



General Assembly

Distr.: General
5 May 2021

Original: English

**United Nations Commission on
International Trade Law**
Fifty-fourth session
Vienna, 29 June–16 July 2021

Legal issues related to the digital economy – proposal for legislative work on electronic transactions and the use of artificial intelligence and automation

Note by the Secretariat

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I. About this note

1. This note presents a proposal for legislative work on electronic transactions and the use of artificial intelligence (AI) and automation.
2. The proposal builds on exploratory and preparatory work carried out by the secretariat and has been guided by the legal taxonomy that the secretariat has been developing on emerging technologies and their applications in the trade context. A revised draft of the section of the taxonomy on AI and automation is contained in [A/CN.9/1064/Add.1](#).
3. After recalling the background to the exploratory work (section II), this note describes the broad contours of the topic (section III) and outlines the next steps for future work (section IV) for the consideration of the Commission.

II. Background

4. For its fifty-third session, the Commission received a progress report from the secretariat on its exploratory work on legal issues related to the digital economy ([A/CN.9/1012](#)), which put forward a workplan for addressing specific legal issues identified in the course of that work.¹ 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.
5. 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.² 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”.³ A further status report on the project is contained in [A/CN.9/1064](#).
6. The expert group meeting on 8 to 9 March 2021, which is reported in [A/CN.9/1064](#), was also convened by the secretariat to consult on the proposal for legislative work on AI and automated contracting. Aspects of the proposal were also put forward for consideration at the webinar on the digitalization of international trade, which was held on 30 March 2021 in cooperation with the Ministry of Economic Development of the Russian Federation and the International Comparative and Law Research Center (as reported in [A/CN.9/1081](#)).

III. Contours of the topic

7. The Commission has previously agreed to use four tests to assess whether legislative work on a topic should be referred to a working group: first, whether it is clear that the topic is likely to be amenable to international harmonization and the consensual development of a legislative text; second, whether the scope of a future text and the policy issues for deliberation are sufficiently clear; third, whether there exists a sufficient likelihood that a legislative text on the topic will enhance modernization, harmonization or unification of the international trade law; and fourth, whether duplication arises with work being undertaken by other international organizations.⁴ This section outlines the broad contours of the topic by reference to those tests, with particular emphasis on the second and fourth tests.

¹ For further background on the project, see paragraphs 2 to 5 of [A/CN.9/1012](#).

² *Official Records of the General Assembly, Seventy-fifth Session, Supplement No. 17 (A/75/17)*, part two, paras. 70-75.

³ *Ibid.*, para. 76.

⁴ *Official Records of the General Assembly, Sixty-eighth Session, Supplement No. 17 (A/68/17)*, paras. 303-304.

A. Scope (including work by other international organizations)

8. The decision by the Commission to explore legal issues related to the digital economy was made in the context of a proposal by Czechia for the secretariat to monitor developments relating to the legal aspects of smart contracts and artificial intelligence. This section describes important scope issues for future work and explains how a legislative proposal for legislative work on electronic transactions and the use of AI and automation emerged from exploratory work on smart contracts and AI.

1. Looking at smart contracts through the prism of automation

9. The exploratory work by the secretariat, as documented in the revised draft taxonomy, has identified difficulties with the term “smart contract” and differences in how it has been defined in both legislation and commentary. It has also identified that, while smart contracts are commonly deployed in distributed ledger systems, their basic function – to automate the performance of a contract – predates the advent of distributed ledger technology. To avoid the risk of confusion, and in keeping with the principle of technology neutrality, the secretariat considers that it is preferable to leave aside the term “smart contract” and instead focus on the use of automated systems (however deployed). At the same time, particular use cases for smart contracts will be relevant in informing future work.

10. As explained in the revised draft taxonomy, the use of automated systems in the formation and performance of contracts (sometimes referred to for convenience as “electronic agents”) is addressed in different ways in the 1996 UNCITRAL Model Law on Electronic Commerce (MLEC) and the 2005 United Nations Convention on the Use of Electronic Communications in International Contracts (ECC). Looking at smart contracts through the prism of automation therefore allows future work on the topic to be anchored in past harmonization efforts at UNCITRAL that have resulted in the consensual development of legislative texts. This in turn provides a framework for future work, which would proceed on the basis of a gap analysis of existing provisions and an assessment of (a) whether those provisions should be fine-tuned to reflect contemporary business practices, and (b) whether additional provisions should be formulated to address new issues in automation (including the deployment of smart contracts). That framework is defined by the policy issues for deliberation that are outlined below.

