CHAPTER 1

The Role and Prospects of Private International Law Harmonisation in the Area of DLT

Gérardine Goh Escolar

1 Introduction[1]

Distributed ledger technology (DLT) is increasingly deployed as a solution for daily operations. DLT finds applications in sectors and use cases such as financial technology (FinTech), smart contracts, derivatives, proof of ownership, asset traceability and digital currency. Its massive potential for a wide range of applications has taken DLT from the rarefied atmosphere reserved only to the most technology-savvy elite to the pockets and desks of many around the world in the form of mechanisms that increase systems robustness and operational efficiency.

DLT and its applications find uses in many commercial sectors and has been the subject of significant investment as a result. However, many Private International Law (PIL) issues remain. Questions relating to the determination of the applicable law, jurisdiction, choice of forum, and recognition and enforcement remain unresolved. The complexity of answers to these questions is further compounded due to the global reach of DLT applications, which do not recognise traditional national borders and thus require novel approaches to traditional concepts in PIL.

At present, for example, there is no clear PIL solution either in relation to the applicable law to digital assets and corresponding transfers, or in relation to the possibility of incorporating party autonomy and choice of law in DLT protocols. Additionally, there is also no clarity as to which State has the jurisdiction to resolve disputes that may arise, with the very rare

1 The author thanks Harry Cheng for his invaluable support in the preparation of this chapter, Christophe Bernasconi and Ning Zhao for their input, as well as Jana Araji, Nadia Bouquet, Ilia Lassin, Jaime Vazquez Garcia, Rachel van der Veen and Deannie Yap for their research assistance. Opinions in this chapter do not engage the organisations with which the author is affiliated. Any errors in this chapter remain entirely those of the author.

© GÉRARDINE GOH ESCOLAR, 2023 | DOI:10.1163/9789004514850_003 Gérardine Goh Escolar - 9789004514850
This is an open access chapter distributed under the terms of the CC BY-NC-ND 4.0 license. Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

exception in which the dispute concerns transactions in which all nodes are located in one State (*i.e.*, one-jurisdiction, permissioned systems). Moreover, the applicability and enforceability of choice of court agreements involving digital assets still hang in the balance.

This chapter will consider the PIL challenges arising from DLT applications, including the considerations that arise in specific DLT use cases. It will discuss the role of PIL harmonisation in DLT, and the ongoing work at the Hague Conference on Private International Law (HCCH), the United Nations Commission on International Trade Law (UNCITRAL) and the International Institute for the Unification of Private Law (UNIDROIT) to harmonise PIL rules that relate to DLT applications. It will then touch on the prospects for such harmonisation, before looking to the future of PIL in the DLT space. To set the stage for this discussion, this chapter first briefly discusses the context of DLT applications and the characteristics of DLT that trigger these PIL challenges.

2 Context

2.1 *What is DLT?*

DLT has been defined as:

> ...the practice that uses nodes...to record, share and synchronize transactions in their respective electronic ledgers (instead of keeping data centralized as in a traditional ledger). The participant at each node of the network can access the recordings shared across that network and can own an identical copy of it. Any changes or additions made to the ledger are reflected and copied to all participants in a matter of seconds or minutes.[2]

DLT is the protocol on which blockchain is based.[3] DLT consists of a register ("ledger") distributed across an online network without a central control

2 United Nations Conference on Trade and Development (UNCTAD), "Harnessing Blockchain for Sustainable Development: Prospects and Challenges" (*UNCTAD*, 25 June 2021), 50 <https://unctad.org/system/files/official-document/dtlstict2021d3_en.pdf>.

3 See also Hague Conference on Private International Law (HCCH), "Developments with respect to PIL implications of the Digital Economy" (*HCCH*, March 2022), para. 13 <https://assets.hcch.net/docs/b06c28c5-d183-4d81-a663-f7bdb8f32dac.pdf>.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

point.[4] A network of computers cryptographically identifies users and validates interactions among users before recording the interactions across the network of identifying and validating computers.[5] Individuals or entities interacting through the system are identified with a pair of cryptographic keys: a public key that acts like an address, and a private key that acts like a password. Any computer connected to the network is referred to as a node. Each of these nodes operates a full copy of validated transactions of the blockchain ledger.[6] Packages of data that carry the recorded data on the network are called "blocks". Each block is definitively linked to the next block using a cryptographic signature, creating a "chain". This allows "blockchains" to act as a ledger that can be accessed and shared with the appropriate permissions.[7]

2.2 *Characteristics of DLT That Impact PIL Considerations*

In considering the characteristics of DLT that may impact PIL considerations, a point of note is that there are many ways of designing, implementing and employing DLT. The characteristics of each DLT system impact the use cases best suited to it and raise different PIL issues.[8] It is particularly important, however, that any initiative aimed at harmonising PIL should focus on the applications of DLT, and should, while addressing the particularities of DLT-based systems and applications, be as technology-neutral and -agnostic as possible.[9]

---

4 UNCTAD (n 2), 2.

5 See *e.g.*, Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (*Bitcoin*) <https://bitcoin.org/bitcoin.pdf> accessed 15 December 2022; Vitalik Buterin, "Ethereum: A Next-Generation Smart Contract and Decentralized Application Platform" (*Ethereum*, 2014) <https://ethereum.org/669c9e2e2027310b6b3cdce6e1c52962/Ethereum_Whitepaper_-_Buterin_2014.pdf> accessed 15 December 2022 (the Ethereum Whitepaper, elaborating on the functioning of blockchains as well as smart contracts).

6 UNCTAD (n 2), 51.

7 *Id.*

8 On the use case analysis of DLT by asset class and product line, see the World Economic Forum (WEF), "Digital Assets, Distributed Ledger Technology and the Future of Capital Markets: Insight Report" (*WEF*, May 2021), 32–86 <https://www3.weforum.org/docs/WEF_Digital_Assets_Distributed_Ledger_Technology_2021.pdf> accessed 15 December 2022.

9 For a discussion on the principle of technological neutrality, the pillars on which this principle is built, and the legislative issues that come up with respect to the definition of legal objects, the design of technology rules and their impact on PIL, see Chapter 3 of this book by Bruno Mathis, "Should Crypto-Asset Regulation be Technology-neutral?". For arguments that a possible international instrument relating to PIL should be technologically neutral and be able to accommodate interplay between bodies of law such as

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

The first such characteristic is the *decentralised* nature of DLT, which operates across traditional jurisdictional borders, has a great impact on considerations of PIL. The decentralised record of transfers of digital assets across multiple internet servers ("nodes") in a DLT mechanism means that transfers are in many cases *disintermediated*. Moreover, transactions and relationships that are created via DLT are multi-party and request multi-signatures for their conclusion, thereby allowing the network to include self-enforcing adjudication within its activities.[10]

The second is that actions from outside of the DLT network cannot prevent transactions from being made within the DLT network, which are partly *automated*. A transaction, once triggered, sets in motion a series of concatenated, previously coded, virtual actions. For this reason, there has been support for the existence of a "rule of code" in DLT environments, because some of these actions are independent of direct human intervention.[11]

Third, transactions in DLT networks are *immutable*. The immutability of DLT transactions provides security against tampering, but in the same vein, they have also been classified by some actors as "disruptive" of existing legal frameworks. Following on the same line of reasoning, some have taken the view that traditional concepts of contract law, including excuses for non-performance such as hardship or *force majeure* cannot, and indeed do not, apply.[12]

Fourth, the pseudonymity of users and the decentralised nature of the ledger make it difficult to determine the *situs* of a transaction.[13] This difficulty in determining the *situs* has led to differing views as to whether analogies can

---

family, succession, intellectual property, insolvency and so on, see Chapter 9 of this book by Burcu Yüksel Ripley and Florian Heindler, "The Law Applicable to Crypto Assets: What Policy Choices are Ahead of Us?".

10 See HCCH, "Developments with respect to PIL implications of the digital economy, including DLT" (*HCCH*, March 2021), paras. 11–14 <https://assets.hcch.net/docs/8bdc7071-c324-4660-96bc-86efba6214f2.pdf> accessed 15 December 2022.

11 See, for example, the Financial Markets Law Committee (FMLC), "Distributed Ledger Technology and Governing Law: Issues of Legal Uncertainty" (*FMLC*, March 2018), 21 <http://fmlc.org/wp-content/uploads/2018/05/dlt_paper.pdf> accessed 15 December 2022.

12 See (n 10), para. 8.

13 Matthias Lehmann (2019) "Who Owns Bitcoin? Private (International) Law Facing the Blockchain," (2019) European Banking Institute Working Paper Series no. 42, 2. For a discourse on the pseudonymity related to DLT appications and its impact on PIL considerations, see Chapter 6 of this book by Anne-Grace Kleczewski, "The Good, the Bad and the Ugly: The Private International Law, the Crypto Transactions, and the Pseudonyms".

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

be drawn from legal frameworks in existing regimes, such as intellectual property[14] or goodwill in a business,[15] or whether this difficulty justifies taking an entirely novel approach.[16] The debate has been compounded by the fact that the perimeters of many domestic legal institutions appear to be insufficient to address the difficulties raised by the cross-border nature of DLT applications. There has also been discussions as to whether the larger-scale applications serviced by Blockchain 3.0 illustrate that "[n]o one solution can fit all DLT systems".[17]

These four characteristics of DLT-based assets, agreements and operations impact on traditional considerations of PIL. The next section will consider the specific PIL challenges brought on by DLT applications.

3 *PIL* Challenges Brought on by DLT Applications

Specific PIL challenges arising from DLT applications include:

> Terminology (*e.g.,* what is the definition of "digital assets" on a blockchain),
> Applicable law and choice of law (*e.g.*, what is the most appropriate connecting factor defining the law applicable to a transaction via blockchain),
> Jurisdiction and choice of court (*e.g.*, how to determine the competent court to resolve a dispute in relation to a crypto asset), and
> Recognition and enforcement (*e.g.*, how to enforce a foreign judicial decision in relation to a service regulated by a smart contract).

This section will look at each of these challenges in turn.

14 Gerald Spindler, "Fintech, digitalization, and the law applicable to proprietary effects of transactions in securities (tokens): a European perspective" (2019) 24 Uniform Law Review 724, 736–737.10 See HCCH, "Developments with respect to PIL implications of the digital economy, including DLT" (*HCCH*, March 2021), paras. 11–14 <https://assets.hcch.net/docs/8bdc7071-c324-4660-96bc-86efba6214f2.pdf> accessed 15 December 2022.

