

# EU PIL, Blockchain, Smart and Ricardian Contracts 2.0

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**Summary:** This study analyses blockchain technologies and smart contracts within the framework of European Union private international law. It shows that the EU has not recognized blockchain or smart contracts as autonomous legal institutions but regulates them through a technologically neutral and sector-based approach. From a private international law perspective, smart contracts are not independent connecting factors. They are technical tools for concluding and performing contracts, and the applicable law is therefore determined by the Rome I Regulation. Party autonomy remains central, and in the absence of a valid choice of law, the applicable law is identified by objective criteria such as the characteristic performance or, in residual cases, by the test of the closest connection. The decentralized and global nature of blockchain does not in itself displace these rules. The study identifies Ricardian contracts, and especially possible Ricardian 2.0, as a legally compatible architecture for smart contracts. By linking legally binding text with code and blockchain execution, they preserve choice of law, judicial interpretation and mandatory rules while enabling automated performance. The EU approach thus integrates new technology into the existing legal order rather than replacing it.

**Keywords:** Smart contracts; tokens; cryptocurrencies; contract formation; offer and acceptance; party autonomy; blockchain; EU PIL

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# 1. Introduction

The development of distributed ledger-based technologies, especially blockchain, is an important technical and legal process.<sup>1</sup> Along with it, the so-called smart contracts, i.e. software tools that enable the automated execution of predefined operations, are coming to the forefront of debates.<sup>2</sup> These technological innovations are eroding traditional legal categories, especially in the areas of private law, private international law, and the regulation of financial and digital markets.<sup>3</sup>

The European Union is responding to these developments by gradually creating a legal framework that is to be characterised by technological neutrality and a sectoral approach.<sup>4</sup> Instead of codifying blockchain or smart contracts as separate legal institutes, EU regulation focuses on the activities, risks, and legal relationships that are implemented through these technologies.<sup>5</sup> This approach leads to the intertwining of public regulation with private law institutes, the application of which remains dependent on interpretation and collision mechanisms in relations with a cross-border element.<sup>6</sup>

- <sup>1</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence*. 2021, pp. 1–4 (defining blockchain as a distributed ledger technology and highlighting its systemic impact on digital economic relations). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)
- <sup>2</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence*. 2021, pp. 1–7 (describing smart contracts as self-executing, automated transactions operating on blockchain infrastructures). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)
- <sup>3</sup> WETENKAMP, L. IPR and Digitization – Does Private International Law Need an Update? *Beiträge zum Transnationaler Wirtschaftsrecht*, 2019, no. 161, pp. 11–26 (on the disruptive impact of digital technologies on private law and conflict-of-laws categories). [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com) DILEK, D. The International Private Law of Digital Values. Conflict of law interests in the digitization of assets. Tübingen: Mohr Siebeck, 2024, esp. §§ 1, 4; [online]. Available at: [https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm\\_source=researchgate.net&utm\\_medium=article](https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm_source=researchgate.net&utm_medium=article)
- <sup>4</sup> DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, vol. 20, no. 4, pp. 263–319 (explaining the EU's technology-neutral and sector-specific regulatory strategy within the digital acquis). [online]. Available at: [https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm\\_source=researchgate.net&utm\\_medium=article](https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm_source=researchgate.net&utm_medium=article)
- <sup>5</sup> KOHLER, Ch. On the External Policy of the European Union in the Field of Private Law. *Rebels Zeitschrift für ausländisches und internationales Privatrecht*, 2025, vol. 89, no. 3, pp. 451–482 (describing how EU legislation regulates activities, risks and relationships rather than specific technologies through unilateral scope rules and regulatory techniques); [online]. Available at: [https://www.mohrsiebeck.com/en/article/zur-aussenprivatrechtspolitik-der-europaeischen-union-101628rebelsz-2025-0041/?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/article/zur-aussenprivatrechtspolitik-der-europaeischen-union-101628rebelsz-2025-0041/?utm_source=chatgpt.com) see also MiCAR, DSA, DMA and Data Act as technology-neutral instruments. [online]. Available at: [https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm\\_source=chatgpt.com](https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm_source=chatgpt.com), <https://eur-lex.europa.eu/eli/reg/2022/2065/oj>, <https://eur-lex.europa.eu/eli/reg/2022/1925/oj>, <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>
- <sup>6</sup> DOMURATH, I.; MICKLITZ, H.-W. *EU Digital Private Law*, 2024, pp. 270–310 (on the interpenetration of public regulatory law and private law concepts in the EU digital order) [online].

The aim of this study is to define the European legal framework for block-chain technologies and summarize the qualifications of smart contracts. The text focuses on EU public law as well as on the private law area, especially EU private international law (EU International Law), which is confronted with the methods of private international law. Based on these methods, the given problematic areas can be assessed through the application of collision and direct tools.<sup>7</sup>

In the case of legal norms of the EU ICJ regulating legal relations established by a treaty with an international element, it is necessary to take into account aspects related to a group of international conventions, European regulations and directives, standardized treaties, customs and customs, individual national regulations not subject to the unification platform, as well as the national legal matter in question.

Smart contracts have been intensively analyzed in legal and interdisciplinary professional literature in recent years.<sup>8</sup> The prevailing view is that their nature remains primarily technological, not normative.<sup>9</sup> Therefore, the definition of basic concepts and institutes, as well as the identification of the relevant EU legal framework, are crucial for a legal understanding of this issue.<sup>10</sup> It is also

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<sup>7</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte*, 2024, esp. §§ 3–6, pp. 48–54 (on the application of conflict-of-laws and directly applicable rules to digital assets and blockchain-based legal relations) [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); WETENKAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? 2019, pp. 11–26 (on the need to apply both conflict rules and substantive connecting factors to digital and AI-based contractual relations). [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

<sup>8</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence*. 2021, pp. 1–10 (surveying the growing legal and interdisciplinary literature on smart contracts and blockchain-based transactions). [online]. Available at: [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>9</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence*, 2021, pp. 6–12 (arguing that smart contracts are primarily technical tools for automated performance rather than normative contracts in themselves) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787); DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 290–305 (on the distinction between technological infrastructures and normative legal ordering in the EU digital acquis). [online]. Available at: [https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm\\_source=researchgate.net&utm\\_medium=article](https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm_source=researchgate.net&utm_medium=article)

<sup>10</sup> DOMURATH, I.; MICKLITZ, H.-W. *EU Digital Private Law*, 2024, pp. 263–319 (mapping the relevant EU digital regulatory framework affecting private law relations, including data,

necessary to have a precise characterization of the subject of digital transactions, i.e. digital assets. It is possible to agree with the view that in private international law, as a rule, it is not the technological architecture used that is decisive, but the way in which the technology is used to create, transfer and apply property values.<sup>11</sup>

## 2. Smart Contracts and Digital Assets

In the broad concept of digital assets, digital assets can be any digitally captured content or information that has an asset value.<sup>12</sup> This includes text content, e-books, electronic documents, online publications, audiovisual data, video, sound, digital images, and software. In the definitional sense, these are intangible data files stored in electronic systems that are individually attributable to a specific person, transferable and, to a certain extent, excluding simultaneous control by multiple entities.<sup>13</sup>