2. Looking at AI as the next generation in automation

11. The exploratory work by the secretariat, as documented in the revised draft taxonomy, has monitored recent international and regional initiatives that have sought to define the general contours of AI systems. Based on those definitions, the secretariat has observed that AI systems resemble the kinds of automated systems that have been addressed in earlier UNCITRAL texts.

12. The ECC defines the term “automated message system” to mean “a computer program or an electronic or other automated means used to initiate an action or respond to data messages or performances in whole or in part, without review or intervention by a natural person each time an action is initiated or a response is generated by the system”. The explanatory note on the ECC suggests that the term covers AI systems running on machine learning algorithms. Specifically, it notes that, “at least in theory it is conceivable that future generations of automated information systems may be created with the ability to act autonomously and not just automatically”, i.e. “through developments in artificial intelligence, a computer may be able to learn through experience, modify the instructions in its own programs and even devise new instructions”.⁵ Moving forward to 2019, the core functions of an “AI system”, as defined in the Recommendation on Artificial Intelligence by the

⁵ United Nations Convention on the Use of Electronic Communications in International Contracts, Sales No. E.07.V.2, para. 211.

Council of the Organisation for Economic Co-operation and Development (“OECD Recommendation”), would appear to correspond to those of an “automated message system”, as defined in the ECC.⁶

13. Looking at AI through the prism of automation provides a framework for future work on the topic, by which the provisions of existing UNCITRAL texts on automated systems could serve as a reference point for identifying the distinguishing features of AI systems that might warrant additional provisions or differentiated treatment altogether. This will be an important policy issue for deliberation in future work.

3. Looking at AI in the context of commercial contracting

14. The *Road Map for Digital Cooperation* presented by the Secretary-General in June 2020 refers to the ubiquity of AI in its applications and to AI-led automation across industries, businesses and societies.⁷ For its part, the secretariat has focused its exploratory work on AI in the trade context. In that context, it has analysed the legal issues related to the use of AI by drawing a rough distinction between “AI in trade” (e.g. the supply of AI-enabled goods and services) and “AI to trade” (e.g. the use of AI systems to manage supply chains, market goods and services, and to form and perform contracts).

15. In its last progress report, the secretariat noted that, while “AI in trade” prompts consideration of new liability regimes, the *ex ante* review of AI systems, and the development of standards on ethical use and governance, which raise complex policy questions well beyond the trade context, “AI to trade” prompts consideration of adapting existing laws to recognize the use of AI, which builds on past efforts at UNCITRAL to harmonize the law of electronic transactions. For that reason, the workplan put forward by the secretariat provided for preparatory work to proceed on AI contracting (i.e. the use of AI in the formation and performance of contracts).

16. At the fifty-third session of the Commission, it was acknowledged that, by limiting its scope to AI and automated contracting, future work would avoid overlap with the work being carried out within the United Nations system and other international forums aimed at developing harmonized standards on the ethical use and governance of AI.⁸ The proposal outlined in the note has been prepared with a view to avoid duplication with work being undertaken by other international organizations.

4. The need for a single, unified and consolidated legislative text

17. Past work of UNCITRAL in the area of electronic commerce demonstrates that the use of automated systems cannot be addressed in a legal vacuum, but rather as an element of a legislative framework enabling the use of electronic transactions (i.e. transactions carried out by means of data messages). While UNCITRAL has developed a series of legislative provisions dealing with electronic transactions – most relevantly in the MLEC and ECC – to date, those provisions are not contained in a single text. In several areas, the ECC introduced innovations, including new provisions on the use of automated systems and updated provisions on the receipt of data messages on account of subsequent developments, including domestic enactments of the MLEC. In other areas, however, by reason in part of its form (a treaty, not a model law), the scope of application of its provisions is limited compared to the MLEC, both in geographic terms (i.e. the ECC applies only to international contracts) and substantive terms (e.g. it does not deal with certain areas connected to the rules of evidence, such as the retention of data messages, admissibility in

⁶ According to the recommendation, an AI system is “a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments”: OECD, Recommendation of the Council on Artificial Intelligence (2019), document C/MIN(2019)3/FINAL.

