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Legal issues relating to the use of distributed ledger technology in trade: scoping paper

Note by the Secretariat

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I. Background

1. The use of distributed ledger technology ("DLT") in trade-related activities has attracted significant attention due to the features of the technology. The first application that referred to the "blockchain" was commercial in nature as it aimed at transferring value without the need for a central supervisor, thus impacting on payment services. Several uses of DLT in trade have been suggested, and while at times expectations have not been met, especially with regard to highly speculative trades, the technology is being tested and used in several commercial fields, and its use in trade has been explored already by several international organizations:

(a) In 2022 the five United Nations Regional Commissions, jointly with the United Nations Conference on Trade and Development (UNCTAD), launched a four-year project entitled *Blockchains for Facilitating Trade and Enhancing Competitiveness*. This joint project builds on the assumption that "blockchain can help building transparent, open, innovative, sustainable and efficient value chains";

(b) UNCTAD's publication *Harnessing Blockchain for Sustainable Development: Prospects and Challenges* (UNCTAD/DTL/STICT/2021/3 and Corr.1) has not only identified use cases for DLT-based applications in the areas of payments and finance, paperless trade and supply chain management, but has also suggested the desirability of international cooperation in setting guidelines, norms and standards to guarantee a fair and responsible adoption of DLT in developing countries;

(c) The World Trade Organization (WTO) has provided significant guidance on the use of DLT in trade through various studies, including the seminal work *Can Blockchain Revolutionize International Trade?* that has first drawn broad attention to the topic. The publication *Blockchain and DLT in Trade: Where Do We Stand?* offers a comprehensive overview of DLT-based initiatives relevant for trade ongoing as at 2020. The study *Accelerating Trade Digitalization to Support MSME Financing* discusses the possible use of DLT and other emerging technologies to address the trade financing gap affecting small and medium-sized enterprises. Research on the relationship between DLT, on the one hand, and provisions of digital economy agreements as well as dedicated chapters of other trade agreements, on the other hand, may be relevant not only for the guidance document but also for the WTO, and joint work on that topic may be envisaged;

(d) The United Nations Economic Commission for Europe (UNECE) has also analysed different aspects of the use of DLT in trade. One early outcome of that work is the *White Paper on Blockchain in Trade Facilitation* (ECE/TRADE/457) prepared by UN/CEFACT. The white paper identifies several use cases of DLT in trade, including maritime and road transport, energy trade, and finance. It discusses legal issues such as admissibility of electronic evidence, non-repudiation, dispute settlement and enforcement, and contract law in the context of DLT;

(e) More recently. UNECE has launched a project on the use of DLT for due diligence and sustainability in cotton and leather value chains (ECE/TRADE/C/CEFACT/2022/9), which aims to implement UN/CEFACT recommendation No. 46 on enhancing traceability and transparency of sustainable value chains in the garment and footwear sector (ECE/TRADE/463). The goal of the project is to provide reliable information to validate traceability, transparency and circularity of the supply chain related to cotton and leather, with a view to upholding environmental, labour and human rights standards. It is to be noted that a similar approach could be taken with regard to the integration of supply chains and electronic warehouse receipts, which is an area of possible future work of UNCITRAL (A/CN.9/1152), and, more generally, in electronic transferable records issued under the UNCITRAL Model Law on Electronic Transferable Records (MLETR).

2. The above initiatives aim at accompanying the transition from a testing phase of DLT in trade to its deployment. Such transition would require guidance on the applicable legal framework as the peculiar features of DLT may pose novel legal issues and require the adaptation of existing legal notions. For instance, the definition

of “data message”, which is a cornerstone of UNCITRAL texts on electronic commerce as it ensures their technological neutrality, has been expanded in the MLETR to encompass “all information logically associated with or otherwise linked together so as to become part of the record, whether generated contemporaneously or not” in order to confirm its application to DLT-based electronic transferable records (art. 2 MLETR). Similarly, rules indicating that the location of equipment and technology supporting the information system is not necessarily the place of business of a party (art. 6(4) of the United Nations Convention on the Use of Electronic Communications in International Contracts; see also, lately, A/CN.9/1132, para. 46) may be particularly useful when DLT is used.