From a legal point of view, based on the above, the key question is whether a smart contract can be qualified as a contract or whether it is only a technical tool for the implementation of contractual arrangements. The prevailing opinion is that a smart contract is usually not a contract in itself.<sup>14</sup> While a classic contract is the

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platforms and algorithmic governance). [online]. Available at: [https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm\\_source=researchgate.net&utm\\_medium=article](https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm_source=researchgate.net&utm_medium=article)

<sup>11</sup> DILEK, D. The International Private Law of Digital Values. Conflict of law interests in the digitization of assets. Tübingen: Mohr Siebeck, 2024, esp. §§ 1, 4, pp. 29-31 (explaining that in private international law the legal characterization of digital assets depends on their economic and legal function rather than on the underlying technology) [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); WETENKAMP, L. IPR and Digitization – Does Private International Law Need an Update? *Contributions to Transnational Business Law*, 2019, no. 161, pp. 20–26. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

<sup>12</sup> DILEK, D. The International Private Law of Digital Values. Conflict of law interests in the digitization of assets. Tübingen: Mohr Siebeck, 2024, § 1 (defining digital values broadly as digitally represented assets or information capable of having economic value). pp. 59-60, [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>13</sup> DILEK, D. Das Internationale Privatrecht digitaler Werte., 2024, §§ 1, 4, pp. 74,85 (on digital assets as intangible data sets that are individually attributable, transferable and capable of exclusive control); PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 7–10 (on crypto-assets as digitally represented values or rights controlled via cryptographic keys).

<sup>14</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 8–14 (arguing that smart contracts are generally not contracts in themselves but operate as a technological performance layer for pre-existing or parallel legal agreements). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

result of a consensus of the parties leading to the creation, change or termination of rights and obligations, a smart contract operates primarily at the technological level and serves as a tool for the implementation of the contract.<sup>15</sup> Situations in which the consensus of the parties is expressed exclusively through interaction with the code, for example by accepting pre-programmed terms without the existence of a separate text arrangement, cannot be ruled out. In such cases, a smart contract can perform not only the function of a technical tool, but also the function of a contract. These situations give rise to legal difficulties, especially in terms of interpretation of the content of the obligation and transparency of contractual terms.<sup>16</sup>

In this context, it is necessary to distinguish between two concepts that are often confused in practice: *smart contract code* and *legal smart contract*. *Smart contract code* refers to the very computer program stored on the blockchain, which is automatically executed when defined conditions are met. This code is deterministic, not subject to interpretation and not able to respond to vague legal concepts, changes in circumstances or value corrective of the law. From a legal point of view, therefore, it is usually not a legal act, but a technical instrument that can have legal consequences. On the other hand, the term *legal smart contract* refers to a contractual arrangement in the legal sense, the performance of which is ensured in whole or in part by means of a *smart contract code*. Legal binding in this case results from the expression of the will of the parties, while the code serves only for its automated execution.<sup>17</sup>

If smart contracts are used to define rights and obligations, as well as the conditions for their implementation, they are considered a variant of a smart legal contract. It is a “legally binding agreement in which some or all of the contractual terms are automatically determined and/or implemented by means of a computer program”.<sup>18</sup> In the Commission’s view, smart contracts can take

<sup>15</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 8–14 (arguing that smart contracts are generally not contracts in themselves but operate as a technological *performance layer* for pre-existing or parallel legal agreements).

<sup>16</sup> DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 295–315 (on problems of transparency, fairness and protection of weaker parties in algorithmically mediated and code-based contractual environments). [online]. Available at: [https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm\\_source=researchgate.net&utm\\_medium=article](https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm_source=researchgate.net&utm_medium=article)

<sup>17</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 9–16 (distinguishing between *smart contract code* as deterministic software and *legal smart contracts* as legally binding agreements whose performance is automated by code). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>18</sup> EUROPEAN COMMISSION. Study on Smart Contracts and Distributed Ledger Technologies in the Financial Sector, 2021, defining a smart legal contract as “a legally binding agreement in which some or all of the contractual terms are automatically defined and/or executed by a computer program.” [online]. Available at: <https://blockchain-observatory.ec.europa.eu/document>

three distinct formats: a natural language contract with automated execution, a hybrid contract or an all-code contract. The distinction between these types of smart legal contracts depends on the extent to which all or part of the contractual arrangement is automated or encrypted.

From the above, it follows that smart legal contracts should be considered as another type of contract, similar to standard forms, contracts generated electronically, and the like.<sup>19</sup> Smart contracts do not represent an alternative to contract law, but its technological extension, the legal relevance of which depends on the relationship to classic institutes of private law, not on the code itself.<sup>20</sup>

Regulation (EU) of the European Parliament and of the Council on harmonised rules on fair access to and use of data (the so-called ‘Fair Access to and Use of Data’). *Data Act*, proposal No. 2022/0047) defines the term smart contract in a purely technical sense.<sup>21</sup> A *smart contract* is a computer program stored in an electronic ledger system, the execution of which is recorded in this ledger. At the same time, the Data Act deliberately avoids the private law classification of smart contracts: it does not address whether they are a contract, nor does it set out the conditions under which they could be of a contractual nature. Its regulation focuses exclusively on the technical and operational aspects of their operation.

This concept is directly related to the close connection of smart contracts to the blockchain (DLT) environment, which is understood as their necessary operational infrastructure. Blockchain plays the role of a technical layer ensuring the automated execution, recording and immutability of operations. Thus, the Data Act implicitly confirms that smart contracts are understood as a technical tool running on the blockchain, not as an autonomous legal institute.

As it stands, the Data Act provides for a specific legal regime for smart contracts used in the implementation of data-sharing agreements. The essential requirements are contained in Article 36 of the Data Act and aim to ensure their

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<sup>19</sup> EUROPEAN COMMISSION. Study on Smart Contracts and Distributed Ledger Technologies in the Financial Sector, 2021 (distinguishing between natural language contracts with automated execution, hybrid contracts and code-only contracts). [online]. Available at: [https://blockchain-observatory.ec.europa.eu/document/download/53a0aeb4-d144-4054-841e-dc169b44f94d\\_en?filename=SmartContractsReport\\_Final.pdf&utm\\_source=chatgpt.com](https://blockchain-observatory.ec.europa.eu/document/download/53a0aeb4-d144-4054-841e-dc169b44f94d_en?filename=SmartContractsReport_Final.pdf&utm_source=chatgpt.com)

<sup>20</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 8–16 (describing the dual-layer model of legal contracts and smart contract code and emphasizing that smart contracts extend, rather than replace, traditional contract law). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>21</sup> Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (*Data Act*), defining *smart contract* as a computer program stored in an electronic ledger and executed and recorded therein. [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>

secure and reliable functioning. Robustness and durability are a key requirement, according to which smart contracts must be designed to demonstrate high technical reliability, minimize the risk of functional errors, and be protected against unauthorized interference or manipulation.<sup>22</sup>

The Data Act thus confirms the approach whereby smart contracts are regulated as a technological mechanism, while questions of their private law classification and effects remain subject to general contract law.<sup>23</sup>