⁷ A/74/821, para. 53.

⁸ *Official Records of the General Assembly, Seventy-fifth Session, Supplement No. 17 (A/75/17)*, part two, para. 72.

evidence, and evidential weight). This patchwork of legislative texts can create an obstacle to the adoption of those texts.

18. It may therefore be desirable for a legislative text on AI and automated contracting to be developed as part of a comprehensive body of provisions dealing with electronic transactions. Not only would that approach avoid perpetuating the patchwork of legislative texts, it would also provide an opportunity for UNCITRAL to fine-tune existing provisions to ensure that they reflect contemporary business practices, including those associated with the “platform economy”, as well as further experiences in the domestic enactment on the MLEC and other developments in electronic transactions law. At the same time, ongoing work within Working Group IV on electronic signatures has highlighted the importance of paying close attention to possible divergence between any new text and existing UNCITRAL texts, particularly where those texts take the form of a treaty.

B. Policy issues for deliberation

1. Provisions supporting electronic contracting in general

19. The use of automated systems to form and perform contracts involves the output of data messages, which are generated by processing data collected from a variety of inputs (i.e. data sources). Future work on the topic could consider incorporating provisions from existing UNCITRAL texts that support electronic contracting in general.

20. Existing UNCITRAL texts contain several provisions that give legal recognition to data messages (including data messages used in connection with the formation and performance of a contract) and to contracts that are constituted by data messages (i.e. electronic contracts). For instance:

<i>Provision</i>	<i>UNCITRAL text</i>
Legal recognition of data messages	ECC, article 8(1); MLEC, articles 5 and 12
Legal recognition of electronic contracts	ECC, article 8(1); MLEC, article 11(1)
Admissibility of data messages in evidence and evidential weight of data messages	MLEC, article 9

21. Existing UNCITRAL texts also contain provisions that allow data messages and electronic contracts to satisfy paper-based legal requirements as to form on the basis of functional equivalence, as well as provisions to determine when and where a data message is dispatched and received. For instance:

<i>Provision</i>	<i>UNCITRAL text</i>
Legal requirement to be in writing	ECC, article 9(2); MLEC, article 6
Legal requirement to be signed	ECC, article 9(3); MLEC, article 7
Legal requirement to be presented or retained in original form	ECC, article 9(4); MLEC, article 9
Time and place of dispatch and receipt of data messages	ECC, article 10; MLEC, article 15

22. Future work on the topic could also consider whether to incorporate innovations regarding the application of functional equivalence rules in circumstances where a trust service is used, as currently before Working Group IV.

23. The incorporation of existing UNCITRAL texts raises the issue of the substantive and geographic scope of a future legislative text. A broader scope provision along the lines of article 1 MLEC (which applies to “any kind of information in the form of a data message used in the context of commercial activities”) might serve an expedient starting point for consideration, and would support the proposal that the future legislative text could serve as a single, unified and consolidated legislative text on electronic transactions. The Commission has already indicated that future work should avoid privacy and data protection issues,⁹ and consideration could be given to developing an exclusion to that effect, particularly in view of the significant role played by automated systems in the processing of personal data. In adopting the MLEC, the Commission also contemplated that laws enacting the MLEC might preserve “any rule of law intended for the protection of consumers”, while ECC excludes consumer contracts outright (art. 2(1)(a)). Consideration could be given to applying the approach in the MLEC, noting in particular the prevalence of consumer contracts concluded online (particularly via online platforms) using automated systems that might benefit from the legal certainty of the future legislative text.

2. Provisions supporting automated contracting in particular

24. Future work on the topic could consider building on provisions from existing UNCITRAL texts that support automated contracting in particular, namely:

<i>Provision</i>	<i>UNCITRAL text</i>
Legal recognition of contracts formed using automated systems	ECC, article 12
Correcting input errors when interacting with an automated system	ECC, article 14

25. Article 12 ECC is formulated in negative terms as a rule of non-discrimination, while article 14 is limited to input errors made by a natural person.