15 Andrew Dickinson, "Cryptocurrencies and the Conflict of Laws," in David Fox and Sarah Green (eds), *Cryptocurrencies in Public and Private Law* (OUP 2019), paras 5.107–5.121.

16 Michael Ng, "Choice of law for property issues regarding Bitcoin under English law," (2019) 15 Journal of Private International Law 315, 316.

17 See (n 11).

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

3.1 *Terminology*

The terminology used in discussing the different technologies, systems and applications in the digital economy, including those based on DLT, is a topic that is increasingly discussed in different fora. The lack of uniformity and harmonisation in these discussions comprise one of the main challenges of DLT, a technology that is both application-agile and evolving.

There have been concerted efforts to harmonise terminology being used, including initiatives by the Blockchain Terminology Project of InterPARES Trust.[18] UNCITRAL and UNIDROIT are also jointly and separately hosting Working and Experts' Groups that are working on the development of legal taxonomies.[19] The HCCH contributes to the work of its sister organisations UNCITRAL and UNIDROIT as an observer to these Working and Experts' Groups.

3.2 *Applicable Law and Choice of Law*

DLT-based applications give rise to various challenges in relation to the applicable law. In this regard, specific questions arise on the issues of characterisation, connecting factors, and the scope and limits on party autonomy.

3.2.1 Characterisation

One challenge to the determination of the applicable law that arises relates to the legal nature of the asset. Some jurisdictions consider that some assets traded in decentralised systems are tangible assets while others are not ("off-platform tokens" vs "on-platform tokens"). There is as yet no harmonised view or approach on this issue.[20]

---

18 See InterPARES Trust Terminology Database, available at: http://interparestrust.org/terminology .

19 United Nations Commission on International Trade Law, "Legal issues related to the digital economy" (*UN*, 8 May 2020), 4 <https://documents-dds-ny.un.org/doc/UNDOC/GEN/V20/024/68/PDF/V2002468.pdf?OpenElement>. The UNIDROIT Working Group on Digital Assets and Private Law is working on guidance that also deals with the matter of terminology, see for an overview of its work: International Institute for the Unification of Private Law (UNIDROIT), "Digital Assets and Private Law" (*UNIDROIT*) <https://www.unidroit.org/work-in-progress/digital-assets-and-private-law/#1622753957479-e442fd67-036d> accessed 15 December 2022.

20 For a discussion of a taxonomy for crypto-of crypto assets and therefore the PIL rules that apply to those assets, see Chapter 7 of this book by Felix Krysa, "Taxonomy and Characterisation of Crypto Assets".

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

3.2.2 Connecting Factors

The traditional connecting factors that relate to geographical locations ("*situs*") may not be of relevance to the functioning of a DLT network.[21] There is broad recognition that the concept of *situs* poses challenges for a PIL framework concerning digital assets, because it is technically and legally difficult to identify the location where assets on the ledger are located.[22] In addition, the pseudonymity of users, the immaterial nature of digital assets, and the uncertainty of the location of network nodes increase the difficulty of identifying useful connecting factors.[23]

In this regard, the difference between permissioned and permissionless systems in the DLT platforms may be crucial in determining what the applicable law is. Individuals on permissioned ledgers must be authorised before they can gain access to the system, thus becoming identifiable. On the other hand, users are not required to obtain permission to participate in permissionless systems, which are usually based on open-source software.

To connect DLT systems to a geographical location, novel formulations have developed, for example, the "Place of the Relevant Operating Authority / Administrator" (PROPA). For systems that function with a master key, there is also the "Primary Residence of the Encryption Private Master Keyholder" (PREMA). Rather than focus on the location of the asset or the place where the transaction was made, the location of the participant (*e.g.*, the consumer) or the relevant operating authority is made the focus instead. Table 1.1: An Overview of Connecting Factors shows an overview of connecting factors that have appeared in the PIL discourse relating to DLT systems and applications.

---

21 For a detailed discussion of the basics of DLT and the connecting factors relevant to the most characteristic use cases of DLT, see Chapter 2 of this book by Tetsuo Morishita, "Technical Description of DLT with a Focus on Possible Connecting Factors".

22 HCCH Conference on Commercial, Digital and Financial Law Across Borders (CODIFI Conference), all contributions available on the HCCH YouTube channel, available online at <https://www.youtube.com/playlist?list=PLL3fQvUXrbUE0D2Oevr8VoAYUXIQ1AD-_> accessed 15 December 2022; CODIFI Conference, Amy Held, "Digital Economy / PIL & DLT: What Challenges Lie Ahead?," 15 September 2022; CODIFI Conference, Sarah Green, "Digital Economy / How is Applicable Law Best Determined – By Asset, System or Transaction?," 13 September 2022. For an examination of the private international law rules relating to *lex situs* and *forum situs* regarding decentralised ledgers and crypto-assets, see Chapter 8 of this book by Amy Held, "Crypto Assets and Decentralised Ledgers: Does *Situs* Actually Matter?".

23 CODIFI Conference, Andrea Bonomi, "Opening of the Digital Economy 'Frameworks' Track," 12 September 2022; CODIFI Conference, Teresa Rodriguez de Las Heras Ballell, "Digital Economy / Expanded Applications of DLT: Supply Chain," 14 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors[24]

Rule and Description	Advantages	Limitations
LEX SITUS[25]	TANGIBLE PROPERTY	DISTRIBUTED AND DECENTRALISED
Traditional PIL property rule. With the historical focus on tangible goods, *lex situs* dictates that rights or entitlement should be governed by law of the place in which the property or claim to property is situated.	For DLT arrangements exchanging 'exogenous tokens'[26] that represent tangible property (especially immovable property), courts will most likely apply the *lex situs* of the underlying asset. For exogenous tokens, changes to existing conflict rules may not be necessary, as the only difference lies in the technology underpinning the transaction. Here, traditional conflict rules may be more appropriate.	*Lex situs* rule does not translate well when applied to a DLT system. Situs of an asset constituted on a DLT ledger is not obvious for two reasons. First, because the ledger is distributed. A network can span several jurisdictions and have no central authority or validation point (especially in permissionless systems). Second, location may be hard to determine for cross-border transfers of intangible assets. Application of geographically-dependent connecting factors are problematic in DLT context.

(*Continued*)

24 This table was originally annexed to HCCH (n 10), Annex I.

25 FMLC (n 11), 10.

26 Distinction between "endogenous tokens" (*i.e.*, native cryptocurrencies) and "exogenous tokens." Endogenous tokens do not refer to anything existing outside the blockchain. Exogenous tokens are those which have a necessary connection with assets existing outside the blockchain. UNIDROIT, "Joint UNCITRAL/UNIDROIT Workshop" (*UN*, 2019), 2 <https://www.unidroit.org/english/news/2019/190506-unidroit-uncitral-workshop/conclusions-e.pdf> accessed 15 December 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
ELECTIVE SITUS[27] Proprietary effects of DLT transactions governed by the chosen law of the DLT network participants.	***SIMPLICITY AND CERTAINTY, ESPECIALLY FOR REGULATION*** Proprietary effects of all transactions on the system are subject to the same governing law. Applicable law of the transaction is transparent to participants and regulation.	***THRESHOLD ISSUES, REGULATORY RISKS*** Two threshold issues. First, party autonomy is not universally accepted as a choice-of-law principle for proprietary issues. Second, it may be difficult to apply in permissionless systems.[28] More significant issue will likely be the perceived regulatory risks. For instance, participants may choose a legal system unrelated to the assets and is subject to significant undue influence. This could potentially facilitate the mass transfer of assets by means of legal adoption in the jurisdiction identified by the connecting factor.

27 FMLC (n 11), 15.

28 For permissioned systems, acceptance of a particular governing law could be included in terms for accession to the system (*e.g.*, clearing houses). Norton Rose Fulbright, "Legal analysis of the governed blockchain" (*Norton Rose Fulbright*, June 2018), 1 <https://www.nortonrosefulbright.com/-/media/files/nrf/nrfweb/imported/emea_4957_online-publication-and-pdf__legal-analysis-of-the-governed-blockchain_v4.pdf?la=en&revision=c15aa8eb-48d5-4d06-8851-8226bdb1145f> accessed 15 December 2022 describes these terms of access as the "Constitution" of a permissioned "governed" blockchain – without which the blockchain would be permissionless.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
MODIFIED ELECTIVE SITUS[29] A variant of the 'elective situs' rule. The participants' choice of *situs* could be restricted by regulation or technology. For example, election could be limited to a choice of law approved by regulators, or restricted in respect of a choice of law lacking any connection to the DLT enterprise.	***ADDRESSES PUBLIC POLICY CONCERNS*** Regulators may consider this necessary if uninhibited choice of parties is perceived as being used for avoidance purposes, or that such free choice would contradict public policy.[30]	Approval from more than one regulator. May be difficult to implement rule that requires approval from more than one regulator – especially where the competent authority for a distributed system is not obvious.
DEEMED ELECTION[31] Another variant of the 'elective situs' rule. Deemed election is determined by relevant regulatory or competent authority, where applicable.	***SIMPLICITY AND TRANSPARENCY*** Proprietary effects of all transactions are subject to the same governing law. Transparency to third parties – assuming that the deemed election would be public knowledge.	***IDENTIFYING THE COMPETENT AUTHORITY*** May be self-defeating. A further rule on determining the relevant national competent authority is needed.

(*Continued*)

29 FMLC (n 11), 16.

30 Although not mentioned in the FMLC Report, Article 4 of the HCCH 2006 Securities Convention, which conditions the validity of the choice of law agreement to the relevant intermediary having an office in that State, meeting certain minimum criteria, provides an example of this kind of restriction on the elective situs. Further, Article 11 of the HCCH 2015 Principles on Choice of Law in International Contracts provides limitations resulting from overriding mandatory rules and public policy (*ordre public*). The FMLC Report mentioned Rome I Regulation as an example, as it restricts party autonomy in choice of law by preserving certain protective rules, rather than by limiting the possible options.