The Data Act requires smart contracts to include secure termination or interruption mechanisms to stop their execution in the event of technical or legal problems. It also stipulates the obligation of archiving and data continuity, including the retention of transaction data, logic and source code for the purpose of subsequent control. Smart contracts must also be protected by effective access control mechanisms to ensure that their operation, modification or deactivation is only possible for authorized persons.<sup>24</sup>

The Data Act also works with the concept of *electronic ledger*, which it defines as an electronic set of data resistant to unauthorized interference, ensuring the authenticity and integrity of data, their precise timing and chronological arrangement.<sup>25</sup> The terminology used and the basic definitional features correspond to *Distributed Ledger Technology* (DLT), which also includes blockchain systems. This terminological framework can be adopted and would be more appropriate in terms of designation than the term *smart contract*. The contracts could then be implemented based on *DLT contracts*.<sup>26</sup>

<sup>22</sup> Regulation on harmonised rules on fair access to and use of data (*Data Act*), COM(2022) 68 final, Article 36; see recital and regulatory structure highlighting technical and operational requirements for smart contracts in data-sharing agreements. [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>

<sup>23</sup> Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (*Data Act*), (the Regulation deliberately refrains from any private-law qualification of smart contracts and treats them as a technological tool). [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>

<sup>24</sup> Data Act, Article 36 (requirements on safe termination and interruption, data archiving and continuity, access-control and security for smart contracts used in data-sharing agreements). [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>

<sup>25</sup> Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (*Data Act*), (defining “electronic ledger” as an electronic data set resistant to unauthorized alteration, ensuring authenticity, integrity, precise time-stamping and chronological ordering of data — effectively corresponding to distributed ledger technologies such as blockchain). [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>

<sup>26</sup> Data Act, Article 36 (compliance with the underlying data-sharing agreement and allocation of responsibility for conformity assessment and declaration of conformity, with liability left to national law). [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>

### 3. Blockchain

From a technical point of view, blockchain is defined in the scientific literature as a distributed database replicated between nodes of a decentralized network, in which each node keeps an identical copy and participates in the validation and writing of new data through a consensus mechanism.<sup>27</sup> Although blockchain has traditionally been associated with cryptocurrencies, its use is more general and consists of ensuring the integrity and immutability of data across different domains. Immutability means that once entered, data cannot be subsequently changed or deleted without compromising the integrity of the entire chain.

Blockchain technology is a decentralized database infrastructure that enables cryptographically secure creation, storage, and use of data by multiple participants.<sup>28</sup> Within this infrastructure, transactions are carried out that are the subject of the data itself, while the blockchain performs the function of distributed ledgers ensuring the time sequence and integrity of recorded operations. Data records are aggregated into blocks, each of which is uniquely identified and cryptographically linked to the previous block through a so-called hash value. This creates a sequential chain that allows for the verifiability and immutability of all recorded transactions. As a rule, copies of the entire blockchain are distributed among network participants, which further strengthens its resistance to unauthorized interference.<sup>29</sup>

Each block usually contains its own identification number, data content, thumbprint of the previous block and timestamp, and may include other elements depending on the architecture of the system. This ensures unambiguous identification and sequential linking of individual records.<sup>30</sup>

Blockchain can be run centrally or in a distributed form. If the entire chain is stored simultaneously by several participants (nodes), it is a distributed ledger,

<sup>27</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 1–6 (defining blockchain as a replicated distributed ledger maintained by peer nodes and secured through consensus mechanisms; noting general uses beyond cryptocurrencies to ensure data integrity and immutability across sectors). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>28</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 1–5 (describing blockchain as a decentralized, shared and cryptographically secured distributed ledger). [online]. Available at:

<sup>29</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 2–6 (on block structure, hashing, chaining of blocks and distributed replication ensuring integrity, immutability and resilience of the ledger). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>30</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 2–5 (describing the structure of blocks, including hashes of previous blocks and timestamps ensuring sequential integrity of the ledger). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

which is organized as a peer-to-peer network in the event of equality of nodes. This decentralization eliminates the risks associated with centralized data storage.<sup>31</sup>

In terms of access, a distinction can be made between public and private blockchains. Public networks allow for unlimited participation, while private networks are limited to a predetermined range of entities and usually require institutional governance.<sup>32</sup>

In terms of content, it is possible to distinguish between blockchains that function as internal ledgers of digital assets, systems that record external assets, and registers that only serve to document information without a direct link to property rights.<sup>33</sup>

## 4. Cryptographic Technologies

Cryptographic technologies are used to ensure the authenticity, integrity, and security of a record created or transmitted within a blockchain.<sup>34</sup> The data recipient wants to be sure who the data comes from and that it has not been altered. The so-called hash function is used to convert the data record created by the blockchain application into a hash, i.e. a string of fixed length that uniquely represents the input data. Integrity verification consists of comparing the received hash value with the value recalculated from the data received; Their agreement confirms that there has been no change in content.<sup>35</sup>

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<sup>31</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 1–4 (on distributed ledger technology, peer-to-peer networks and the elimination of single points of failure through decentralization). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>32</sup> PINHEIRO, *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 3–6 (distinguishing public and private blockchains as well as permissionless and permissioned systems, and explaining their governance structures). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>33</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, §§ 1–2 and § 4 (differentiating between blockchains used to record digital assets, external assets and purely informational registries, and discussing their relevance for legal characterization). [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>34</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 2–6 (on the use of cryptography in blockchain to ensure authenticity, integrity and security of transactions). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>35</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 4–7 (explaining cryptographic hash functions, fixed-length hashes and their role in verifying data integrity within blockchain systems). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

To reach a consensus on the validity and order of blocks, blockchain uses consensus mechanisms that fundamentally determine its architecture. These mechanisms can be broadly distinguished into models in which one node proposes a new block and the others validate it, and models in which the entire network of network participants is involved in the creation and confirmation of the next block. The most widely used mechanisms for validation and block creation are Proof-of-Work (PoW), Proof-of-Stake (PoS), and Practical Byzantine Fault Tolerance (pBFT). In addition to these, there are other, less widespread consensus mechanisms, such as delegated Proof-of-Stake (dPoS), Proof-of-Importance (PoI), delegated Byzantine fault tolerance (dBFT), and Proof-of-Authority (PoA), which represent alternative models for achieving compliance in blockchain networks.<sup>36</sup>

From several points of view, a smart contract is always tied to software code. In addition, this code brings another dimension to the legal view of smart contracts, as it allows the creation and cancellation of tokens. In addition to initiating and modifying the transactions that are carried out through it, this code is associated with another terminological question regarding the definition and legal qualification of tokens.<sup>37</sup>

## 5. Digital Assets and Tokens

In principle, any kind of data can be stored on the blockchain, including data that represents digital assets or values. These digital assets can also be digitally allocated to specific entities on the blockchain in the form of so-called tokens,