26. Consideration could also be given to developing those provisions further. For example:

(a) *Reformulation of legal recognition rule* – it is conceivable that the provision in article 12 could be reformulated in positive terms to provide for the validity and enforceability of contracts formed using automated systems if specified conditions are met. Such an approach may raise concerns about establishing a dual regime whereby the requirements for formation of contracts differ depending on whether an automated system is used. The conditions for validity and enforceability may also require an enquiry into a combination of acts and state of mind of the parties, which are addressed separately below;

(b) *Automated performance of contracts* – the provision in article 12 could recognize the use of automated systems not only to form but also to perform contracts;

(c) *Mistake in the output of the automated system* – article 14 distinguishes human error when interacting with an automated system from erroneous data messages generated by the automated system, whether resulting from errors in how the system was programmed, erroneous input from an external data source, a system malfunction, or third-party interference with the system. The provision could be expanded to include rules for applying the law of mistake to automated contracts.

⁹ Ibid., para. 75.

27. Future work could also consider additional provisions to recognize specific practices in automated contracting (including the deployment of smart contracts). For example:

(a) *Contracts in the form of computer code* – the provision giving legal recognition to electronic contracts could be modified to expressly recognize contracts in the form of computer code. While computer code is a form of data message, specific recognition of the use of computer code might address some concerns raised in commentary regarding smart contracts (as elaborated in the revised draft taxonomy);

(b) *Reformulation of admissibility rule* – it is conceivable that the provision of admissibility, which is formulated in negative terms as a rule of non-discrimination, could be reformulated in positive terms to provide for the admissibility of data messages if specific conditions are met. Close attention may need to be paid to ensuring the technological neutrality of reformulated provision;

(c) *Inclusion of dynamic information* – a new provision could give legal recognition to the inclusion of dynamic information in the contract (e.g. information that may change periodically or continuously, based on an external data source, such as a market price), which is a feature of smart contracts. A possible source for such a provision is article 6 MLETR, which is designed to facilitate the inclusion of dynamic data in electronic transferable records by declaring that nothing in the model law “precludes the inclusion of information in an electronic transferable record in addition to that contained in a transferable document or instrument”. In the context of a contract, different considerations may arise, including requirements on incorporation and certainty of terms. The provision could alternatively be formulated as a rule of non-discrimination by declaring that an electronic contract shall not be denied validity or enforceability on the sole ground that its terms may be determined by incorporation of information from an external data source.

3. Disclosure obligations

28. In the preparation of existing UNCITRAL texts in the area of electronic commerce, proposals have been put forward to establish disclosure obligations on the parties regarding (a) precontractual information, and (b) the terms of the contract. Such proposals have so far not been taken up for a variety of reasons, including (a) that a disclosure obligation is regulatory in nature, and (b) that the obligation would establish a dual regime whereby the requirements for electronic contracting would be different to requirements for paper-based contracting. As a result, the provisions on disclosure in the ECC do not establish any new obligation, but rather defer to domestic law. Specifically:

(a) Article 7 ECC preserves domestic law requirements for parties to disclose their identities, places of business or other information, as well as the legal consequences under domestic law for failing to comply with those requirements;

(b) Article 13 ECC preserves domestic law requirements for the parties to make data messages containing the terms of the contract available to the other party, as well as the legal consequences under domestic law for failing to comply with those requirements.

29. Future work on the topic could consider whether the practice of automated contracting warrants a reconsideration of disclosure obligations. For instance:

(a) *Precontractual information* – a new provision could require the party operating an automated system to make information available to counterparties about the use of the system (including counterparties also operating automated systems). Close attention may need to be paid to balancing transparency with the rights of the parties to guard the secrecy of information relating to the operation of the system, including the algorithms on which they operate. For automated systems incorporating AI elements, such a provision would presumably be without prejudice to other obligations arising outside the legislative text relating to the transparency and explainability of AI systems;