3. Mindful of its central coordinating role in digital trade law, at its fifty-fifth session, in 2022, the Commission requested the secretariat to prepare a guidance document on legal issues relating to the use of distributed ledger systems in trade, within existing resources, and in cooperation with other concerned organizations, as appropriate (A/77/17, paras. 22(f) and 169). The request of the Commission originated from the preparation of a section on distributed ledger systems of the *Taxonomy of Legal Issues related to the Digital Economy* (the “Taxonomy”).

4. As for purpose, the guidance document could provide explanations useful to commercial operators, especially MSMEs and operators located in developing countries, in assessing whether DLT-enabled services address their needs, and the impact of the use of such services on their business. Raising awareness of those legal issues could promote greater security and sustainability in digital transformation efforts, including within the United Nations system itself (A/77/17, para. 167). Regarding the latter, the guidance document would implement Recommendation 6 of the Report of the Joint Inspection Unit *Blockchain applications in the United Nations system: towards a state of readiness* (JIU/REP/2020/7). By mapping existing law, the guidance document could also identify legal gaps that may be submitted to the Commission for further consideration, including for possible legislative work.

5. Regarding content, the guidance document should build on existing UNCITRAL texts and ongoing work at the working group level, as well as the relevant parts of the taxonomy. It should not take a position on whether particular trade-related activities should be enabled by DLT systems (as opposed to other technologies or methods), nor should it mandate specific rules to govern the provision of DLT-enabled services or the relations between the parties (A/77/17, para. 168).

6. The Taxonomy provides fundamental notions useful for defining the scope and structure of the guidance document. In particular, it offers a working definition of DLT that “may be formulated in terms of a bundle of technologies and methods that are deployed to implement and maintain a ledger (or database) that is shared, replicated and synchronized on multiple networked computers (or servers). A distributed ledger system (“DLT system”) is thus the system (comprised of software and hardware components) that supports the deployment of those technologies and methods. DLT systems differ in their design, governance, purpose and use” (para. 174).

7. Moreover, the Taxonomy introduces a distinction between “infrastructure layer” and “application layer” of DLT, with the former relating to the use of DLT by a commercial operator, and the latter relating to the provision of services in full or in part relying on DLT to clients and users (Taxonomy, para. 176). This distinction is maintained in the guidance document. The Taxonomy also offers a description of the relevant actors that may be further refined in the guidance document (Taxonomy, paras. 177–184).

II. Content of the guidance document

8. As mentioned above, the guidance document aims to provide legal guidance to commercial operators considering the use of DLT in trade. It does not provide advice on whether DLT is the appropriate technology for the intended use. Dedicated tools,

such as the *Redesigning Trust: Blockchain Deployment Toolkit* prepared by the World Economic Forum, may complement the guidance document by providing such advice.

Use cases

9. DLT is an emerging technology, and its commercial and non-commercial applications are still at their early stages. For instance, the prevailing outlook on the use of DLT for certain digital assets known as "cryptoassets" or "cryptocurrencies" may have recently changed due to speculative trade, although that issue may not be directly related to the technology used. On the other hand, non-speculative applications are emerging. For instance, non-fungible tokens (NFTs) based on DLT have emerged as a possible solution to the singularity requirements of electronic transferable records (see article 10(1)(b)(i) MLETR), thus providing a possible commercial use case for NFTs. The use of DLT has also been suggested for publicizing security rights in light of the persistence of the information stored in DLT and of its easy accessibility (see para. 38 below).