<sup>36</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 6–12; DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, § 2 (surveying consensus mechanisms such as PoW, PoS and pBFT and their relevance for blockchain architecture and governance). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787https://www.mohrsi-beck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787https://www.mohrsi-beck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>37</sup> DOMURATH, I., MICKLITZ, H.W. *EU Digital Private Law: Tattering or New Beginning? European Review of Contract Law*, 2024, pp. 270–310 (on how digital infrastructures and tokenization reshape private law categories in the EU). [online]. Available at: [https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm\\_source=researchgate.net&utm\\_medium=article](https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm_source=researchgate.net&utm_medium=article) DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, §§ 1, 4 (on tokens as digitally represented values or rights created, transferred and extinguished through blockchain code); REGULATION (EU) 2023/1114 (MiCA) (defining and regulating crypto-assets and tokens as legally relevant digital representations of value or rights) [online]. Available at: [https://www.mohrsi-beck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsi-beck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com);

which represent data records in a distributed ledger.<sup>38</sup> As a rule, those records are clearly assigned to a specific person who is authorised to dispose of them and thus have an element of sole control.<sup>39</sup> A token is a digital unit existing on a blockchain that represents a certain value, right, or claim and is transferable between network users. It serves as a technical and economic tool for the functioning of blockchain systems.<sup>40</sup>

The value of tokens can be based on various mechanisms, by limiting their supply, which creates economic scarcity, or by being able to exchange them for consideration. Tokens may further embody or represent rights, claims, or other factual or legal positions.<sup>41</sup> Therefore, the functional classification of tokens into monetary, utility and investment tokens has become established in the professional literature.<sup>42</sup> Public and open blockchains usually feature a native token

<sup>38</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 6–10 (on crypto-assets as digital representations of value or rights recorded and transferred on a blockchain) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787); DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, § 1 (defining digital values as digitally represented assets or positions capable of being allocated to specific persons). [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>39</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, §§ 1, 4 pp. 13–26 (on individual attribution and exclusive control over digital assets through cryptographic keys and ledger entries); PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 7–9 (on control over crypto-assets via public and private keys). [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>40</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 6–10 (defining crypto-assets and tokens as digital representations of value or rights transferable on a blockchain and serving both technical and economic functions) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787); DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, § 1 (on digital values as digitally represented and transferable positions). [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>41</sup> REGULATION (EU) 2023/1114 (MiCA) (defining crypto-assets as digital representations of value or rights that can be transferred and stored electronically using DLT, and covering tokens that embody economic or legal positions); [online]. Available at: [https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm\\_source=chatgpt.com](https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm_source=chatgpt.com)

DOMURATH, I.; MICKLITZ, H.W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 270–300 (on tokenization as a key mechanism reshaping market relations and private law categories in the EU digital order) [online]. Available at: [https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm\\_source=eresearchgate.net&utm\\_medium=article](https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html?utm_source=eresearchgate.net&utm_medium=article).

<sup>42</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, § 4 p. 74 (arguing that the common functional classification of tokens into payment, utility and investment tokens is insufficient for conflict-of-laws purposes and proposing a specific typology of digital values tailored

that is closely linked to a particular blockchain. Also referred to as a *coin*, *this token* incentivizes node operators to maintain the network and creates incentives for its users. At the same time, it allows you to regulate the use of blockchain and ensure its long-term sustainability. Since such a token is exchanged between participants in return for certain behaviour, it effectively functions as a means of payment and is referred to as cryptocurrency.<sup>43</sup>

However, in addition to cryptocurrencies, there are other types of tokens that do not represent money, but, for example, claims against a certain person, rights to certain property, or other economic value.<sup>44</sup>

At the same time, the token is used to determine who holds it, i.e. who has the right to dispose of the token. According to the nature of the rights attached to the token, a distinction is made in particular *between security tokens*, which give rise to a claim for financial consideration or are of an investment nature, and *utility tokens*, which provide other economic values, such as the right to use a certain service.<sup>45</sup> In short, a token is a universal digital carrier of value, right,

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to private international law) [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); WETEN KAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? *Beiträge zum Transnationalen Wirtschaftsrecht*, No. 161, 2019, pp. 21–26 (highlighting the need for functional and interest-oriented qualification of digital assets in conflict-of-laws analysis) [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com).

<sup>43</sup> PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 3–8 (on native tokens and cryptocurrencies as incentives for node operators and users, functioning as a medium of exchange in public blockchains) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787); REGULATION (EU) 2023/1114 (MiCA) (on crypto-assets used as means of exchange and their regulatory classification). [online]. Available at: [https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm\\_source=chatgpt.com](https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm_source=chatgpt.com)

<sup>44</sup> REGULATION (EU) 2023/1114 (MiCA) (covering crypto-assets that represent claims, rights or other economic values beyond payment tokens) [online]. Available at: [https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm\\_source=chatgpt.com](https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm_source=chatgpt.com); DOMURATH, I.; MICKLITZ, H.W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 270–300 (on tokenization of claims, assets and contractual positions within the EU digital order). [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>45</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, § 4 p. 59, (on different types of tokens and the relevance of the underlying rights for legal qualification); REGULATION (EU) 2023/1114 (MiCA) (distinguishing between crypto-assets with investment features, such as asset-referenced and e-money tokens, and those granting access to services); WETENKAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? 2019, pp. 21–26 (on the legal relevance of the nature of the rights embodied in digital assets) [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com).

or information, whose specific meaning depends on what function is assigned to it within the blockchain.<sup>46</sup>

Records of token holdings and transfers are stored in a decentralized manner on blockchain systems through distributed ledger technology (DLT), and the network itself is often also managed in a decentralized manner. Digital tokens and the activities associated with their management and transfer thus show the nature of globally dispersed or ubiquitous objects that cannot be easily located in a single state.<sup>47</sup>

However, this feature fundamentally complicates the determination of the applicable law, as classic conflict-of-law law is based on the existence of an identifiable place, registered office or other geographically applaudable connecting factor. Such an element is usually absent in decentralized blockchain structures. At the same time, there is no internationally unified substantive regime for cryptocurrencies and tokens, and national legal systems do not agree on their legal nature.<sup>48</sup>

The legal classification of dematerialized tokens and their transfers is particularly problematic. It is indisputable that due to the absence of a physical form, tokens cannot be considered things in the traditional civil law sense. Moreover, in the absence of a special legal regime, it is highly questionable whether the token holder enjoys an absolute right to an intangible good, comparable to the right of ownership.<sup>49</sup>

<sup>46</sup> DOMURATH, I.; MICKLITZ, H.W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 270–305 (on functional, use-based qualification of tokenised assets in the EU digital order) [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>; DILEK, D. Das Internationale Privatrecht digitaler Werte., 2024, § 1 (emphasising that the legal meaning of digital assets depends on their assigned function rather than the underlying technology). [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>47</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, §§ 1–2, p. 12 (describing crypto-assets and tokens as digitally represented, globally distributed values recorded on DLT); PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence.*, 2021, pp. 1–8 (on the decentralized and borderless nature of blockchain-based transactions). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>48</sup> WETENKAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? *Beiträge zum Transnationalen Wirtschaftsrecht*, 2019, no. 161, pp. 17–26 (on the difficulty of applying traditional connecting factors to ubiquitous digital objects) [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com); DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, §§ 3–5 (on the absence of a harmonized private-law regime for crypto-assets and the resulting conflict-of-laws problems). [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>49</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte.*, 2024, § 4 (arguing that tokens cannot be treated as tangible things and that their qualification as objects of property rights is

From the point of view of private and public law, it is essential to distinguish between tokens that are subject to specific legal regulation by virtue of the rights or facts they represent, the regulation of financial supervision, and tokens that are subject to general provisions of private law. In addition to financial legislation, other specific regulatory regimes are also possible, in the areas of energy and health.<sup>50</sup>