(b) *Terms of the contract* – a new provision could require the party operating the automated system to make the terms of the contract in a form that is “accessible so as to be usable for subsequent reference”, along the lines of the functional equivalence rule for writing in article 9(2) ECC. In that context, the term “accessible” is understood to mean “readable and interpretable” and “usable” is understood to cover use by humans and machine.¹⁰ The provision could also extend to a requirement to retain the terms for subsequent retrieval by counterparties. During negotiations on the ECC, the particular risks associated with the availability of terms when contracting in an online environment were recognized,¹¹ and it was noted that disclosure obligations regarding the terms of the contract could enhance legal certainty, transparency, and predictability in international electronic transactions.¹² The issue is particularly relevant to contracts concluded via online platforms, although in that context, the platform operator may be in a better position to satisfy the requirement, even if it is not a party to the contract.

4. Attribution

30. As noted above (para. 19), the output of an automated system takes the form of data messages. Those data messages may trigger further automated, mechanical or human processes, and may include data messages used in connection with the formation and performance of a contract.

31. Future work on the topic could consider laying down rules on the attribution of data messages generated by an automated system, building on the approach taken in existing UNCITRAL texts. In that regard, article 13(2)(b) MLEC adopts the approach that a data message sent by an automated system is attributed to the person by whom, or on whose behalf, the system is programmed. And while the ECC itself does not contain a rule on attribution,¹³ the explanatory note to the ECC states that it is based on the general principle that a data message generated by an automated system is attributed to the person on whose behalf the system is operated.¹⁴

32. The approach taken in existing UNCITRAL texts is consistent with the view that automated systems are mere tools that have no independent will or legal personality. It assumes that, while automated systems are sometimes referred to for convenience as “electronic agents”, they are not “agents” in the ordinary legal sense.

33. The issue of attribution is linked to matters relating to state of mind (i.e. the state of mind of the person in connection to outputs attributed to the person) and liability (i.e. legal consequences flowing from those outputs). Indeed, the term “attribution” is sometimes used to refer to “liability”, although the guide to enactment of the MLEC makes it clear that attribution is not concerned with liability.¹⁵

5. Matters relating to state of mind

34. If future work on the topic were to consider laying down rules on the attribution of the output of an automated system, it could also consider laying down rules for

¹⁰ Explanatory note on the ECC, above footnote 5, para. 146.

¹¹ Ibid., para. 220.

¹² Ibid., para. 217.

¹³ See A/CN.9/546, paras. 125–127, which records deliberations of the Working Group on Electronic Commerce (as it then was) on dealing with rules on attribution.

¹⁴ Explanatory note on the ECC, above footnote 5, para. 212.

¹⁵ UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with additional article 5 *bis* as adopted in 1998, Sales No. E.99.V.4. Specifically, the guide states (at para. 83): “The purpose of article 13 is not to assign responsibility. It deals rather with attribution of data messages by establishing a presumption that under certain circumstances a data message would be considered as a message of the originator...”. It also states (at para. 92): “Early drafts of article 13 contained an additional paragraph, expressing the principle that the attribution of authorship of a data message to the originator should not interfere with the legal consequences of that message, which should be determined by other applicable rules of national law. It was later felt that it was not necessary to express that principle in the Model Law but that it should be mentioned in this Guide”.

determining the state of mind – i.e. what a person “knew”, “believed” or “intended” – in connection with that output. Specifically, domestic law on contract validity and enforceability, as well as on contract avoidance, may require an enquiry into the state of mind of the parties in connection with the formation of the contract, while the terms of the contract itself may also require an enquiry into the statement of mind of the parties in connection with alleged non-performance of the contract. The output of the system may also engage non-contractual obligations of a party in connection with the contracts that require a similar enquiry.