10. In order to identify commercial use cases for DLT, it seems relevant to discuss in the guidance document certain features that are often associated with the use of DLT, though they may not be exclusive to it. One of these features is the persistence of information (or "immutability"), i.e., the need for consensus to modify information stored in the ledger, which may provide a higher assurance of the integrity of that information and the lack of unilateral modifications. Another issue is the non-discretionary nature of the execution of commands contained in scripts stored in the ledger, which may be associated with a technology-specific notion of automated contracts (so-called "smart contracts", Taxonomy, para. 172). A third prominent issue relates to challenges in interoperability due to technical or legal obstacles.

11. Preliminary work carried out in the secretariat identified several legal matters of interest for the guidance document. Often, these matters intersect with current work of UNCITRAL and with existing UNCITRAL texts, highlighting the cross-cutting nature of the use of DLT in trade.

Governance of the infrastructure layer

12. The governance of the infrastructure layer of the distributed ledger is an issue of significant practical relevance. The guidance document will offer an illustration of classifications such as public and private distributed ledgers, and permissioned and permissionless distributed ledgers (Taxonomy, para. 169). Different legal solutions based on contract and other law are possible depending on the features of the distributed ledger (Taxonomy, paras. 185–189). Options include the legal status and ownership of the network and of its operator, if any, as well as of the network participants. Such options have important consequences with respect to allocation of liability. Case law on this point is increasingly available.[1]

13. A variety of legal solutions are currently possible to define rights and obligations of the various stakeholders, including the user. Contractual options include the use of a rulebook or of separate contracts. Each solution has an impact on the enforcement authority and mechanisms. Blockchain consortiums are also emerging as governance entities appropriate for distributed ledgers.

14. The use of decentralized autonomous organizations (DAO) as entities managing the distributed ledger system is peculiar. DAO may be legally qualified in different manners depending on their features and the applicable law, and there may be significant differences between legal expectations and perceptions of the participants in the DAO and of the users of the distributed ledger system. To address legal uncertainty and promote the use of DLT, recent legislative efforts aim to provide a

[1] High Court of England and Wales, *Tulip Trading Limited v. Bitcoin Association for BSV*, [2022] EWHC 667 (Ch); Court of Appeal of England (Civil Division), *Tulip Trading Ltd v. van der Laan*, [2023] EWCA Civ 83; California Southern District Court, *Sarcuni et al v. bZx DAO et al.*, 2023 WL 2657633 (27 March 2023).

dedicated treatment to DAO including a liability regime,[2] or to adjust existing company law in order to accommodate DAO's needs.

15. Moreover, the user of DLT-based services may require guidance on the rights and obligations arising from the termination of the use of the DLT. Additional issues possibly relevant for the user pertain to the relationship between operators and third-party service providers in case of outsourcing of some of the functions of the distributed ledger.

General principles

16. A discussion of the application of general principles underpinning UNCITRAL texts on electronic commerce to DLT in the legal guidance document seems desirable. One prominent issue related to the application of a general principle of electronic commerce law, namely the principle of technology neutrality, refers to legal effect and evidentiary value of information stored on DLT. Laws have been adopted that confirm the application of that general principle in the DLT context. However, laws have also been passed that give DLT a special status because of its intrinsic features (Taxonomy, para. 190). Moreover, DLT applications may be provided in the context of trust services and may be used to give assurance of quality of data such as origin and integrity. This discussion will touch also upon the use of DLT-based trust services to satisfy requirements contained in UNCITRAL texts (Taxonomy, paras. 202–208) such as the UNCITRAL Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services (MLIT).

Cross-border issues

17. Cross-border legal recognition of information stored in DLT may pose peculiar challenges due to the distributed nature of the ledger, which may not be easily located. This may impact legal notions such as "applicable law" whose determination may refer to national jurisdictions. Moreover, jurisdictions that have adopted laws restricting the use of encryption technologies – for instance, by recognizing legal effect only to electronic signatures issued in compliance with national encryption standards and schemes – may limit the ability to give legal recognition to the use of DLT, which is also based on encryption techniques. It may therefore be useful to provide legal guidance on such issues in light of general principles underpinning UNCITRAL texts such as the principle of technology neutrality and the principle of non-discrimination of legal recognition effects based on the place of use and location of equipment.