Until 2024, European law, particularly the definition of financial instruments contained in MiFID II, did not know either cryptocurrencies or units of account. However, with the adoption of the Markets in Crypto-Assets Regulation (CMA), the European Union has created its own comprehensive regulatory framework (*Markets in Crypto-Assets Regulation – MiCA/MiCAR*), which is part of a broader range of sources of EU law.<sup>51</sup>

## 6. Relevant Sources of EU PILAW

The European Union does not subject blockchain technology to separate legal regulation, but regulates the activities, risks and legal relationships carried out through distributed ledger technologies based on a technology-neutral and functional approach. In EU law, blockchain is conceived as a technical infrastructure whose legal relevance depends on the specific field of use. Since 2020, EU law-making has focused mainly on financial markets, the digital economy and data protection, where both systemic risks and the regulatory need for legal certainty are concentrated.<sup>52</sup>

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controversial in the absence of specific legislation) [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); DOMURATH, I.; MICKLITZ, H. W. *EU Digital Private Law*, 2024, pp. 270–305 (on the unsettled private-law status of tokenised assets in EU law) [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/>

<sup>50</sup> DOMURATH, I.; MICKLITZ, H.W. *EU Digital Private Law*, 2024, pp. 270–305 (on the overlap between financial regulation and private law for tokenised assets) [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>.

<sup>51</sup> REGULATION (EU) 2023/1114 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on markets in crypto-assets (MiCA), OJ L 165, 15.7.2023[online]. Available at: [https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm\\_source=chatgpt.com](https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica?utm_source=chatgpt.com); DOMURATH, I.; MICKLITZ, H.W. *EU Digital Private Law*, 2024, pp. 263–290 (on the EU’s shift from MiFID-based classification to a bespoke crypto-assets regime under MiCA) [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>52</sup> DOMURATH, I.; MICKLITZ, H.W. *EU Digital Private Law: Tattering or New Beginning? European Review of Contract Law*, 2024, pp. 263–310 (on the EU’s technology-neutral, functional approach to regulating digital infrastructures, including DLT and blockchain) [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>, MÖSLEIN, F. Distributed Ledger Technology and Smart Contracts. In: MÖSLEIN, F.; OMLOR, S. (eds.).

The basic public law regulation is the above-mentioned Regulation (EU) 2023/1114 on markets in crypto-assets (MiCA), which harmonises the rules for the issuance of crypto-assets, the provision of crypto-asset services and establishes a uniform supervisory regime in the EU. Regulation (EU) 2022/858 on the DLT Pilot Regime, which allows for regulated testing of DLT-based trading and settlement systems, as well as Regulation (EU) 2022/2554 (DORA), which imposes ICT and cyber risk management obligations on financial institutions, will apply in addition. Regulation (EU) 2023/2854 (Data Act) is also of particular importance, as it introduces public law requirements for smart contracts used in data sharing, but limits itself exclusively to their technical and operational characteristics and avoids their private law qualification.<sup>53</sup>

## 6.1. Global Harmonization

In addition to EU regulation, international unification institutions, in particular UNIDROIT and the Hague Conference on Private International Law (HCCH), are also dealing with digital assets and distributed ledger technologies. UNIDROIT has adopted the Principles of Digital Assets and Private Law, which represent a model private law framework for digital assets and govern the issues of possession, transfer, bona fide transferee protection and conflict-of-law localization based on a functional analogy to traditional property rights. HCCH, on the other hand, focuses primarily on the conflict-of-law aspects of digital assets, including the concept of determining the applicable law according to the law determined by the system or protocol itself, which reflects the technical nature of distributed ledgers, but at the same time raises issues of legal certainty and protection of weaker parties.<sup>54</sup>

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*FinTech-Handbuch*. München: C.H. Beck, 2023, pp. 201–245 (on the EU Digital Finance Package and the focus on financial markets, data and systemic risk rather than on “blockchain” as such). Available at: [https://cdn-asset-service.com-api.beck-shop.de/product/inhaltsverzeichnis/35466459/inhaltsverzeichnis-moeslein-omlor-fintech-handbuch-9783406804779.pdf?utm\\_source=chatgpt.com](https://cdn-asset-service.com-api.beck-shop.de/product/inhaltsverzeichnis/35466459/inhaltsverzeichnis-moeslein-omlor-fintech-handbuch-9783406804779.pdf?utm_source=chatgpt.com)

<sup>53</sup> REGULATION (EU) 2023/1114 (MiCA) Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets, [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1114>; REGULATION (EU) 2022/858 (DLT Pilot Regime); [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2022/858/oj>; REGULATION (EU) 2022/2554 (DORA); [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2022/2554/oj>; REGULATION (EU) 2023/2854 (Data Act); [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2023/2854/oj>

<sup>54</sup> UNIDROIT, Principles on Digital Assets and Private Law, 2023 (model rules on control, transfer, good-faith acquisition and conflict-of-laws localisation of digital assets) [online]. Available at: [https://www.unidroit.org/wp-content/uploads/2024/01/Principles-on-Digital-Assets-and-Private-Law-linked-1.pdf?utm\\_source=chatgpt.com](https://www.unidroit.org/wp-content/uploads/2024/01/Principles-on-Digital-Assets-and-Private-Law-linked-1.pdf?utm_source=chatgpt.com); HCCH, Digital Economy, Data Flows and Private

The UNIDROIT and HCCH initiatives indicate the possibility of deeper private unification in the future. However, the European Union's approach to the unification of private law has so far been restrained. Given the growing practical importance of blockchain applications, pressure can be expected to address private law issues more systematically, either through further CJEU case law or by gradually adopting elements from the UNIDROIT Model Rules and the HCCH conflict law concepts.<sup>55</sup>

## 6.2. EU Private International Law

The private law aspects of blockchain transactions are not regulated by a specific codification in European Union law but are subject to the general framework of private international law. The law applicable to contractual obligations is determined by Regulation (EC) No 593/2008 (*Rome I*), while non-contractual and tortious liability is governed by Regulation (EC) No 864/2007 (*Rome II*). The international jurisdiction of courts and the recognition and enforcement of judgments in civil and commercial matters are governed by Regulation (EU) No 1215/2012 (*Brussels Ia*),<sup>56</sup> the Extension Agreement applies in Denmark and the Lugano Convention in Iceland, Norway and Switzerland.<sup>57</sup>