35. As noted in the explanatory note, the central rule in article 12 ECC is that the validity of a contract does not require human review of each of the individual actions carried out by the automated message system or the resulting contract. Accordingly, it is conceivable that the party to whom the output of the automated system is attributed has no knowledge of a particular transaction forming a contract, and can therefore have no actual intention to be bound in connection with the contract.¹⁶ Consideration could be given to formulating a rule as to how requirements regarding the intention of the parties are to be determined in those circumstances:

(a) *Reference to the programming of the automated system* – one conceivable option would be to refer to the state of mind of the person who programmed the system, or on whose behalf the system was programmed, and the types of transactions anticipated. This approach was accepted by the Court of Appeal of Singapore in its 2020 judgment in the case of *Quoine Pte. Ltd. v. B2B2 Ltd* (“*Quoine*”);¹⁷

(b) *Reference to the circumstances of the actual transaction* – another conceivable option would be to refer to the state of mind that the party operating the automated system would have had if the party knew of relevant circumstances surrounding the transaction. This approach was argued before, but ultimately rejected by, the Court of Appeal of Singapore in *Quoine*.¹⁸

36. Given the variety of circumstances in which the state of mind of the parties might be relevant, future work could look incrementally at other areas of contract law that require an enquiry into the state of mind of the parties (e.g. the law of mistake, which is also addressed in para. 26 above).

6. Liability

37. Future work on the topic could consider addressing rules on liability. Liability covers a range of issues, including:

(a) The circumstances triggering liability (e.g. the occurrence of events, the engagement in conduct, and a state of mind in connection with those events or conduct);

(b) Burden of proof and other evidentiary issues in establishing those circumstances; and

(c) The legal consequences flowing from those circumstances (e.g. the obligation to pay damages and the basis on which damages are assessed).

38. While no existing UNCITRAL text on electronic contracting deals in detail with liability, the UNCITRAL Model Law on Electronic Signatures (MLES) does deal with certain liability issues. Specifically, the MLES establishes the circumstances triggering the liability of parties involved in the use of electronic signatures, although it leaves it to domestic law to determine the legal consequences flowing from those circumstances.

¹⁶ Explanatory note on the ECC, above footnote 5, para. 215.

¹⁷ *Quoine Pte. Ltd. v. B2B2 Ltd.*, Civil Appeal No. 81 of 2019, Judgment, 24 February 2020, *Singapore Law Reports*, vol. 2020, No. 2, p. 20, [2020] SGCA(I) 02, para. 97. The case concerned a contract formed by the interaction of automated systems deployed by the parties without human involvement on either side.

¹⁸ *Ibid.*

39. One issue that may arise for consideration is whether any liability regime should be limited to contractual liability (i.e. liability triggered by breach of a contractual obligation), or whether it could be expanded to non-contractual liability, such as liability arising in connection with the contractual relationship. In either case, difficult issues may arise as the complexity and capability of the automated system increases, particularly if the circumstances triggering liability require a causal link to be established between the output of the system and the conduct of the party operating the system. For instance, it may be difficult to establish that the output was caused by an error in how the system was programmed, rather than an erroneous input from an external data source or third-party interference with the system. Consideration could be given to formulating presumptions to address the evidentiary difficulties in favour of the counterparty. Consideration could also be given to a suggestion made during the negotiations on the ECC to shield the party operating the system for erroneous data messages generated in a manner that could not have reasonably been anticipated by the person in programming the system, or where the error was beyond the party's control.¹⁹

40. Consideration could also be given to the role that reliability of the system might play in establishing liability, as well as the relevance of compliance with harmonized standards on ethical use and governance developed in other international forums. Both of those elements – reliability and international standards – are incorporated into existing UNCITRAL texts in the area of electronic commerce.

41. Another liability issue that could be considered in future work is whether to prescribe the legal consequences flowing from the failure to comply with obligations imposed by the legislative text itself (e.g. disclosure obligations).

7. Remedies

42. A case commonly presented in commentary is that of a smart contract deployed in a distributed ledger system whose execution cannot be altered or stopped once deployed. Existing remedies under domestic law may not be sufficiently adapted to meet the challenges posed by automated contracting in cases in which the contract is found to be invalid or unenforceable, in cases of a breach of contract, or in cases in which the contract is avoided.

43. Future work on the topic may wish to consider developing provisions on how particular remedies may be adapted or applied. Particular consideration could be given to specific performance and restitution.

8. Identification of objects

44. In view of the role played by external data sources in the operation of automated systems, future work on the topic could consider the issue of identification of objects. The issue is not currently being addressed by Working Group IV in its work on IdM and trust services.