18. Regarding private international law aspects, it may be possible to refer to the application in the DLT context of principles broadly adopted in UNCITRAL texts such as favour for party autonomy and non-displacement of private international law rules. Dedicated work by other international organizations, for example by the Hague Conference on Private International Law, will also be referenced. Bespoke private international law issues include the law applicable to DAO and the law applicable to facilities, including platforms, for exchange of cryptocurrencies and other digital assets.

Contract automation

19. The use of DLT is often associated with contract automation by referring to so-called "smart contracts", which however may not be contracts in a legal sense. The UNCITRAL tenet is that contract automation is technology-neutral and therefore not necessarily related to the use of DLT (Taxonomy, para. 172). The work currently carried out by Working Group IV on contract automation (A/CN.9/1125 and A/CN.9/1131) is relevant also for contract automation executed on DLT. Hence, the guidance document will feature the work of that Working Group.

[2] E.g., the Decentralized Autonomous Organizations (DAO) Supplement (2022) adopted in the State of Wyoming, USA.

20. It is often indicated that information stored in a DLT-based application is immutable, in the sense that a consensus-based modification of that information requires certain technical conditions that cannot be easily met unilaterally (as opposed to a modification based on the decision of a single central operator of a centralized information repository). In that sense, information stored in DLT is persistent (see para. 10 above). However, that quality does not prevent from reversing the legal effects of that information, and the guidance document will discuss this matter. One subset of this issue relates to the legal treatment of input errors when stored in DLT.

21. Another prominent issue is the identification of the source of the information, which could be a legal or a physical person, or a physical or a digital object in case of use of oracles: identification is necessary to verify the origin of the data message stored on the ledger and to ensure its reliability. The matter will be discussed also with reference to the MLIT.

Contract conclusion

22. Another aspect of identification relates to satisfying contract law form requirements and regulatory requirements to identify the party to a transaction, typically when concluding a contract, or for procedural purposes such as serving legal documents. One feature of DLT is the use of pseudonymity. While pseudonymity may not necessarily be an obstacle to identification of the party (see Explanatory Note to MLETR, para. 78), it may create challenges to that identification, particularly if the law requires the use of a certain method or procedure, or the fulfilment of a specific level of assurance in the identity. Specific legal procedures have been devised for service of judicial documents in case of significant challenges to the identification of the party, namely with regard to cryptocurrencies.

23. Moreover, the use of electronic signatures as trust services for the identification of a party may face challenges in the DLT context when multiple signatures are required. A discussion of pseudonymity and other identification challenges in the use of DLT may benefit from references to the MLIT.

Contract performance

24. Yet another set of issues arising from the use of DLT pertains to contract performance. A first set of issues relates to the relationship with the DLT service provider, i.e., the infrastructure layer. It is necessary to determine in the agreement between the service provider and the user the expected service level, which is critical for business continuity. In such cases, it is also of great importance to establish (to the extent possible, before the breach occurs) whether claims should be brought against the DLT owner or operator (including a DAO), or against developers, and the relevance of individual nodes.

25. A specific issue relating to the relationship between DLT service provider and user is the right to audit and the enforcement of auditing procedures. To that end, it may be necessary not only to identify the operators, but also to foresee the mechanisms to amend computer code and data already stored in the distributed ledger.

26. The persistence of information in the distributed ledger may affect the modalities of contract performance. The ability to recover digital assets in case of default of the other party is another relevant matter. Among others, segregation of digital assets is a notion relevant to ensure recovery of digital assets. This issue intersects the work carried out by Working Group V on civil asset tracing and recovery in insolvency proceedings (A/CN.9/WG.V/WP.186).

Liability

27. Contractual, extracontractual and other liability may arise also with regard to the use of DLT-based applications for trade. Features of DLT such as persistence of information, decentralization and automation pose novel risks that may require dedicated legal treatment. Liability issues may be particularly delicate with respect to

allocation and attribution of risk among participants for transactions processed in the infrastructure layer.