31 FMLC (n 11), 17.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
CHOSEN LAW OF THE TRANSACTION/ TRANSFER/ ASSIGNMENT[32]	***PARTY AUTONOMY, SIMPLICITY***	***COMPETING ENTITLEMENTS, PRACTICAL DIFFICULTIES, FRAGMENTATION***
In the context of one or more transfers of an asset, proprietary effects of the transaction are determined by the applicable law of the assignment.	Applying the law of assignment allows parties to choose the law that will govern proprietary effects of the transaction. Simplicity and coherence regarding the choice of law rule on contractual effects.	No certain answer in case of competing entitlements where successive transfers take place under different governing laws. Requires participants in DLT system to coordinate and agree on governing law. Practical difficulty and inefficiency of this requirement undermines the speed and efficiency of using DLT. Fragmentation within a DLT system, where recorded transactions are subject to multiple different laws.

32 *Id.*

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
PROPA[33]	***CERTAINTY***	***RELOCATION OF R(O)A, IDENTIFYING THE R(O)A, PERMISSIONLESS SYSTEMS.*** *See 'PREMA' below for 'costs.'*
Place of the Relevant Operating Authority/ Administrator. This rule presupposes that the DLT system is both (i) permissioned and (ii) centralised (under the control of a central operating authority or administrator). For such a system, the governing law would either be (i) the location of the R(O)A[34] or (ii) the R(O)A is responsible for determining the governing law.		The PROPA rule is problematic where the R(O)A is required to move jurisdictions (e.g. Brexit). May not always be clear who the R(O)A is. Whether an authority should be the R(O)A may change depending on the role of the administrators.[35] Furthermore, additional rules are required to choose between two R(O)A candidates have equivalent powers and are located in different jurisdictions. Most importantly, PROPA would not be applicable in systems without R(O)As, specifically – permissionless and 'trustless' DLT systems.

(*Continued*)

33 *Id*. at 18.

34 Relevant Operating Authority/Administrator.

35 For instance, an administrator's role may be limited to verifying participants' identity or providing technical access to the ledger. It is uncertain as to what functions and purposes an administrator must serve in order to qualify as an R(O)A.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
PREMA[36]	***CERTAINTY***	***TERTIARY 'WARRANT' KEY, COSTS***
Primary Residence of the Encryption Private Master keyholder. Similar to PROPA, but this approach looks to the location of the private master key[37] for the DLT system (for systems that have such a key). Presumptively, this location would be the primary residence, centre of main interests or (possibly) domicile of the master key-holder.		A significant disadvantage of PREMA is the increasing prevalence of tertiary 'warrant' keys. These keys allow DLT enterprises to decrypt data if they are served with a court order. For both PROPA and PREMA, legal opinion must be sought in locating the R(O)A/ master key holder, thereby increasing costs for market participants.
LOCATION OF ISSUER MASTER ACCOUNT[38]	***ENFORCING CLAIMS***	***ACTION AGAINST SYSTEM ADMINISTRATOR***
For securities issues, this looks to the place of the issuer master account where there is no intermediary and investors hold securities directly from the issuing company.	In addition to other advantages (simplicity, certainty), this rule aligns choice of law with the legal system under which claims must ultimately be enforced against the issuer.	By contrast, a disadvantage of this rule is the lack of alignment between choice of law and the legal system under which regulatory or legal action against the system administrator can be most effectively taken.

36 FMLC (n 11), 19.

37 This would be the key by which the R(O)A or relevant authority controls the ability to transfer digital assets on the ledger.

38 FMLC (n 11), 19.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
LOCATION OF PARTICIPANT[39] Applies law of the place where the system participant (*i.e.*, who is transferring assets) is resident, has centre of main interest, or is domiciled.	***BULK TRANSFERS*** Appropriate for transfer of assets in bulk. Otherwise, transferees would have to conduct due diligence on each asset under its own governing law or *lex situs* respectively.	***RELEVANCE, QUESTIONS OF ENTITLEMENT, SPLITTING THE LEDGER*** Questionable relevance of this benefit (*left, 'bulk transfers'*) in a DLT environment. A significant disadvantage is that this rule gives no clear answer to questions of entitlement where there are: joint transferors, chains of assignments, or change in habitual residence by the transferor. Rule artificially splits up the distributed ledger record.

(*Continued*)

39 *Id.* at 19–20.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
LAW OF PRIVATE USER KEY[40]		***DETERMINING LOCATION, COSTS***
Location of private user key[41] for the DLT system. This would presumptively be the primary residence, centre of main interests or (possibly), domicile of user key-holder.		May be difficult to objectively determined domicile of user key-holder, especially because one key may be composed of several parts that are held across multiple jurisdictions. Establishing location of the relevant person will necessitate complex legal opinions and cost.
LAW OF THE ASSIGNED CLAIM[42]	***ELECTIVE SITUS, WIDER CONFLICTS REGIME***	***ONLY APPLICABLE TO EXOGENOUS INTANGIBLE ASSETS***
Proprietary effects of transaction would be governed by the applicable law of the assigned claim. Understood as a kind of *situs* rule for intangible assets. Here, the *situs* is deemed to be the legal system identified as the applicable law of the asset.	This approach enjoys the same advantages as with an elective *situs* rule. For the EU, it would also have the benefit of aligning with the wider conflicts of law regime (Rome I).	Rule can only be implemented for intangible assets that have a separate existence from the DLT system (*i.e.,* must not be tangible assets or native 'on-platform'[43] tokens). As previously mentioned, tangible assets will likely be

40 FMLC (n 11), 20.

41 Key by which a participant in the system controls the digital asset.

42 FMLC (n 11), 20.

43 Depending on whether the distributed ledger is a blockchain, the term "on-platform" may be used interchangeably with "on-chain." The same applies for "off-platform" and "off-chain."

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

TABLE 1.1 Overview of connecting factors (*Continued*)

Rule and Description	Advantages	Limitations
		governed by *lex situs*. As for virtual 'on-chain' endogenous tokens, a separate rule tailored to the distributed system is required.
LEX CODICIS[44] *Also: lex digitalis, PResC*.[45] Looks to the governing law of the code that was used to create the original distributed ledger programme. Usually taken to be the Primary residence of the original Coder (PResC).	***SIMPLICITY AND CERTAINTY*** Original coder can be identified relatively easily. Rule also provides *ex ante* certainty.	***RELEVANCE OF ORIGINAL CODER*** Tenuous connection to the original coder. Where the coder is not also the system administrator, there is little reason why they should be relevant to and responsible for subsequent developments on the distributed ledger.

The challenges inherent in applying traditional connecting factors to assets on DLT platforms has also led to the creation of novel types of connecting factors that involve information technology criteria. One example is the formulation of a "*lex codicis*" or "*lex digitalis*", which considers the governing law of the code that was used to create the original distributed ledger programme. In the case where the computer code itself does not have a particular *situs*, the governing law of the code is taken to be the primary residence of the coder (or PResC).[46]

Industry players have advocated a deeper analysis of possible connecting factors, which would enhance the legal understanding of blockchain assets as

44 FMLC (n 11), 21.
45 Primary Residence of the Coder.
46 FMLC (n 11), 21.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

they evolve.[47] This is preferable to a static approach that lays out how blockchain assets should be classified, as the way forward should have flexibility to adopt to new and creative blockchain assets. For example, some experts have opined that a proxy for geographic *situs* needs to be found for digital assets since they do not possess a physical location.[48] Emerging approaches to this problem have focused on examining explicit choices of law, such as Article 12 of the 2022 Uniform Commercial Code Amendments. This article provides a "waterfall" of alternatives for determining the governing law of a "controllable electronic record".[49] "The primary rules of this waterfall require for their applicability express provisions of a controllable electronic record, an attached or logically associated record, or the system in which a controllable electronic record is recorded"; as last resort, the law of the District of Columbia is applied.[50] Similarly, the draft principles of the UNIDROIT Digital Assets Working Group adopt a waterfall of four factors to discern the applicable law – the first consideration would be to apply the law that is applicable to the custodian of the crypto asset, since most crypto assets are held by an exchange or wallet.[51]

3.2.3 Party Autonomy

Another challenge to the determination of applicable law is the growing movement that seeks to differentiate between actions inside and outside of a blockchain ("on-chain" vs "off-chain"). This differentiation has impact on party autonomy because there is no guarantee that a *situs* chosen by the parties in off-chain agreements will be effectively applicable.[52]

---

47 CODIFI Conference, Tju-Liang Chua, "Interview with the General Counsel of Ethereum," 12 September 2022.

48 CODIFI Conference, Hin Liu, "Digital Economy / Digital Assets Remedies," 15 September 2022.

49 Official Comment to Article 12, available at Uniform Law Commission, "UCC, 2022 Amendments to" (*ULC*) <https://www.uniformlaws.org/viewdocument/final-act-164?CommunityKey=1457c422-ddb7-40b0-8c76-39a1991651ac&tab=librarydocuments> accessed 15 December 2022.

50 *Id.*

51 For a discourse on digital assets that are held by a (crypto-)custodian and those that are not, and an argumentation that the custodian forms the closest connecting factor in the area of secured transactions, see Chapter 16 of this book by Matthias Haentjens and Matthias Lehmann, "The Law Governing Secured Transactions in Digital Assets".

52 On the law applicable to digital representations of off-chain assets, including tentative approaches to proprietary and private international law rules relating to tokenised assets and digital twins, see Chapter 10 of this book by Emeric Prévost, "The Law Applicable to Digital Representations of Off-Chain Assets".

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

Some experts have proposed a party autonomy-focused approach that allows the applicable law to be chosen by the parties.[53] One example, reflecting the draft principles of the UNIDROIT Digital Assets and Private Law Working Group, is to adopt a "waterfall" of four factors to discern the applicable law.[54] Under this approach, the first consideration is to apply the law that is applicable to the custodian of the crypto asset, since most crypto assets are held by a crypto exchange or wallet.[55] Other possible options may be tied to the system on which the asset was created.[56] In the absence of explicit choice of law, another alternative approach may rely on the law of the place of characteristic performance.[57]

3.2.4 Revision and Use of Existing Frameworks to Determine the Applicable Law

There is broad consensus that, where possible, it would be preferable to use existing frameworks (for example, in existing insolvency law) rather than developing new connecting factors exclusively for an existing field's intersection with DLT.[58] Experts have also discussed the possibility of revising PIL rules applicable to negotiable instruments, particularly to ensure that the party autonomy principle could be applied and to take into account how digitalisation transforms core features of negotiable instruments, namely the place of signature and physical possession requirements.[59]

Experts have also noted that the HCCH 2015 Principles on the Choice of Law in International Commercial Contracts[60] could be relevant to DLT applications. Clarity on choice of law would be crucial in this context, as the parties'

53 CODIFI Conference, Emeric Prévost, "Digital Economy / Loi applicable: determination par actif, par système ou par transaction?," 13 September 2022.