9. Differentiated treatment for AI systems

45. So far as AI systems merely represent a new generation of automated systems, any new rules on the use of automated systems to form and perform contracts would *prima facie* apply to them. However, as detailed in the revised draft taxonomy, two distinguishing features of AI systems have been put forward to justify differentiated treatment:

(a) The first distinguishing feature is the use of algorithms – in particular “machine learning” techniques – that improve the performance of pre-defined tasks and allow for the performance of new tasks according to pre-defined objectives. The significance of that feature was signalled by the Court of Appeal of Singapore in its judgment in *Quoine*, which stressed on several occasions that the automated system

¹⁹ Explanatory note on the ECC, above footnote 5, para. 230.

in question in that case was programmed to operate in a “deterministic” manner, in the sense that it would always generate the same output given the same input and did not have the capacity to modify the output in response to varying conditions. While the court did not indicate whether its legal analysis of the law of mistake as applied to automated contracts would have differed if the system was not programmed to operate in a “deterministic” manner, commentators have suggested that such systems would necessitate a different approach.²⁰ However, it has been questioned whether “deterministic” programming can really serve as a basis for distinguishing AI systems on the basis that both an automated system operating according to pre-defined tasks and a more “autonomous” system operating according to pre-defined objectives are operating as programmed;²¹

(b) The second distinguishing feature is the processing of large quantities of data from multiple sources (sometimes referred to as “big data”).

46. While those features make AI systems more complex and capable, and combine to create the so-called “black box” problem that is described in the revised draft taxonomy, the secretariat has cautioned against the use of loaded human analogies – such as “learning” or “autonomy” – in analysing their legal significance. It is also questionable whether qualitative measures such as “complexity” and “capability” could serve as a basis for differentiated legal treatment. As noted in the revised draft taxonomy, the recent proposal within the European Union for an “Artificial Intelligence Act”, which adopts a definition of “AI system” that is modelled on the OECD definition, establishes special rules for “high-risk” AI systems by reference to the purpose or objectives for which the AI system is deployed, or the tasks that it performs, rather than by reference to some intrinsic feature of its programming.²²

47. Future work on the topic may wish to consider whether AI systems warrant modified or additional rules to give legal certainty to their deployment in the trade context. Given the potential remoteness between programming and operation of an AI system over the course of its deployment, particular consideration could be given to rules for determining state of mind and rules on liability, whose application might be especially affected by that remoteness.

IV. Next steps

48. The secretariat will report orally to the Commission at its fifty-fourth session on further consultations regarding the proposed legislative projects outlined above.

49. The development of a legislative text on electronic transactions and the use of AI and automation is closely connected to current and former mandates of Working Group IV. The Commission may therefore wish to refer the topic to Working Group IV to build on its experience. In that context, the Commission may wish to recall that the Working Group expects to finalize draft provisions on identity management and trust services at its next session, which is tentatively scheduled for 18 to 22 October 2021 (see [A/CN.9/1051](#), para. 11). Accordingly, the Commission may wish to refer the topic to the Working Group for initial consideration before the next session of the Commission.

50. The Commission may also wish to note that ongoing preparatory work by the secretariat on data transactions (as reported in [A/CN.9/1064](#)) may result in the presentation of a proposal for future work on the topic at its next session. Given the interdependence of data transactions and AI/automation, as noted at the

²⁰ Vincent Ooi and Kian Peng Soh, “Rethinking mistake in the age of algorithms: Quoine Pte Ltd v B2C2 Ltd”, *King’s Law Journal*, vol. 31, No. 3 (2020), p. 367.

²¹ See, e.g., Eliza Mik, “From automation to autonomy: Some non-existent problems in contract law”, *Journal of Contract Law*, vol. 36 (2020), p. 205.

²² See European Commission, Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts, document COM(2021) 206 final (21 April 2021).

fifty-third session,²³ and the past experience of the Working Group in handling two topics simultaneously, the Commission may consider it expedient, upon consideration of that proposal, also to refer the topic to the Working Group to work on in sequence or even to develop in parallel.

²³ *Official Records of the General Assembly, Seventy-fifth Session, Supplement No. 17 (A/75/17)*, part two, para. 75.