisions addressing unexpected actions carried out by automated systems.

Remarks on article 8

72. For as long as UNCITRAL has worked on electronic contracting, legal issues arising from unexpected outputs of automated systems have been a focus of legal doctrine. More recently, advances in AI technology have renewed interest in whether the outputs of non-deterministic systems can properly be regarded as an expression of the will of the persons who use them, and therefore whether they can be validly used to form and perform contracts.

73. Consistent with the principle of non-discrimination, the Model Law assumes that solutions under existing law can be applied to address unexpected outputs. During the preparation of the Model Law, it was felt that a stand-alone provision specifically addressing the issue was unnecessary and could even be undesirable if it interfered with fundamental domestic law concepts and principles, as well as with established trade usages. Nevertheless, it was stated that a stand-alone provision could be useful for some jurisdictions to supplement existing solutions.

74. Accordingly, article 8 is included in the Model Law as an optional provision, as indicated by its placement in square brackets. The accompanying footnote invites States enacting the Model Law to consider incorporating the provision into their domestic law if they wish specifically to legislate the issue of unexpected actions carried out by automated systems.

75. In general terms, article 8 deals with actions that might be said to be unintended. It is focused primarily on the operation of non-deterministic systems deploying AI techniques, for which unpredictability is a distinguishing feature (see para. 30 above), but it also covers the operation of deterministic systems. It therefore applies to situations in which an automated system is operating as designed but generates an unexpected output, as well as to situations where the output is affected by errors in programming, errors in transmission and third-party interference. While these errors can equally arise in the context of electronic contracting, the risk of their occurrence may be heightened in the context of automated contracting on account of a wider range of technical issues outside the control of the person using the system.

76. Article 8 does not deal with input errors made by a natural person interacting with an automated system (for example, an unintentional keystroke error when placing an order through a website), which is addressed in article 14 of the Electronic Communications Convention. Like article 14 of the Convention, article 8 of the Model Law deals with substantive law issues, but on a narrowly defined issue of particular significance for automated contracting. By its very nature, article 8 is medium-specific: it only applies in the context of automated contracting and not in other contractual settings. As such, it departs from the approach generally applied in UNCITRAL texts on electronic commerce, which seek to ensure that the same substantive law applies to contracting regardless of the medium, thereby avoiding a duality of regimes (see para. 13 above).

77. The starting point for article 8 is the principle that a party using an automated system as part of its trade-related activities bears the risk of the output of that system. In general terms, paragraph 1 mitigates that principle with regard to unexpected outputs by allowing a party to disavow the output in certain circumstances, and thus avoid the legal consequences of that output that may flow under other law. It builds on an approach, already foreshadowed during the preparation of the Electronic Communications Convention, that a party should not be required to bear the risk of data messages that are generated on its behalf by an automated system in a manner that the party could not have reasonably anticipated.⁴³ Consistent with the principle of party autonomy (see para. 15 above), paragraph 1 applies unless otherwise agreed by the parties and thus defers to rules on allocation of risk that may be agreed by the parties. By doing so, the Model Law encourages parties using automated systems to address unexpected outputs in their agreed frameworks.

⁴³*United Nations Convention on the Use of Electronic Communications in International Contracts*, para. 230; A/CN.9/484, para. 108.

78. Paragraph 1 is concerned with “actions”, which are discussed above (paras. 27 and 50). It is concerned not with the individual operations carried out by the system but with the output that the system generates, on which parties using the system might seek to rely in their trading activities. While paragraph 1 presupposes the existence of a contract between the parties, it applies to actions throughout the contract life cycle and therefore covers actions carried out prior to the conclusion of a contract in connection with the formation of the contract (see para. 33 above). In particular, the reference to party to a contract is not intended to prevent paragraph 1 from being applied to deny a claim that a contract exists between the parties.