54 UNIDROIT, "Master Copy of the Draft Principles and Comments" (*UNIDROIT*, December 2022) <https://www.unidroit.org/wp-content/uploads/2022/12/W.G.7-Doc.-2-Draft-Principles-and-Commentary.pdf> accessed 15 December 2022.

55 CODIFI Conference, Matthias Lehmann, "Digital Economy / How is Applicable Law Best Determined – By Asset, System or Transaction?," 13 September 2022.

56 CODIFI Conference, Louise Gullifer, "Digital Economy / Characterising Relationships Between Asset Holders and Exchanges," 13 September 2022.

57 CODIFI Conference, Kelvin Low, "Digital Economy / How is Applicable Law Best Determined – By Asset, System or Transaction?," on 13 September 2022.

58 CODIFI Conference, Florian Heindler, "Digital Economy / PIL & DLT: What Challenges Lie Ahead?," 15 September 2022.

59 CODIFI Conference, Benjamin Geva and Sagi Peari, "Securities / Negotiable Instruments," 14 September 2022.

60 HCCH, "Principles on Choice of Law in International Commercial Contracts," (*HCCH*, 19 March 2015) <https://www.hcch.net/en/instruments/conventions/full-text/?cid=135> (HCCH 2015 Principles).

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

choice would be an important consideration when circumstances could make it difficult to localise contracts in one State.[61] Experts considered the potential application of the HCCH 2015 Principles to issues such as smart contracts based on DLT systems and for transactions such as cross-border transfers of data, which remain largely subject to different national laws.[62]

3.3 *Jurisdiction and Choice of Court*

The allocation of jurisdiction among national courts is another PIL issue that arises in relation to digital assets based on DLT.

One example is in the case of Initial Coin Offerings (ICOs), which triggered a wave of class actions filed in the USA. The court of the Northern District of California discussed the matter of jurisdiction in relation to such digital assets in the case of *Tezos*, where it considered "the operative question" of "where does an unregistered security, purchased on the internet, and recorded "on the blockchain," actually take place?"[63] In its Order, the court considered the various aspects of the sale, noting the location of the server that hosted the website in question, the location of the individual who operated the website, and the fact that the transaction was validated by a network of global nodes clustered most densely in the United States. The court found that, "[w]hile no single one of these factors is dispositive to the analysis, together they support an inference that [the] alleged securities purchase occurred inside the United States."[64]

3.4 *Recognition and Enforcement*

Dispute resolution and remedies awarded may also pose various challenges depending on the asset and the system in question. The valuation of an asset under dispute, for example, could depend on whether it is unique or fungible, and this determination could condition whether or not an injunction may be

61 CODIFI Conference, Benjamin Geva and Sagi Peari, "Securities/ Negotiable Instruments," 14 September 2022.

62 CODIFI Conference, Florence Guillaume, "HCCH Principles / The HCCH Principles and the Digital World (French Session)," 15 September 2022.

63 *In re Tezos Securities Litigation*, (N.D. Cal.), Case no. 17-cv-06779-RS, Order on Defendants' Motion to Dismiss (available online at <https://storage.courtlistener.com/recap/gov.uscourts.cand.319743/gov.uscourts.cand.319743.148.0.pdf> accessed 15 December 2022). For an analysis of this decision, see Koji Takahashi, "Prescriptive Jurisdiction in Securities Regulations: Transformation from ICO (Initial Coin Offering) to the STO (Security Token Offering) and the IEO (Initial Exchange Offering)," (2020) 45 Ilkam Law Review 31, 42.

64 *In re Tezos Securities Litigation, supra* note 63, at 13–14.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

granted.[65] Given that courts may issue orders compelling certain assets to be turned over, difficulties that may arise include questions of whether a turnover order against automated smart contracts can be enforced, or how to access digital assets in the case private keys have been lost. At present there is no effective and practical means of execution of virtual assets, and no harmonisation across jurisdictions as to the recognition and enforcement of these types of orders.[66]

Experts moreover agree that there is a lacuna in cross-border dispute-resolution law. Specifically, the absence of a non-institutional set of rules, such as the UNCITRAL Model Law on International Commercial Arbitration,[67] means that there is no framework that may be partially self-enforced on the blockchain and partially enforceable off-chain.[68] There may also be difficulties in deciding where to initiate recognition and enforcement proceedings of a transaction carried out, for example, in a metaverse.[69] In these cases, it has been argued that allowing the claimant to bring proceedings before the courts of their habitual residence may be a potential solution.[70]

4 Case Studies: PIL Considerations in DLT Use Cases

The continued optimism in the outlook on Web3 and the digital economy has fuelled the recent widespread decoupling of DLT use cases. This has led to the validation and adoption of concrete and sector-specific use cases, as well as

65 For an excellent discussion of the outcome of blockchain-based dispute resolution, see Chapter 21 of this book by Pietro Ortolani, "Recognition and Enforcement of the Outcome of Blockchain-Based Dispute Resolution".

66 CODIFI Conference, Andrew Hinkes, "Digital Economy / Digital Assets Remedies," 15 September 2022.

67 UNCITRAL, "UNCITRAL Model Law on International Commercial Arbitration (1985), with amendments as adopted in 2006" (*UNCITRAL*, 2008) <https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/19-09955_e_ebook.pdf> accessed 15 December 2022.

68 CODIFI Conference, Pietro Ortolani, "Digital Economy / Blockchain-Based Dispute Settlement Mechanisms (Ortolani)," 14 September 2022.

69 CODIFI Conference, Juliette Asso, "Digital Economy / Expanded Applications of DLT: Metaverses," 14 September 2022.

70 CODIFI Conference, Laura Azaria, "Digital Economy / Expanded Applications of DLT: Supply Chain," 14 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

the unique drivers of growth as a result of these use cases.[71] DLT applications to various fields, including financial transactions, Internet of Things (IoT), and value and supply chains, have grown exponentially. Blockchain 1.0 relied on proof-of-work (PoW) protocol as the foundation of blockchain technologies. From there, Blockchain 2.0 evolved to smart contracts involving greater functionality, decentralised applications, and autonomously executing algorithms. Blockchain 3.0 now focuses on larger-scale applications of non-currency-related DLT, improved performance, and greater scalability and interoperability, all rooted in proof-of-stake (PoS) protocol.[72]

As discussed above, the specificities of each DLT use case condition their challenges to the traditional notions of PIL. This section discusses PIL considerations in specific DLT use cases: tokenisation, digital currencies, cloud economies and metaverses, and decentralised autonomous organisations (DAOs).

4.1 *Tokenisation*

Applications of tokenisation today include asset tokenisation, non-fungible tokens (NFTs), global value and supply chains, and soulbound tokens (SBTs). Each of these classes of applications raise unique PIL considerations. This sub-section will brief discuss each class in turn.

4.1.1 Asset Tokenisation

Tokenisation of real assets refers to the digital representation of existing real (physical) assets on distributed ledgers,[73] including the representation on DLT of traditional asset classes such as financial instruments, collateral or real assets.[74] According to the OECD,

---

71 See in the field of security in the Internet of Things, *e.g.*, Anshul Jain, Tanya Singh, and Nitesh Jain, "Framework for Securing IoT Ecosystem Using Blockchain: Use Cases Suggesting Theoretical Architecture," in Milan Tuba, Shyam Akashe, and Amit Joshi (eds), *ICT Systems and Sustainability* (Springer 2020), 223–232.

72 "Proof of stake" refers to "a consensus distribution algorithm which determines which users are eligible to add new blocks to the blockchain, thus, earning a cryptocurrency payment as mining fee. Using this method, of the users who participate in the mining process, those with more tokens are favoured over those with less." See UNCTAD (n 2), 4 and 52.

73 Garrick Hilleman and Michel Rauchs, "2017 Global Blockchain Benchmarking Study," (*SSRN*, 21 September 2017), 51, 64 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3040224>.

74 See for example Financial Stability Board (FSB), "Decentralised financial technologies: Report on financial stability, regulatory and governance implications" (*FSB*, 6 June 2019) <https://www.fsb.org/wp-content/uploads/P060619.pdf>.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

> [t]he application of DLTs and smart contracts in asset tokenisation has the potential to deliver a number of benefits, including efficiency gains driven by automation and disintermediation; transparency; improved liquidity potential and tradability of assets with near-absent liquidity by adding liquidity to currently illiquid assets; faster and potentially more efficient clearing and settlement. It allows for fractional ownership of assets which, in turn, could lower barriers to investment and promote more inclusive access by retail investors to previously unaffordable or insufficiently divisive asset classes, allowing global pools of capital to reach parts of the financial markets previously reserved to large investors.[75]

There are two types of asset tokenisation. The first is tokenisation that represents a pre-existing off-chain real asset. This type of asset tokenisation includes financial assets in conventional securities, non-financial assets such as real estate, and commodities such as gold. The second consists of tokens that are native to the blockchain, and which exist and trade only on-chain. This second type of asset tokenisation includes financial assets issued on DLT and equity securities.

Tokens representing a pre-existing off-chain real asset carry the rights of the assets that they represent. The real assets exist off-chain and are generally placed into safekeeping or custody to ensure that the tokens are constantly backed by the assets they represent. This type of tokenisation raises questions relating to the characterisation of such tokens for purposes of PIL,[76] and the significant role of custodianship of assets that have been tokenised.[77]

It is a truism that trust in the tokenisation of assets will depend on a credible central authority that can guarantee the connection of the real world with the blockchain. The regulation of tokenisation may be necessary to promote financial stability and market integrity while also protecting the consumer. Some experts have expressed the view that tokenisation simply replaces one digital

75 Organisation for Economic Co-operation and Development (OECD), "The Tokenisation of Assets and Potential Implications for Financial Markets" (*OECD*, 2020), 7 <https://www.oecd.org/finance/The-Tokenisation-of-Assets-and-Potential-Implications-for-Financial-Markets.pdf> accessed 15 December 2022.

76 For a discussion of the Swiss private international law applicable to various characterisations of tokens, see Chapter 22 of this book by Pascal Favrod-Coune and Kévin Belet, "Conflict of Laws and Tokens in Swiss Private International Law".