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International Law, 2022–2024 (exploring system-based and protocol-based connecting factors for digital assets) [online]. Available at: [https://assets.hcch.net/docs/62ba4cfa-098e-41a7-8441-afb800db2cd7.pdf?utm\\_source=chatgpt.com](https://assets.hcch.net/docs/62ba4cfa-098e-41a7-8441-afb800db2cd7.pdf?utm_source=chatgpt.com) RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (warning against replacing traditional connecting factors with purely technical ones). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>55</sup> UNIDROIT, Principles on Digital Assets and Private Law, 2023; HCCH, Digital Economy, Data Flows and Private International Law, 2022–2024 [online]. Available at: [https://www.unidroit.org/wp-content/uploads/2024/01/Principles-on-Digital-Assets-and-Private-Law-linked-1.pdf?utm\\_source=chatgpt.com](https://www.unidroit.org/wp-content/uploads/2024/01/Principles-on-Digital-Assets-and-Private-Law-linked-1.pdf?utm_source=chatgpt.com), [https://assets.hcch.net/docs/62ba4cfa-098e-41a7-8441-afb800db2cd7.pdf?utm\\_source=chatgpt.com](https://assets.hcch.net/docs/62ba4cfa-098e-41a7-8441-afb800db2cd7.pdf?utm_source=chatgpt.com), RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (contrasting EU's reliance on existing PIL instruments with emerging international unification projects); DOMURATH, I.; MICKLITZ, H. W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 263–305. [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>56</sup> DOMURATH, I.; MICKLITZ, H. W. *EU Digital Private Law*, 2024, pp. 270–305 (on the interaction of MiCA, DLT Pilot Regime, DORA and Data Act as a layered public-law framework governing crypto-assets and smart contracts while leaving private-law qualification largely untouched). [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>57</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte*. Tübingen: Mohr Siebeck, 2024, §§ 3–6, p. 186 (on the application of Rome I, Rome II and Brussels Ia to crypto-assets and blockchain-based contracts) [online]. Available at: <https://www.mohrsiebeck.com/en/book/das>

The legal framework of the EU ICLA is not limited to obligations and international jurisdiction but also includes other areas of private law that may be relevant to legal relationships implemented through blockchain technologies. In the field of enforcement in cross-border non-contentious cases, Regulation (EC) No 805/2004 on the creation of a European Enforcement Order for uncontested claims allows for direct enforcement without the need for a declaration of enforceability in another Member State. In matters of succession, including the transfer of digital assets and crypto assets within the estate, Regulation (EU) No 650/2012 on jurisdiction, applicable law, recognition and enforcement of decisions and on the establishment of a European Certificate of Succession is decisive.<sup>58</sup>

The matrimonial property regime is governed by Council Regulation (EU) 2016/1103, while the property regime of registered partnerships is governed by Council Regulation (EU) 2016/1104. These regulations are also relevant for blockchain assets registered in distributed ledgers, as they can determine the law applicable to their acquisition, management and settlement in family and inheritance relationships with an international element. Other sources of private international law are international conventions binding on the European Union or its Member States, as well as custom and case-law.<sup>59</sup>

Although the case law of the Court of Justice of the European Union does not explicitly concern blockchain and smart contracts, it does provide binding interpretative bases in the areas of digital services, electronic transactions, consumer protection, personal data processing and conflict-of-law law. Of particular

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-internationale-privatrecht-digitaler-werte-9783161639364?utm\_source=chatgpt.com; WETENKAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? *Beiträge zum Transnationalen Wirtschaftsrecht*, No. 161, 2019, pp. 17–30 (on the suitability and limits of EU conflict-of-laws instruments for ubiquitous digital transactions) [online]. Available at: DOMURATH, I.; MICKLITZ, H. W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 263–305 [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>58</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte*, 2024, §§ 6–8, p. 279 (on enforcement, succession and the treatment of digital and crypto-assets under EU private international law); WETENKAMP, L. *IPR und Digitalisierung*, 2019, pp. 26–35 (on cross-border enforcement and succession involving digital assets) [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

<sup>59</sup> DILEK, D. *The International Private Law of Digital Values*. Tübingen: Mohr Siebeck, 2024, §§ 6–8 (on the application of EU matrimonial property and partnership property regimes to digital and crypto-assets) [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); WETENKAMP, L. IPR and Digitization – Does Private International Law Need an Update? *Contributions to Transnational Business Law*, 2019, no. 161, pp. 26–35. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

importance is the case law on the GDPR, which consistently promotes effective protection of data subjects, the enforceability of their rights and the responsibility of the controller, thus limiting the possibility of justifying interference with fundamental rights by the mere technical architecture of immutable distributed ledgers.<sup>60</sup>

Private international law formulates the principle of the closest connection, according to which the applicable legal order is the one to which the legal relationship resulting from the factual circumstances has the most intense link. Determining the closest link requires an assessment of the social, political, economic and cultural factors characteristic of cross-border relations.<sup>61</sup>

On this basis, the jurisprudence of private international law has gradually developed, which today forms the methodological framework for determining the law with the closest connection. These developments are of particular importance in the context of all digital assets. Digital assets are a new phenomenon that has only been marginally encountered in previous case law and legal doctrine, which complicates their legal classification and conflict-of-law classification; this also applies in intellectual property law, where there is still no comprehensive conflict-of-law framework for digital assets.<sup>62</sup>

Any attempt to exercise control over digital assets under the current conflict-of-law framework is associated with considerable difficulties. In the area of obligations, Regulation (EC) No 593/2008 (Rome I) and Regulation (EC) No 864/2007 (Rome II), their escape clauses, can continue to be applied to contractual and non-contractual obligations relating to digital assets. By contrast, there

<sup>60</sup> DOMURATH, I.; MICKLITZ, H.W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 295–320 (on the role of CJEU case law in shaping the application of digital and data law to private-law relationships) [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html> SDEU, judgments on GDPR, e.g. Case C-131/12 Google Spain; Case C-311/18 Schrems II (on effectiveness, data subject rights and accountability overriding purely technical architectures). [online]. Available at:

<sup>61</sup> WETENKAMP, L. *IPR und Digitalisierung*, 2019, pp. 10–20 (on closest connection as a multi-dimensional, not merely territorial, concept) [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com); RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (applying the closest-connection principle to blockchain-based contractual relations). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>62</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte*. Tübingen: Mohr Siebeck, 2024, §§ 1–2, pp. 12–15 (on digital assets as a new category challenging traditional conflict-of-laws classifications) [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); WETENKAMP, L. *IPR und Digitalisierung*, 2019, pp. 20–30 (on the lack of conflict-of-laws rules for digital and IP-related assets). [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

is no specific conflict-of-law regime in the area of rights in rem to digital assets, and the current EU ICA does not provide for a unified set of specific links.<sup>63</sup>

Digital assets, in particular tokens, are commonly subject to cross-border transactions, which makes the question of determining the applicable law extremely relevant. Private international law is applicable when there is a relevant international element. In the case of contracts, it is sufficient if parties from different countries are involved, if the contract is concluded or performed abroad, and, according to some opinions, also if a foreign language is chosen. In the context of smart contracts, such an element can be the very use of cross-border blockchain infrastructure, which includes nodes in different legal systems.<sup>64</sup>

The issue of cross-border contracts relating to digital assets is unsatisfactory and therefore contractual obligations related to tokens and smart contracts in the EU need to be assessed primarily under the Rome I Regulation.<sup>65</sup>

The scope of the Rome I Regulation applies to contractual obligations with an international element in civil and commercial matters (Article 1(1)), unless one of the exceptions under Article 1(1) applies. 2. The concept of a contractual obligation is an autonomous concept of EU law and designates an obligation voluntarily assumed by one party towards the other which creates a special legal relationship.<sup>66</sup>

Digital assets in the form of tokens are typically created and operated on fully or partially decentralized blockchain networks, and even participation in such