79. The concepts and terminology in paragraph 1 draw on article 13, paragraph 5, of the Model Law on Electronic Commerce and other UNCITRAL texts. By preventing a party from relying on an action attributed to another party, paragraph 1 effectively deprives that party of the right to assert the legal consequences flowing from the action. Accordingly, in addition to denying a claim that a contract exists, paragraph 1 could be applied to deny a claim that a contract incorporates particular terms contained in an unexpected communication generated by an automated system, or a claim for breach of contract constituted by an unexpected communication sent by the system to a connected device.

80. Paragraph 1 is subject to two conditions established in subparagraphs (a) and (b) thereof, which are concerned with the knowledge and expectations of the parties. Consistent with provisions of other UNCITRAL texts that allocate risk between parties in a contractual setting, these conditions are designed to reflect notions of reasonable expectations and fair dealing.

81. Subparagraph (a) is concerned not with what the party to which the action is attributed actually expected, but rather with what that party could “reasonably” have expected. It calls for an objective determination of that party’s expectations in the light of all the circumstances of the particular action at the time that it is carried out. Depending on those circumstances, a range of factors may be relevant, including: (a) the nature and purpose of the contract; (b) the type of transaction for which the action is carried out; and (c) trade usages and practices established between the parties. Information made available to the party on the design, operation and use of the automated system may also be relevant, although such information might not be readily understood by the party so as to be a decisive factor in the determination. During the preparation of the Model Law, it was stated that unexpected actions refer to outcomes where the party would not have concluded the contract or would have done so only on fundamentally different contract terms should it have been aware of the action from the outset.

82. Subparagraph (b) is concerned with the knowledge of the party seeking to rely on the unexpected action. Unlike subparagraph (a), subparagraph (b) calls for either a subjective or objective determination of that party's knowledge. In other words, it is satisfied either (i) if it is determined that the party seeking to rely on an unexpected action actually knew that the other party did not expect the action; or (ii) if it is determined that a reasonable person in the same situation as the party would be expected to have known that state of affairs. The reference to what the party could reasonably be expected to have known is concerned not with the reasonable expectations of the party but rather with what the party ought to have known.

83. Paragraph 2 clarifies the supplementary nature of article 8. It is intended to preserve solutions under existing law that address unexpected outcomes, such as rules to avoid a contract in case of mistake or to excuse non-performance in case of force majeure. Unlike paragraph 2 of article 2 (see also article 9), paragraph 2 of article 8 expressly refers to any "agreement of the parties" with the intention of preserving solutions under agreed frameworks, such as rules of an algorithmic trading platform that reverse erroneous transactions. Moreover, by referring to rules that govern the legal consequences of an action carried out by an automated system, it signals the relevance not just of rules that deal with unexpected (or unintended) outcomes but also of rules of more general application, such as rules of liability. During the preparation of the Model Law, it was acknowledged that systems deploying AI techniques present potential obstacles to applying these laws on account of concerns about the explainability and traceability of those outputs. At the same time, article 8 is not intended to establish any presumptions or allocate the burden of proof, nor does it displace the rules of evidence.

References

[A/79/17](#), paras. 219–233; [A/CN.9/1093](#), paras. 75 and 76; [A/CN.9/1125](#), paras. 33, 50 and 51; [A/CN.9/1132](#), paras. 78–81; [A/CN.9/1162](#), paras. 50–54.

Article 9. Information requirements

Nothing in this Law affects the application of any rule of law that may require a person to disclose information on the design, operation or use of an automated system, or provides legal consequences for failing to do so or for disclosing inaccurate, incomplete or false information.

Remarks on article 9

84. During the preparation of the Model Law, consideration was given to formulating a substantive rule prescribing information disclosure requirements, particularly in the context of concluding a contract. Ultimately, it was decided not to include such a rule but instead to formulate a rule that draws attention to the possible existence of such requirements under other law (such as laws regulating the ethical use and governance of AI, laws regulating transactions with consumers and laws regulating the processing of personal data). By deferring to these other laws, the Model Law avoids a duality of contract law regimes in which different requirements apply depending on whether the contract is formed and performed with human involvement (see para. 13 above).