77 For an excellent discourse on possible connecting factors and policy choices, in particular in relation to asset tokenisation, see Ripley and Heindler (n 9).

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

technology with another – *i.e.,* a change from the use of electronic entries in securities registries of depositories with the use of cryptographic dematerialised securities based on DLT. As such, no issues of PIL, for example, in relation to jurisdiction, would arise if regulation were to take a technology-neutral approach.

On the other hand, given the novel nature of the models and processes involved in asset tokenisation, it may be unclear whether a domestic legal framework fully captures tokenisation. Legal frameworks put in place may need explicit jurisdiction over new actors, which will mostly be acting across borders. New regulation may also become necessary to regulate applicable law, jurisdiction, and recognition and enforcement in relation to the interoperability between the on-chain and off-chain habitats. Risks associated with the cross-border use of DLT, for example, in the cross-border management of financial risks and the cross-border protection of digital identity, may also need to be addressed. It has been noted that "[c]ross-border transactions of tokenised assets require international cooperation to limit regulatory arbitrage and for the smooth operation of tokenised markets".[78] This also includes dispute settlement, recourse and redress in case of fraud, insolvency, or technical fault.

Addressing the PIL issues that arise in asset tokenisation may become increasingly urgent as cross-border transactions of tokenised assets become more widespread.

4.1.2 Non-Fungible Tokens

Non-fungible tokens (NFTs) are a class of digital asset or token that can be proved to be unique, meaning that it is not interchangeable (*i.e.*, "non-fungible") with another digital asset token. The uniqueness, transparency and provability of ownership, and asset programmability of the NFT is usually cryptographically, immutably and publicly recorded on a distributed ledger.[79] This feature has been deployed to provide both digital and physical works with an NFT "certificate" of uniqueness and authenticity. The European Union Blockchain Observatory and Forum has noted that indicative NFT use cases include

78 *Id.* at 8.

79 The European Union Blockchain Observatory and Forum, "Demystifying Non-Fungible Tokens (NFTs)" (*EU BlockChain*, 20 November 2021), 4–5 <https://www.eublockchainforum.eu/sites/default/files/reports/DemystifyingNFTs_November%202021_2.pdf>.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

digital art[80] (including gaming collectibles),[81] supply chain logistics,[82] content ownership,[83] and metaverse assets.[84]

Recent attention has focused on disputes arising from the minting, purchase, and theft of NFTs and NFT collections. For example, independent artists who post their work in publicly-viewable online galleries have reported that their artwork has been stolen and transformed into NFT collections without their consent.[85] These disputes indicate that challenges can arise based on the characterisation of NFTs (and whether they have proprietary status) and the lack of clarity over intellectual property rights (including copyright and trademark) associated with the token, especially when the token is linked with a physical good.

One PIL issue that arises in relation to NFTs is the recognition and enforcement of the underlying mechanism used for transferring and establishing ownership. Some commentators have argued that NFTs should be considered like property deeds that give an ownership title to a physical asset.[86] However, such deeds or titles generally entitle the holder to ownership of the asset but is not the asset in itself. In direct contrast, the purchase of an NFT gives ownership of the NFT itself, with any further rights

80 See, *e.g.*, Christie's, "Beeple, Everydays: The First 5000 Days" (*Christie's*) <https://onlineonly.christies.com/s/beeple-first-5000-days/beeple-b-1981-1/112924> accessed 15 December 2022, which was minted on 16 February 2021 and sold at online auction on 11 March 2021 in excess of USD 69 million.

81 See, *e.g.*, Cryptokitties, backed on the Ethereum blockchain, which allows players to breed digital kitties in-game to be traded via the use of NFTs.

82 See, *e.g.*, Nike's Cryptokicks project, for which it secured a patent, that stores unique identifiers given to each pair of shoes.

83 See, *e.g.*, Audius, "Home" (*Audius*) <https://audius.co/> accessed 15 December 2022, a decentralised audio streaming and sharing platform on the blockchain.

84 See, *e.g.*, for sales of digital land in the Sandbox and Decentraland, Keira Wright, "Virtual l and in the metaverse dominated NFT sales over past week" (*Cointelegraph*, 6 December 2021) <https://cointelegraph.com/news/virtual-land-in-the-metaverse-dominated-nft-sales-over-past-week>.

85 See, for example, Lois Beckett, "'Huge mess of theft and fraud:' artists sound alarm as NFT crime proliferates" (*The Guardian*, 29 January 2022) <https://www.theguardian.com/global/2022/jan/29/huge-mess-of-theft-artists-sound-alarm-theft-nfts-proliferates> and James Purtill, "Artists report discovering their work is being stolen and sold as NFTs" (*ABC*, 16 March 2021) <https://www.abc.net.au/news/science/2021-03-16/nfts-artists-report-their-work-is-being-stolen-and-sold/13249408>.

86 *Id.* at 40; see also Jeremy Goldman, "A Primer on NFTs and Intellectual Property" (*Lexology*, 11 March 2021) <https://www.lexology.com/library/detail.aspx?g=d96ed012-8789-4e87-bc1d-70ba76569c0f>.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

or entitlements unless otherwise decided by the terms of the token smart contract. This raises the question of whether NFT transactions are solely contractual, or whether they carry proprietary characteristics. Other issues that arise in regard of characterisation is whether NFTs can be considered commodities[87] or securities.[88]

It should be noted that the proprietary nature of NFTs has been recognised in recent legal decisions rendered by the English and Singaporean courts.[89] Moreover, it has been noted that digital assets could be the subject of proprietary rights.[90] Consequently, the questions of whether digital assets are capable of infringing upon, conferring, or being protected under intellectual property rights has come to the fore.[91]

In addition, an NFT may also constitute a receipt of ownership for a linked real-world asset or a fraction of that asset, such as a portion of a digital painting.[92] In this regard there are risks associated with NFT trading, including poorly formed or non-existent contracts, unclear rights of ownership, and trademark and copyright concerns.[93] Notably, to overcome matters of enforcement relating to blockchain-based assets, a restraining order has been served via NFT.[94] The characterisation of NFTs—whether as property or not—is a pressing PIL issue that may merit further consideration.[95]

87 See, *e.g.*, the U.S. Commodity Futures Trading Commission (CFTC), "Digital Assets Primer" (*CFTC*, 2020) <https://www.google.com/url?sa=t&rct=j&q=&esrc> accessed 15 December 2022.

88 See, *e.g.*, the position of the U.S. Securities and Exchange Commission (SEC), "Framework for 'Investment Contract' Analysis of Digital Assets" (*SEC*, 2021) <https://www.sec.gov/files/dlt-framework.pdf> accessed 15 December 2022.

89 *Id*.

90 UNIDROIT, "Workshop on Issues Related to Enforcement in Digital Assets: Summary Conclusions" (*UNIDROIT*, 10 June 2022) <https://www.unidroit.org/wp-content/uploads/2022/08/Enforcement-and-DA-Side-Event-Draft-Summary-Conclusions-Final.pdf>. See also UNIDROIT's Draft Digital Assets Principles which includes guidance on linked digital assets, transfers relating to digital assets, custody of digital assets, secured transactions where digital assets were the collateral, and control over digital assets.

91 Amy Madison Luo, "NFTs: A Legal Guide for Creators and Collectors" (*Coindesk*, 11 March 2021) <https://www.coindesk.com/policy/2021/03/11/nfts-a-legal-guide-for-creators-and-collectors/>.

92 CODIFI Conference, Emeric Prévost, "Digital Economy / Loi applicable: determination par actif, par système ou par transaction?" 13 September 2022.

93 CODIFI Conference, Ronald Sum, "Digital Economy / Blockchain-Based Dispute Settlement Mechanisms," 14 September 2022.

94 CODIFI Conference, Andrew Hinkes, "Digital Economy / Digital Assets Remedies," 15 September 2022.

95 CODIFI Conference, Hin Liu, "Digital Economy / Digital Assets Remedies," 15 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

4.1.3 Global Value and Supply Chains

Global value and supply chains are sectors in which DLT has potentially transformative and disruptive applications. The use of DLT could transit the global value and supply chains from linear models to circular global chains in which parties are simultaneously and concurrently interacting with each other, potentially in real-time. Some processes could become entirely automated. These developments could catalyse a move away from a network of bundles of bilateral contracts. The reconfiguration of global value and supply chains would raise questions relating to the applicable law, the role of contracts, and the impact of automation on allocation of liability.[96]

4.1.4 Soulbound Tokens (SBTs)

The introduction of Soulbound Tokens (SBTs) in May 2022 by Vitalik Buterin and co-authors describes a new class of tokenisation and digital assets.[97] SBTs are defined as publicly-visible, non-transferable tokens representing affiliations, memberships, and credentials, enabling a DLT wallet to act as an "extended resume" of the holder's activities as relationships.[98] Illustrations of SBT use cases include proof of attendance at a conference, recognition of extensive contributions to a charity, or extensive participation in the governance of DAOs. SBTs can also be used to model traditional financial systems and arrangements, with a lien-like SBT showing that the holder has an outstanding debt obligation. Conversely, a credit score-like SBT may show that the holder has consistently made payments on a loan.

SBTs may provide a digital method of representing a wallet holder's location, personal identification, or affiliations. They could thus provide indication of real-world identities, locations, places of business, and patterns of social or economic behaviour. Interestingly, these are facts that facilitate the application of traditional connecting factors in PIL. Further, users would be incentivised to voluntarily acquire more SBTs to signal the consistency and reliability of their performance of obligations. SBTs may thus overcome the challenges

96 CODIFI Conference, Teresa Rodriguez De Las Heras Ballell, "Digital Economy / Expanded Applications of DLT: Supply Chain," 14 September 2022.

97 E. Glen Weyl, Puja Ohlhaver, and Vitalik Buterin, "Decentralized Society: Finding Web3's Soul" (*SSRN*, 11 May 2022) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4105763>.

98 The term "Soulbound" is borrowed from massively multiplayer online games, where Soulbound equipment is typically rewarded for accomplishments of high complexity and time investment and is "bound" to the player's "soul" because it cannot be traded or sold to other players. The equipment therefore has reputational value because it proves that the owner accomplished a significant challenge in the game.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

that DLT poses to the PIL factors of *situs* and identity while respecting the ethos of peer-to-peer exchange that guides many DLT communities.