Payments and other digital storage of value

28. An issue that has attracted attention is the legal treatment of data storing value, which is generally described as “digital assets”. While any data has some value, and therefore may be defined as digital asset, the legal notion of “digital assets” often refers to storage and transfer of value with the use of DLT.

29. There is not yet a settled definition of digital assets, and attempts are being made at defining the law applicable to digital assets, including private international law issues. However, digital assets are used in trade, and a description of their features and of legal issues arising from their use may be of interest for commercial operators. It may be useful to do so by discussing the most common types of digital assets separately. The following classification of digital assets may be used as a working hypothesis.

30. A first class of digital assets consists of central bank digital currencies (CBDC). CBDC are defined as fiat money issued in electronic form. As such, they are subject to the law applicable to fiat money. Additional legal issues may arise because of their electronic nature.

31. Certain digital assets may be considered as payment services. As noted, the original intent behind the creation of bitcoin and of blockchain was the ability to enable decentralized payments. Payment services carried out using DLT systems are subject to the law of payments, including any applicable regulation. The legal modalities for the exchange of value may however differ. For instance, if DLT-based digital assets used to transfer value are legally considered commodities, their exchange may be qualified as barter.

32. It may be possible to issue electronic transferable records, as defined in the UNCITRAL Model Law on Electronic Transferable Records, using DLT-based applications. In that case, the records are transferable documents and instruments in electronic form, and, as such, the substantive law of those documents and instruments applies together with the rules contained in the enactment of the MLETR.

33. Alternatively, it may be possible to issue electronic transferable records under a law that does not foresee a functional equivalence approach (as the MLETR does), but legally enables the use of those records only in digital form. In that case, the law usually contains substantive law aspects of the use of those records.

34. Finally, a residual category consists of cryptocurrencies, i.e., digital storage of value that does not fall under any of the previous or other categories already recognized by the law. Cryptocurrencies may be subject to laws and regulations applicable to securities, to commodities or to both. The legal and regulatory regimes of cryptocurrencies are not yet complete. However, cryptocurrencies are used for commercial and other purposes. For instance, during the coronavirus disease (COVID-19) pandemic the use of cryptocurrencies increased significantly in developing countries due to their attractiveness as a channel for transfer of remittances and to the perception that they may hold value against inflation and depreciation (UNCTAD Policy Brief No. 100, p. 3).

Dispute resolution and related issues

35. The use of DLT in dispute resolution is being considered as part of the current mandate of UNCITRAL on stocktaking of developments relating to dispute resolution in the digital economy (A/CN.9/1154 and Add.1). That use may relate to at least three different aspects, which may operate separately or in conjunction. The first relates to incorporating the use of DLT in online arbitration to take advantage of DLT features such as speed and automation. Speed and predictability of outcome in such case needs to be balanced against respect for procedural safeguards such as due process and fairness.

36. The second aspect leverages on the decentralized nature of DLT and of the use of pseudonymity to promote the participation of non-disputing parties such as jurors (“decentralized justice” or “crowdsourced dispute resolution”). After examining the case, the jurors may cast votes using DLT-based tokens in favour of one out of multiple decisions. The jurors who vote in favour of the prevailing decision are rewarded with additional tokens, while the others may lose the spent tokens.

37. The third aspect relies on the use of bots to resolve the dispute. The bots make data-driven decisions based on rule-based or weak AI tools, and the decision may be subsequently executed automatically using DLT-based applications. Data-driven information may also be made available to parties before adjudication to promote dispute settlement.

Security interests

38. The use of DLT has been suggested also in the context of security interests. Features such as persistence of information and easy accessibility from multiple locations may be particularly useful for publicizing security rights, thus making them effective against third parties. A separate issue relates to the ability to perfect security rights in cryptocurrencies and other types of digital assets.