85. Article 9 is modelled on article 5 of the Model Law on Electronic Transferable Records, articles 7 and 13 of the Electronic Communications Convention and articles 12 and 24 of the Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services. It complements article 2, paragraph 2, of the Model Law to clarify that the Model Law does not affect the application of information disclosure requirements. It also clarifies that the Model Law does not deal with the legal consequences flowing from non-compliance with those requirements.

86. As a stand-alone provision, it signals the importance of information disclosure as a means to enhance transparency, explainability and traceability in the use of automated systems, particularly those deploying AI techniques, and thus promote greater predictability, legal certainty and confidence in automated contracting. Examples of information mentioned during the preparation of the Model Law include: (a) information on the identity of the party deploying the system; (b) information notifying natural persons if they are interacting with an automated system; (c) information on the operation of the system, such as operation logs; and (d) information on system malfunction, including in the event of a data breach. At the same time, it was also acknowledged that information on the design and operation of the system might not always be available or accessible to the parties, particularly where a third-party service provider is involved and the information is subject to protection against disclosure.

87. By referring to information disclosure not only on the use but also on the design and operation, article 9 also signals the importance of information disclosure relating to the design, operation or use of automated systems, particularly those deploying AI techniques, and thus beyond the contractual setting in which the system is ultimately used. For this reason, it is formulated in slightly different terms to the corresponding provision of the Electronic Communications Convention, without reference to the contracting parties.

88. While article 9 only refers to any rule of law, consistent with the principle of party autonomy (see para. 15 above), the Model Law is not intended to displace any information disclosure requirements that may be imposed on the parties under their agreed frameworks. The practice of prescribing such requirements in the rules of algorithmic trading platforms and the need to preserve the application of those rules was acknowledged during the preparation of the Model Law.

References

[A/79/17](#), paras. 203, 216 and 230; [A/CN.9/1093](#), paras. 62 and 74; [A/CN.9/1125](#), paras. 32 and 49–55; [A/CN.9/1132](#), para. 84; [A/CN.9/1162](#), para. 50.

Article 10. Non-avoidance

Unless otherwise provided by law, a party shall not be relieved from the legal consequences of its failure to comply with a rule of law on the sole ground that it used an automated system.

Remarks on article 10

89. During the preparation of the Model Law, consideration was given to formulating a rule that would impose on the party operating the automated system an obligation to ensure compliance of the system with applicable laws. However, as focus shifted away from the operator of the system, which may be a third party, to the contracting parties, it was felt that a more appropriate approach would be to formulate a rule prohibiting a party from invoking the use of an automated system to excuse non-compliance with applicable law.

90. Consistent with the principle of non-discrimination, article 10 reflects the assumption that existing rules of law can be applied to automated contracting and thus focuses on the legal consequences flowing from non-compliance with that law. Thus, although the term “rule of law” itself does not cover rules agreed by the parties (see para. 37 above), article 10 is intended to encompass non-performance of a (legally binding) contract, and the absence of an express reference to

“agreement of the parties” (see art. 8, para. 2) should not be interpreted as implying that automation can be used to avoid the legal consequences of contract non-performance. Nevertheless, article 10 encompasses non-compliance with the types of laws covered by paragraph 2 of article 2, such as laws regulating the processing of personal data, laws regulating the ethical use and governance of AI, and laws regulating transactions with consumers or other weaker parties.

91. The reference to a party not being relieved from the legal consequences of non-compliance draws on terminology in other UNCITRAL texts on electronic commerce (e.g. articles 7 and 13 of the Electronic Communications Convention and article 5 of the Model Law on Electronic Transferable Records).

References

[A/79/17](#), paras. 234–236; [A/CN.9/1125](#), paras. 40, 41 and 66–70; [A/CN.9/1132](#), paras. 82–85; [A/CN.9/1162](#), paras. 55–58.

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