On the other hand, SBTs may challenge traditional notions of control under property law. SBTs are not intended to be freely transferable after initial acquisition, and users may only "destroy" it.[99] This may raise questions as to whether they may be accurately characterised as property. SBTs may thus raise complications in the search for general rules to characterise DLT assets.

4.2 *Digital Currencies*

Digital currencies are a "digital version of cash, controlled by a private cryptographic key – a unique random string of numbers."[100] Digital currency is owned by the holder of the private key associated with the relevant crypto wallet, which is used to hold and transfer the currency. There are currently three types of digital currencies: Central Bank Digital Currencies (CBDCs), which are digital versions of fiat issued by a country's central bank; Stable-Coins (*e.g.* Diem, formerly Libra), which are backed by a reserve asset such as fiat currency[101] held at banks; and Cryptocurrencies (*e.g.* bitcoin, ethereum, solana).

4.2.1 Central Bank Digital Currencies (CBDCs)

Token-based CBDCs have been defined as (a) a form of money (b) issued by a central bank (c) whereby the monetary claim on the central bank is incorporated in a digital token and (d) the transfer of the token equals transfer of the claim, (e) without current-account relationship between the central bank and the holder.[102] CBDCs have gained the attention of governments for their potential as a "new form of money"[103] to promote policy goals including financial

99 The hypothetical disincentive to doing so is that a wallet devoid of SCRTs will appear as a new user with no reputational markers, *i.e.*, potentially risky to transact with.

100 Visa (2021), "The Crypto Phenomenon: Consumer Attitudes & Usage", p. 7, available at https://usa.visa.com/content/dam/VCOM/regional/na/us/Solutions/documents/the-crypto-phenomenon-technical-paper.pdf.

101 "Fiat currency" refers to "any legal tender designated and issued by a central authority that people are willing to accept in exchange for goods and services because it is backed by regulation and because they trust this central authority." Consultative Group to Assist the Poor (CGAP), "Bitcoin versus Electronic Money" (*World Bank*, January 2014), 1 <https://documents1.worldbank.org/curated/en/455961468152724527/pdf/881640BRI0Box330WLEDGENOTES0Jan02014.pdf> accessed 15 December 2022.

102 Marianne Bechara et al. (eds), *IMF Fintech Note, Private Law Aspects of Token-Based CBDC* (First Draft, on file with author), para. 3.

103 *Id.* at para. 9. As opposed to account-based CBDC, token-based CBDC have been recognised to legally represent a truly "new form of money" that, per its definition, incorporates

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

inclusion; reduced transaction costs; resilience of payments in emergency situations; reduced illicit use of money; and increased competition in a country's payments sector.[104]

CBDCs have redefined the questions to be considered in the matter of the legal frameworks and developments that would need to be in place to reliably accommodate digital versions of fiat currency.[105] PIL questions that could arise include the recognition and enforcement of judgments in CBDC systems, jurisdiction in relation to intermediaries, and interoperability with existing (fiat) financial systems. CBDC trials are underway in jurisdictions like the People's Republic of China and the Bahamas, with expectation that they could be used in the future for cross-border payments, e-commerce, machine-to-machine transactions, and smart contracts. A PIL framework may need to be developed now rather than waiting until CBDCs have been put into actual practice. Additionally, legal frameworks concerning insolvency,[106] data protection and cyber security will need to be developed.[107]

The first PIL concern will be the characterisation of CBDCs. Determining the legal nature of CBDCs under existing property law classifications will bear on whether and how ownership rights in CBDCs can be held and evidenced.[108] This, in turn, will determine how CBDCs can be legally transferred between economic agents, held in custody and "deposited" with financial intermediaries, and pledged with creditors.[109] The legal roles of registries and wallets will also need consideration in order to determine the downstream implications on the holding and evidencing of ownership rights. Even if existing private international rules are to be applied to CBDCs, it is not clear whether the existing rules are fit for purpose.[110] If a CBDC is classified as a tangible-intangible hybrid under a domestic legal framework, for example,

a monetary claim on the central bank in a digital token where the transfer of that token equals transfer to the claim and that entails no current-account legal relationship between the central bank and the holder.

104 Gabriel Soderberg et al. (eds), *Behind the Scenes of Central Bank Digital Currency: Emerging Trends, Insights and Policy Lessons* (IMF 2022), 6–7.

105 *Id.*

106 For a discussion on private international law questions related to CBDCs, see Chapter 12 of this book by Caroline Kleiner, "The Law(s) Applicable to Central Bank Digital Currencies".

107 CODIFI Conference, Heng Wang, "Digital Economy / Central Bank Digital Currencies (CBDCs) & Private International Law," 13 September 2022.

108 Bechara et al. (n 103), para. 23.

109 *Id.* at para. 14.

110 *Id.* at para. 55.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

the *lex rei sitae* could apply, but it is unclear what the *situs* of the distributed registers and wallets holding the CBDC tokens would be.[111]

In relation to cross-border CBDC access by non-residents, central banks may delegate functions to private sector intermediaries.[112] Banks examining and piloting CBDCs have converged on a model that is based on intermediation,[113] which may potentially require the use of foreign intermediaries, or intermediaries with worldwide offices. Some experts have thus argued that the PIL implications of these operations resemble the intermediation and dematerialisation challenges that informed the development of the *Convention of 5 July 2006 on the Law Applicable to Certain Rights in Respect of Securities held with an Intermediary* (HCCH 2006 Securities Convention).[114]

4.2.2 Stablecoins

There are three main categories of stablecoins: currency-linked stablecoins, asset-linked stablecoins, and stablecoins linked to cryptocurrencies or algorithms. In relation to stablecoins, it is important to note the fundamental distinction between the law that applies to the stablecoin, and the law that applies to the assets represented by the stablecoin. While parties are free to choose the law applicable to their contractual relationship in line with the principle of party autonomy, some comentators have argued that the freedom of choice of law must be limited to the stablecoin as such and should not extend to underlying assets that are themselves subject to mandatory PIL.[115]

The law applicable to assets represented by the stablecoin should be determined on the basis of the kind of asset represented by the token. However, the relationship between the stablecoin and the asset it represents is very tenuous. At present there is no consensus on which law should apply to that relationship, as it seems to fall between the cracks of the law governing the stablecoin and the law governing the asset represented by the stablecoin. An important PIL question is whether an asset that is part of stablecoin portfolio

111 *Id.*

112 See generally Bank for International Settlements (BIS), "Options for access and interoperability of CBDC for cross-border payments: Report to the G20" (*BIS*, July 2022) <https://www.bis.org/publ/othp52.pdf> accessed 15 December 2022.

113 Soderberg et al. (n 105), 8.

114 CODIFI Conference, Angelina Kwan, "Opening of the HCCH Securities Convention Track," 12 September 2022.

115 See, on this point, Chapter 13 of this book by Matthias Lehmann and Hannes Meyle, "The Law Applicable to Stablecoins".

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

must be distinguished from the law governing the stablecoin on the one hand and the assets of the portfolio on the other.[116]

4.2.3 Cryptocurrencies

Cryptocurrencies have been the subject of intense scrutiny over the last few years.[117] Specifically, specific objections have been raised to the application of PIL frameworks to legal relationships involving the use of cryptocurrencies. These objections have either been based on the argument that these relationships are self-regulated and are subject to the *lex cryptographica* as opposed to legal regulation such as *lex mecatoria*,[118] or that there are major obstacles to the application of PIL to cryptocurrencies, including the delocalisation of transactions and the pseudonymity of actors.[119] These objections have been framed along two lines – either by classing cryptocurrencies as assets in the sense of intangible movable property or by viewing cryptocurrencies as currency, and applying PIL by analogy.[120] The rapid evolution and diversification of the crypto asset and cryptocurrency landscape will require that choice of law rules offer "a sufficient degree of flexibility along with legal foreseeability and certainty".[121] One possible solution may be to allow for the principle of party autonomy in choice of law.[122] This would allow parties to agree on the law governing the relationship between them, while accepting that there may be certain limitations on the freedom of choice.[123]

116 *Id.*

117 On a range of approaches and challenges dealing with cryptocurrency in the private international law, see Chapter 11 of this book by Francesca C. Villata, "Cryptocurrencies and Conflict-of-Laws"; see also CODIFI Conference, Andrew Hinkes, "Digital Economy / Digital Assets Remedies," 15 September 2022.

118 See, *e.g.*, Primavera De Fillippi and Aaron Wright, *Blockchain and the Law – The Rule of Code* (HUP 2018). For an opposite view, see Chapter 4 of this book by David Sindres, "Is Bitcoin out of Reach for Private International Law?".

119 See, *e.g.*, Mathias Audit, "Le droit international privé confronté à la blockchain," (2020) 4 Revue critique de droit international privé 669, 689.

120 See, *e.g.*, Sindres (n 119).

121 Ripley and Heindler (n 9).

122 Symeon C. Symeonides, *Codifying Choice of Law Around the World: An International Comparative Analysis* (OUP 2017), Chapter 3.

123 See, *e.g.*, HCCH (n 10), Annex I.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

4.3 *Cloud Economies and Metaverses*

Cloud economies and web3 metaverses are "emerging market virtual world economies with a continually developing complex mix of digital goods, services, and assets that generate real-world value for users".[124] They allow users to own and trade digital assets as NFTs, creating a "new free-market internet-native economy that can be monetised in the physical world".[125] Examples of commercial activities in cloud economies and metaverses include art galleries,[126] business headquarters,[127] sponsored content,[128] and music venues.[129] The metaverse has been described as a high-revenue opportunity that spans social commerce, digital events, hardware, and content monetisation.[130]

Cloud economies and metaverses are use cases for Decentralised Finance (DeFi), including aggregators, DeFi primitives, oracles, and marketplaces. They work with agents relating to sovereign virtual goods and NFTs, including minting houses, metadata and token standards, as well as physically redeemable NFTs. The characterisation of these agents will have an impact on the PIL implications of the applicable legal frameworks. Of particular significance to PIL considerations is that fact that cloud economies and metaverses involve decentralised governance, including DAO frameworks and their attendant voting mechanisms, community audits, and multisignature wallets.[131] The decentralised

124 David Grider, "The Metaverse: Web 3.0 Virtual Cloud Economies" (*Grayscale*, November 2021), 10 <https://grayscale.com/wp-content/uploads/2021/11/Grayscale_Metaverse_Report_Nov2021.pdf> accessed 15 December 2022.

125 *Id.* at 7.

126 See, *e.g.*, "Salgado" (*Sotheby's*) <https://metaverse.sothebys.com/salgado> accessed 15 December 2022.

127 See, *e.g.*, "Markets" (*Binance*) <https://www.binance.com/en/markets/coinInfo-Metaverse> accessed 15 December 2022.

128 See, *e.g.*, "DCL x Atari: Yes, you read that correctly – Atari is coming to Decentraland" (*Decentraland*, 26 January 2021) <https://decentraland.org/blog/announcements/dcl-x-atari/>.

129 See, *e.g.*, Travis Scott, "Travis Scott and Fortnite Present: Astronomical (Full Event Video)" (*YouTube*, 26 April 2020) <https://www.youtube.com/watch?v=wYeFAlVC8qU>, Kizuna AI, "Introduction" (*2020hello*) <https://2020hello.world/en/> accessed 15 December 2022, and Kai from Splash, "About" (*Virtual Humans*) <https://www.virtualhumans.org/human/kai> accessed 15 December 2022.

130 Grider (n 125), *op. cit.* (n 115), 9, 16. See also Pedro Palandrani, "The Metaverse Takes Shape as Several Themes Converge" (*Global x*, 13 September 2021) <https://www.globalxetfs.com/content/files/The-Metaverse-Takes-Shape-as-Several-Themes-Converge.pdf>.

131 A "multisignature wallet" (also referred to as a "multigeniture wallet") refers to a cryptocurrency wallet that requires authentication from multiple parties to complete a transaction, which is the type of cryptocurrency wallets commonly used in DAOs, see, *e.g.*, Monika di Angelo and Gernot Salzer, "Characteristics of Wallet Contracts on Ethereum"

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

cloud services implicated means that storage, computing, and databases are decentralised in the borderless cloud. The borderless nature of cloud economies and metaverses creates challenges for the traditional significance of geographic location in PIL.[132]

Another issue that arises in cloud economies and metaverses is the PIL implications of cross-border data transactions. PIL questions relating to jurisdiction, applicable law and recognition may become increasingly urgent as data transactions take place in the cloud economy, and as certifications of data transactions are increasingly tokenised.

One PIL issue that arises in cross-border data transactions is the question of characterisation. UNCITRAL's work related to data transactions has found that contracts for the provision of data are analogous to contracts for the sale of goods, whereas contracts for the processing of data are analogous to contracts for services.[133] This may have an impact on the determination of the applicable law. It may be significant to note that UNCTAD's position is that that cross-border data flows are distinct from both goods and services and should be considered neither e-commerce nor trade.[134] These divergent approaches to the characterisation of cross-border data flows may have implications on the development of a PIL framework for cross-border data transactions in cloud economies and metaverses.

It has been noted that determining the applicable law in cloud economies and metaverses is increasingly important, and perhaps should be regulated by an international treaty.[135] Potential issues include due process, incapacity, or the award being contrary to public policy.[136] The creation of specific solutions relating to jurisdiction, applicable law, and enforcement of metaverse-related disputes may, however, need to be based on the specific contours of the

(*TU Wien*), 1–2 <https://publik.tuwien.ac.at/files/publik_289326.pdf> accessed 15 December 2022.

132 Dan Jerker B. Svantesson, "The (uneasy) relationship between the HCCH and information technology," in Thomas John, Rishi Gulati, and Ben Kohler (eds), *The Elgar Companion to the Hague Conference on Private International Law* (Edward Elgar Publishing 2020), 462.

133 UNCITRAL, "Legal issues related to the digital economy (including dispute resolution) – progress report" (*UNCITRAL*, 5 April 2021), 4–5 <https://uncitral.un.org/sites/uncitral.un.org/files/1064_advance_copy_e.pdf>.

134 UNCTAD, "Digital Economy Report 2021 Overview" (*UNCTAD*, 29 September 2021), 3–5 <https://unctad.org/system/files/official-document/der2021_overview_en_0.pdf>.

135 CODIFI Conference, Juliette Asso, "Digital Economy / Expanded Applications of DLT: Metaverses," 14 September 2022.

136 CODIFI Conference, Juliette Asso and Laura Azaria, "Digital Economy / Expanded Applications of DLT: Metaverses," 14 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

metaverse. Some experts have opined that the use of a metaverse to carry out a transaction is sufficient to make the transaction international, making each transaction subject to the relevant conflict of laws applicable.[137]

Moreover, it should be noted that metaverses are decentralised, dematerialised, virtual worlds in which anonymous avatars transact.[138] An expert has noted that off-chain enforcement raises important PIL concerns relating to pseudonymity and the question of where recognition and enforcement proceedings of a transaction carried out in a metaverse should be initiated.[139] In this regard, guidelines and rules that allow for some cross-border certainty and harmonisation between jurisdictions may be helpful.[140]

4.4 *Decentralized Autonomous Organisations* (*DAOs*)

The difference between regulated DAOs incorporated under the law of a State and "maverick DAOs" lacking any such framework underlie questions relating to PIL.[141] These questions concern (a) whether regulated DAOs can be recognised in other States; (b) whether maverick DAOs have a legal existence in State jurisdictions; and (c) what law could be applicable to a maverick DAO. DAO compliance with securities laws, and whether distributions from a DAO cooperative may have tax consequences, are topics on which clarity in PIL matters would be helpful.[142]

Some experts have proposed that one possible way forward would be the development of a PIL convention framework that would address the law applicable to DAOs. This convention could provide a framework for the automatic recognition of DAOs that have been validly incorporated, constituted

137 *Id.*

138 CODIFI Conference, Juliette Asso, "Digital Economy / Expanded Applications of DLT: Metaverses," 14 September 2022.

139 CODIFI Conference, Laura Azaria, "Digital Economy / Expanded Applications of DLT: Metaverses," 14 September 2022.

140 *Id.*

141 CODIFI Conference, Florence Guillaume and Sven Riva, "Digital Economy / Decentralised Autonomous Organisations," 15 September 2022. For an excellent exposition on the structure and functioning of DAOs, including the separation between "regulated" and "maverick" DAOs, see Chapter 20 of this book by Florence Guillaume and Sven Riva, "Blockchain Dispute Resolution for Decentralized Autonomous Organizations: The Rise of Decentralized Autonomous Justice".

142 CODIFI Conference, James Wigginton, "Digital Economy / Decentralised Autonomous Organisations (DAOs)," 15 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

or organised.[143] This recognition of a DAO must include the recognition of its legal personality and the limited liability of its members, so that DAOs can be utilised as legal vehicles for businesses.[144] Methods to determine the possible applicable law may rely on the code of the DAO or resort to rules of law that are generally accepted on an international level.[145]

5 Role of PIL Harmonisation in DLT – Why Harmonise?

Initiatives to better frame the legal framework around DLT have been undertaken, with varying degrees of complexity and speed, by regulators around the world. The heterogeneity of these various regulatory initiatives has raised concerns about the implications for PIL, in particular a concern about fragmentation in approaches relating to applicable law, choice of law, choice of forum, recognition, and enforcement. For example, Germany elaborates on such concerns in its *Blockchain Strategy of the Federal Government*, which includes the matter of which legal system applies, as well as the issue of the enforceability of law in cross-border DLT structures.[146]

Fragmentation can already be observed at different levels. First, not all kinds of digital assets available are regulated. In many jurisdictions, only some of them (mostly cryptocurrencies) have been the object of domestic frameworks.[147] Other jurisdictions have addressed specific DLT applications.[148] Still others have approached the matter from the angle that there is a need to regulate the digital economy more broadly.[149] Moreover, the use and understanding of terminology are varied among the different initiatives. Second, in relation to the assets regulated, the legal nature of the assets has been understood differently by different jurisdictions. For example, some jurisdictions classify

143 CODIFI Conference, Florence Guillaume, "Digital Economy / Decentralised Autonomous Organisations (DAOs)," 15 September 2022.

144 CODIFI Conference, Sven Riva, "Digital Economy / Decentralised Autonomous Organisations (DAOs)," 15 September 2022.

145 CODIFI Conference, Florence Guillaume, "Digital Economy / Decentralised Autonomous Organisations (DAOs)," 15 September 2022.

146 German Federal Ministry for Economic Affairs and Climate Action and Ministry of Finance, "Blockchain Strategy of the Federal Government: We Set Out the Course for the Token Economy" (*BMWK*, 7 March 2019) <https://www.bmwi.de/Redaktion/EN/Publikationen/Digitale-Welt/blockchain-strategy.pdf?__blob=publicationFile&v=3>.

147 See more details per country in HCCH (n 10), Annex II.

148 See the examples of Bermuda and Mauritius in *id.*

149 See the examples of Liechtenstein and Switzerland in *id.*

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

cryptocurrencies as equivalent to securities, and apply the relevant securities laws and regulations.[150] Other jurisdictions consider cryptocurrencies to be property or fungible assets, and apply the relevant property law.[151] Third, the fragmentation can be also observed in terms of the different approaches taken towards legal reform aimed at regulating the emerging digital economy. While some jurisdictions have issued papers pointing towards the continuing applicability of existing legal frameworks,[152] other jurisdictions have amended their legislations or issued new legislation.[153]

A recent mapping initiative from the Global Blockchain Business Council, the Global Standard Mapping Initiative (GSMI) 2020, emphasised the need for uniform global standards to facilitate impactful and responsible cross-border innovation in relation to DLT.[154] The Report, which represented an "unprecedented effort to map and analyse the current blockchain landscape", noted the fragmentation of regulatory approaches across the world, and that "existing efforts to coordinate across jurisdictions have been piecemeal at best and chaotic at worst".[155] The Report concludes "breaking through traditionally siloed bodies of information, industries, and geographic barriers will facilitate more functional networks".[156]

Fragmentation creates challenges for the digital economy, which is inherently cross-border. A uniform PIL framework can address such challenges without interfering with the internal regulation of these decentralised systems, thereby providing coherence and certainty to the relevant stakeholders while domestic initiatives are ongoing.[157] A harmonised PIL framework based on generally acceptable conflict-of-laws principles will thus protect users (and especially ensure weaker party protection), enable innovation, improve good governance, and strengthen the rule of law in the digital economy.[158] Specific concerns arise in the fields of insolvency and intellectual property.

---

150 See the examples of Australia, Israel, Kazakhstan and Singapore in *id*.

151 See the examples of the People's Republic of China and Italy in *id*.

152 See the examples of Australia, Israel, Lithuania and the United Arab Emirates in *id*.

153 See the examples of Bermuda, France, Liechtenstein, Mauritius, Singapore and Switzerland in *id*.

154 Global Blockchain Business Council (GBBC), "Global Standard Mapping Initiative (GSMI) 2020" (*GBBC*, October 2020), 2 <https://gbbcouncil.org/wp-content/uploads/2020/10/GSMI-Legal-Regulatory-Report.pdf>.

155 See (n 145), 25.

156 *Id.*

157 CODIFI Conference, Hin Liu, "Digital Economy / Digital Assets Remedies," 15 September 2022.

158 CODIFI Conference, Louise Gullifer, "Digital Economy / Characterising Relationships Between Asset Holders and Exchanges," 21 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

In relation to insolvency, UNCITRAL Working Group V: Insolvency Law (UNCITRAL WG V) is currently considering applicable law in insolvency proceedings. The UNCITRAL Secretariat noted that "rules for localisation of assets, law applicable to the rights and claims existing at the time of the commencement of insolvency proceedings … or other rules of private international law" may be outside the scope of UNCITRAL WG V's study, and that these matters could "become the subject of a separate study that would need to be undertaken in close cooperation with the Hague Conference on Private International Law".[159] At the HCCH's recently concluded CODIFI Conference, expert discussions highlighted a number of cross-border issues concerning insolvency and digital transactions and assets, such as third-party effects of insolvency of digital asset platforms, the characterisation of digital assets as property for the purposes of an insolvency proceeding, and the mechanics of injunctive relief involving electronic platforms.[160]

In relation to the protection of intellectual property rights, experts have noted that DLT systems and applications have given rise to a wide range of implications in the field of intellectual property.[161] The advent of the digital economy and DLT systems and applications has motivated study of whether existing instruments and legislation are adequate for the new technological landscape. Experts thus have proposed an approach that leverages pre-existing connecting factors, with adaptations being made to apply to situations involving the protection of intellectual property rights relating to DLT applications or crypto assets.[162] Existing rules may thus need to be updated through legislative action or by the judiciary, as necessary. The HCCH is continuing with its monitoring of intellectual property-related developments and cases in the digital sphere, and in particular the emerging proliferation of litigation over digital collectibles. The jurisprudence in this regard illustrates that there is confusion over the technical and legal underpinnings of NFTs and the properties and rights that may be linked to them. Until a uniform international perspective

159 *Id.*

160 For a detailed discussion of international insolvency law in relation to cryptocurrencies, the (proprietary or contractual) relationships involved between exchanges and users, and jurisdiction and applicable law questions in insolvency proceedings concerning cryptocurrencies, see Chapter 15 of this book by Giovanni Maria Nori and Matteo Girolametti, "International Insolvency Law and Cryptocurrencies".

161 CODIFI Conference, Florian Heindler, "Digital Economy / PIL & DLT: What Challenges Lie Ahead?," 15 September 2022.

162 *Id.*; CODIFI Conference, Andrea Bonomi, "Opening of the Digital Economy 'Frameworks' Track," 12 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

emerges in this regard, the PIL implications of domestic regulatory approaches to intellectual property remains pressing.

6 Prospects for the Harmonisation of PIL in DLT

Work is ongoing at the HCCH, UNCITRAL and UNIDROIT in relation to the harmonisation of PIL in DLT-related sectors.[163] These three sister organisations are committed to cooperatively explore and respond to the intersection of technology, economics, and law found in DLT. The digital economy, including DLT-based applications, is a topic where the work of all three organisations is converging.[164] Each of these organisations has received requests from their members to study and provide guidance on different aspects of the topic. Coordination between the three organisations is thus important to ensure proper harmonisation but is also challenging given the rapid pace at which the landscape of DLT-based applications continues to shift.[165]

UNCITRAL has continued to work on five key topics: Artificial Intelligence and automation, Data transactions, Digital assets, Online platforms and specifically, Distributed ledger systems and technology. DLT-based applications run through these five topics, and UNCITRAL has emphasised the importance of coordination with the HCCH on the PIL aspects identified in this work.[166] The HCCH participates as an observer in UNCITRAL's Working Group IV on Electronic Commerce and Working Group V on Insolvency.

UNIDROIT continues its work on the development of a set of Principles by their Working Group on Digital Assets and Private Law, which include a Principle on PIL. The HCCH participates as an observer in this work, and UNIDROIT has noted that the input of the HCCH continues to be welcome in the development of this Principle on PIL.[167]

The HCCH has, since March 2020, allocated resources to follow the PIL implications relating to developments in the field of DLT, in particular in

163 CODIFI Conference, Christophe Bernasconi, Anna Joubin-Bret, and Ignacio Tirado, "CODIFI – Tripartite Discussion: HCCH, UNCITRAL, UNIDROIT," 12 September 2022.

164 CODIFI Conference, Gérardine Goh Escolar et al., "Digital Economy / Closing Session: Concurrent Design Facility," 16 September 2022.

165 *Id.*

166 CODIFI Conference, Anna Joubin-Bret, "CODIFI – Tripartite Discussion: HCCH, UNCITRAL, UNIDROIT," 12 September 2022.

167 CODIFI Conference, Ignacio Tirado, "CODIFI – Tripartite Discussion: HCCH, UNCITRAL, UNIDROIT," 12 September 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

relation to FinTech.[168] Under the mandate given to it by its Council on General Affairs and Policy, the HCCH recently concluded the inaugural HCCH Conference on Commercial, Digital and Financial Law Across Borders (CODIFI Conference).[169] The CODIFI Conference sessions were organised along six thematic tracks, including three tracks that address matters related to the digital economy and, more specifically, DLT. Topics selected for these three tracks were informed by the requests of Members which had responded to a survey distributed by the Permanent Bureau in late 2021.

- The Digital Economy "Frameworks" track focused on the PIL issues in the new decentralised economy that is based on technologies such as DLT;
- The Digital Economy "Relationships" track considered the use of DLT and other technologies as building blocks for governance of enterprises, transactions, financial services, dispute resolution, operations management and sustainable development; and
- The Digital Economy "Redefine" track broadly considered innovations in the fintech industry, including specific perspectives and approaches of national jurisdictions regarding digital commerce.

At the time of writing, the outcomes of the HCCH CODIFI Conference have been compiled to inform Members of the HCCH in preparation for their next CGAP meeting in March 2023, at which the Members will decide on the future work programme of the HCCH. Based on the findings and recommendations of the experts who participated in the HCCH CODIFI Conference, HCCH Members may consider further work on the harmonisation of private international law rules in relation to the digital economy more broadly, and the applications that include those based on DLT more specifically.

7 Conclusion: Looking to the Future

Recent strides made in the growth and mainstreaming of Web3 have been powered by the token and DLT-based economy, and its "potential to revolutionize

168 HCCH "Proposal for the Allocation of Resources to follow Private International Law implications relating to Developments in the field of Distributed Ledger Technology, in particular in relation to Financial Technology" (*HCCH*, March 2020) <https://assets.hcch.net/docs/f787749d-9512-4a9e-ad4a-cbc585bddd2e.pdf> accessed 15 December 2022.

169 See for more information, HCCH, "HCCH CODIFI Conference" (*HCCH*) <https://www.hcch.net/en/projects/post-convention-projects/hcch-codifi-conference> accessed 15 December 2022.

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0

agreements and value exchange".[170] Web3 is defined by various parties as the "Read-Write-Own"[171] internet "owned by its builders and users, and orchestrated with tokens".[172] Forecasts are that this new user-owned economy will, in the long-term, outperform the traditional economy based on legacy institutions.[173]

In the digital trade sector, the complexity of cross-border transactions, including those based on DLT, continues to pose challenges in the discernment of applicable rules amidst different domestic legal systems.[174] Emerging technologies have altered the way in which regulatory authorities, businesses and consumers conduct transactions and resolve disputes. Issues of computational law and digitalisation may lead to silos between diverse actors and commercial systems, including "hard" and "soft-law" instruments, being broken.[175]

The digital economy, including that based on DLT, has documented benefits in terms of job creation, and the empowerment of women and minorities. It also provides regulatory sandbox opportunities to validate innovations. However, extensive cross-border cooperation to achieve harmoniation and support the adoption of common minimum standards may be timely and necessary.[176] A robust and harmonised PIL framework will ensure the legal certainty necessary to allow the transition towards a more sustainable economy, while protecting consumers and weaker parties, and provide a useful framework in the achievement of Environmental, Social and Governance (ESG) initiatives and risk management. The legal certainty ensured by a harmonised PIL framework will support greater financial inclusion by enabling greater access to modern financial services and financing.[177]

---

170 Shermin Voshmgir, *Token Economy: How the Web3 Reinvents the Internet* (2nd edn, BlockchainHub Berlin 2020), 2.

171 Eshita, "Web3: in a nutshell" (*eshita.mirror.xyz*, 9 September 2021) <https://eshita.mirror.xyz/H5bNIXATsWUv_QbbEz6lckYcgAa2rhXEPDRkecOlCOI>.

172 Chris Dixon, "Why Web 3 Matters" (*Twitter*, 26 September 2021) <https://twitter.com/cdixon/status/1442201621266534402>.

173 See, *e.g.*, Jason Potts and Ellie Rennie, "Web3 and the creative industries: How blockchains are reshaping business models," in Stuart Cunningham and Terry Flew (eds), *A Research Agenda for Creative Industries* (Edward Elgar Publishing 2019), 93–111.

174 CODIFI Conference, Craig Atkinson, "CODIFI – Digital Economy / Human-Centred Finance and Trade for Sustainable Development," 16 September 2022.

175 *Id.*

176 CODIFI Conference, Laurence Thébault, "CODIFI – Digital Economy / Human-Centred Finance and Trade for Sustainable Development," 16 September 2022.

177 *Id.*

Gérardine Goh Escolar - 9789004514850
Downloaded from Brill.com 01/28/2024 12:04:27PM
via Open Access. This is an open access chapter distributed under the terms
of the CC BY-NC-ND 4.0 License.
http://creativecommons.org/licenses/CC-BY-NC-ND/4.0