<sup>63</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the applicability of Rome I and Rome II to blockchain-based obligations and the role of escape clauses); DILEK, D. *Das Internationale Privatrecht digitaler Werte*, 2024, §§ 3–5. [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>64</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the existence of an international element in blockchain-based contracts and the irrelevance of purely technical node location as a connecting factor); WETENKAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? *Beiträge zum Transnationalen Wirtschaftsrecht*, 2019, no. 161, pp. 17–26. [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

<sup>65</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte*. Tübingen: Mohr Siebeck, 2024, §§ 3–5 (on the application of Rome I to contractual obligations relating to digital assets) [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 263–305. [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>66</sup> CJEU, Case C-147/12 ÖFAB; Case C-249/16 Kareda (on the autonomous EU concept of “contractual obligation” under Rome I); RÜHL, G., 2020 (on smart contracts executing voluntarily assumed obligations). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

a network may, in certain circumstances, give rise to a contractual obligation within the meaning of the Rome I Regulation.<sup>67</sup>

The purpose and architecture of a particular network are decisive, as they define the circle of participants, their rights and obligations. If a blockchain network creates structured cooperation between multiple entities, mutual contractual obligations may arise between them, often implicitly and without formalized contractual text. Such relationships may fall within the scope of the Rome I Regulation. This conclusion is relevant to decentralized autonomous organizations (DAOs) and decentralized finance (DeFi) structures, according to some opinions.<sup>68</sup>

## 7. Smart Contracts as Contractual Obligations

The question of whether smart contracts create contractual obligations depends on their definition. In a narrow, technical concept, smart contracts are just software that automatically performs certain operations without necessarily having legal significance. However, in a broader sense, it is software that manages, performs or documents legally relevant actions on the basis of digitally verifiable events and that may, under certain circumstances, be used to conclude contracts or exercise rights in rem and obligations or a combination thereof in connection with an external or parallel contractual arrangement.<sup>69</sup> The program code can serve as a means of expressing the will or as a tool for initiating legally or commercially relevant processes and thus produce legal effects outside the

<sup>67</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on blockchain participation as potentially creating contractual obligations under Rome I) [online]. Available at: MÖSLEIN, F. Distributed Ledger Technology and Smart Contracts. In: MÖSLEIN, F.; OMLOR, S. (eds.). *FinTech-Handbuch*. München: C.H. Beck, 2023, pp. 210–230. [online]. Available at:

<sup>68</sup> MÖSLEIN, F. *FinTech-Handbuch*, 2023, pp. 231–245 (on DAO and DeFi as contract-like governance structures); [online]. Available at: [https://cdn-assetservice.ecom-api.beck-shop.de/product/inhaltsverzeichnis/35466459/inhaltsverzeichnis-moeslein-omlor-fintech-handbuch-9783406804779.pdf?utm\\_source=chatgpt.com](https://cdn-assetservice.ecom-api.beck-shop.de/product/inhaltsverzeichnis/35466459/inhaltsverzeichnis-moeslein-omlor-fintech-handbuch-9783406804779.pdf?utm_source=chatgpt.com) RÜHL, G., 2020 (on implicit agreements and cooperative structures in blockchain networks).

<sup>69</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the distinction between smart contract code and legal contracts) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com). PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence*, 2021, pp. 8–16 (on smart contract code versus legal contracts) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787); DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 295–320. [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

technological layer, without creating a contractual obligation in itself. Although there is no full consensus as to whether smart contracts understood in this way can be considered contractual obligations within the meaning of the Rome I Regulation, it is methodologically necessary to distinguish between smart contracts and smart legal contracts.<sup>70</sup>

In a broader sense, it is software that manages, executes or documents legally relevant actions based on digitally verifiable events and that can be used under certain circumstances to conclude contracts or exercise rights in rem and obligations – typically in combination with a previous, parallel or subsequent contractual arrangement, i.e. in the concept of smart legal contracts.<sup>71</sup>

In the European Union, the area of conflict-of-law rules in this area is largely unified by the Rome I Regulation and the Rome II Regulation. As a result, all the courts of the EU Member States, with the systemic exception of Denmark under the Rome Convention of 1980, consider questions falling within their jurisdiction under the same conflict-of-law rules, both in relations within the Union, so also in relations with third countries.<sup>72</sup>

If there is no uniform regulation of the establishment of the applicable law worldwide, or at least at the EU level, it is necessary to consider the conflict of laws rules of all potential forum states before whose courts the dispute could be heard in the preventive (not only) conflict-of-law analysis.<sup>73</sup>

Within the EU, the question of forum states is regulated by the Brussels Ia Regulation, which lays down uniform rules for the international jurisdiction of courts and for the recognition and enforcement of judgments. In relations

<sup>70</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the distinction between smart contract code and legal contracts) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com); PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence*, 2021, pp. 8–16. [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>71</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the distinction between smart contract code and legal contracts) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com). DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 295–320. [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/erc-2024-2014/html>

<sup>72</sup> REGULATION (EC) No 593/2008 (Rome I); REGULATION (EC) No 864/2007 (Rome II), [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/oj>; RÜHL, G., 2020 (on the uniform application of Rome I/II to smart legal contracts). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>73</sup> DICEY, MORRIS AND COLLINS. *The Conflict of Laws*, 15th ed., 2012, pp. 25–40; WETENKAMP, L., 2019, pp. 16–25. [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

between Member States and Denmark, the Brussels I Extension Agreement will apply, while in EU relations (including Denmark) with Iceland, Norway and Switzerland, the Lugano Convention will apply.<sup>74</sup>

To avoid complications in determining the international jurisdiction of courts and also to achieve a compact result, it is recommended from a practical point of view to use international prorogation agreements. For determining the ordinary court of the defendant pursuant to Article 4 of the Brussels I Regulation, it is possible for one of the parties, even after the conclusion of the contract, by a mere change of domicile, to establish international jurisdiction of the court which the other party could not have otherwise foreseen. In relations between entrepreneurs, the possibility of an agreement on the choice of court under Article 25 et seq. of the Brussels Ia Regulation and the corresponding provisions of international conventions is therefore crucial.<sup>75</sup>

However, Brussels Ia provides for a special, mandatory regime in consumer relations. If an entrepreneur within the meaning of Article 17 para. 1 lit. (c) Brussels Ia directs its activity to the consumer's domicile, and the contract falls within the scope of that activity, the consumer has a right to do so under Article 18(1) of the Regulation. 1 the right to choose whether to sue the entrepreneur before his general court or before the court of his residence. A trader may bring an action against a consumer only before the court of the consumer's domicile (Article 18(2)). Choice-of-court agreements are only permissible to a limited extent in the field of consumer contracts under Article 19 Brussels Ia.<sup>76</sup>

In addition, the foreign element in private international law activates both the conflict of laws regulation and the direct rules of the IPS. These direct norms take the form of unified substantive law, contained in international conventions, typically the 1980 United Nations Convention on Contracts for the International

<sup>74</sup> REGULATION (EU) No 1215/2012 (Brussels Ia); Agreement between the European Community and the Kingdom of Denmark on jurisdiction and the recognition and enforcement of judgments; Lugano Convention 2007. [online]. Available at:

<sup>75</sup> REGULATION (EU) No 1215/2012 (Brussels Ia), Arts. 4, 25; CJEU, Case C-214/89 Powell Duffryn (on jurisdiction agreements in commercial matters); RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the importance of jurisdiction clauses in cross-border blockchain contracts). [online]. Available at: [https://eur-lex.europa.eu/eli/reg/2012/1215/ojhttps://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://eur-lex.europa.eu/eli/reg/2012/1215/ojhttps://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>76</sup> REGULATION (EU) No 1215/2012 (Brussels Ia), Arts. 17–19; CJEU, Case C-190/11 Mühlleitner; Case C-585/08 and C-144/09 Pammer and Alpenhof (on directing activities to the consumer's state in online and digital commerce) [online]. Available at: [https://eur-lex.europa.eu/eli/reg/2012/1215/oj;DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? \*European Review of Contract Law\*, 2024, pp. 295–320 \(on consumer protection and jurisdiction in digital and platform-based contracts\). \[online\]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>](https://eur-lex.europa.eu/eli/reg/2012/1215/oj;DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? European Review of Contract Law, 2024, pp. 295–320 (on consumer protection and jurisdiction in digital and platform-based contracts). [online]. Available at: https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html)

Sale of Goods (CISG). The CISG establishes a uniform substantive regime for international sales contracts and applies directly to contracts concluded between parties domiciled in different contracting states pursuant to Article 1 of the CISG; however, due to its internal gap, it is significantly supplemented by the Rome I Regulation.<sup>77</sup> A smart legal contract that fulfils the characteristics of a purchase contract within the meaning of the CISG would be subject to this regime directly, without the need to apply conflict-of-law rules. However, national conflict-of-law law applies in the alternative, to fill the gaps under Article 7(1) of the Charter. 2 of the CISG or if the scope of the Convention is excluded by law or by agreement of the parties pursuant to Articles 2 and 6 of the CISG.

## 8. Ricardian Contracts and Ricardian Smart Legal Contracts

In practice, the courts of the European Union Member States apply the Rome I Regulation to smart legal contracts and apply its rules for the choice of applicable law. However, the question of whether Rome I can be related to smart contracts understood as mere software is questionable. It is therefore correct to proceed with the question whether Rome I would have affected smart legal contracts, or more precisely Ricardian smart legal contracts, and not the accompanying code itself.<sup>78</sup>

The term Ricardian contract refers to a special type of contractual documentation that integrates the legal, economic and technical levels of the obligation into a single coherent artifact. Contrary to the common understanding of smart contracts as self-executing code, the Ricardian contract is not primarily a program, but a legal document that is at the same time designed to be human-readable, machine-interpretable, and cryptographically verifiable. Its aim is not to automate

<sup>77</sup> CISG, United Nations Convention on Contracts for the International Sale of Goods, Arts. 1, 7[online]. Available at: [https://uncitral.un.org/en/texts/salegoods/conventions/sale\\_of\\_goods](https://uncitral.un.org/en/texts/salegoods/conventions/sale_of_goods); RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the applicability of CISG to smart legal contracts and its relationship with Rome I) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com) SC HLECHTRIEM, P.; SCHWENZER, I. *Commentary on the UN Convention on the International Sale of Goods (CISG)*, 4th ed., 2016, pp. 75–95.

<sup>78</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (distinguishing between smart contract code and legally binding smart legal contracts for the purposes of Rome I); MANTE, J.; MAK, C. “Smart Contracts” versus “Smart Legal Contracts”: *Shifting Terminology*, 2 October 2023, [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com)

the creation of an undertaking, but to create a uniform reference framework for its legal content, technical implementation and evidentiary value.<sup>79</sup>

The Ricardian Treaty was created as a response to the structural contradiction between the legal treaty in natural language and its digital implementation. Traditional contracts are based on linguistic openness, allowing interpretation in the context of good faith and purpose, while digital systems require an unambiguous and formally structured representation suitable for automated processing. The Ricardian Treaty overcomes this tension by having the same document exist in two functional forms – as a legally binding text and as a data object.<sup>80</sup>

From a legal point of view, it is essential that the Ricardian treaty is not a new type of contract, but a special way of its documentation and representation. The content of the obligation is expressed in natural language and is subject to the normal rules of contract law, including interpretation, nullity, content control and weaker party protection. The technical layer of a Ricardian contract, typically in the form of a hashed document, metadata, or a structured description of the commitment, is used to identify, ensure integrity, and connect to other systems, such as tokens or smart contracts.<sup>81</sup>

It is this feature that makes Ricardian contracts a key tool in blockchain and decentralized application environments. While smart contracts as code perform predefined operations, they cannot express complex legal arrangements on their own, especially clauses on liability, applicable law, jurisdiction, contract changes or dispute resolution, the Ricardian contract allows these elements to be incorporated into a legally binding text and at the same time cryptographically linked to the code implementation.<sup>82</sup>

<sup>79</sup> MANTE, J.; MAK, C., 2023 (defining Ricardian contracts as human-readable, machine-readable and cryptographically verifiable legal instruments) [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com); MÖSLEIN, F. Distributed Ledger Technology and Smart Contracts. In: MÖSLEIN, F.; OMLOR, S. (eds.). *FinTech-Handbuch*. München: C.H. Beck, 2023, pp. 215–225. [online]. Available at:

<sup>80</sup> MANTE, J.; MAK, C., 2023; DOMURATH, I.; MICKLITZ, H.W. EU Digital Private Law: Tattening or New Beginning? *European Review of Contract Law*, 2024, pp. 295–320 (on the tension between natural-language contracts and automated execution in EU digital private law). [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>81</sup> MANTE, J.; MAK, C. “Smart Contracts” versus “Smart Legal Contracts”: Shifting Terminology, 2 October 2023 (on Ricardian contracts as a form of legally binding documentation combined with cryptographic identifiers) [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com) RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020. [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>82</sup> MANTE, J.; MAK, C., 2023, [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com).

From the point of view of private international law, the Ricardian Treaty is of particular importance, since it makes it possible to capture in a transparent and evidentiary manner the will of the parties as to the applicable law, the jurisdiction of the courts and the nature of the obligation. Where the contractual relationship is technically implemented through a decentralized infrastructure without territorial anchoring, the Ricardian contract becomes a key carrier of conflict-of-law relevant information. It makes it possible to locate a contractual relationship to a certain legal order based on the autonomy of the will of the parties, not random technical links.<sup>83</sup>

The Ricardian Treaties also serve an important evidentiary function. Cryptographic assurance of document integrity makes it possible to prove that a certain text of the contract has been accepted at a certain time and has not been subsequently changed. In combination with a blockchain record, a strong audit trail can be created, usable in both court and arbitration, which is essential in an automated fulfilment environment.<sup>84</sup>

It is crucial to distinguish between a Ricardian contract and a smart contract. A Ricardian contract is a carrier of the legal obligation and will of the parties, whereas a smart contract is a tool of technical execution. Both elements can be linked, but they are not interchangeable; It is the textual expression of the autonomy of the will that is legally relevant, not the code.<sup>85</sup>

In this sense, Ricardian contracts represent a key element of the legal anchoring of decentralized transactions. They make it possible to maintain the basic institutes of contract law – consensus, interpretation, liability and protection of

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DOMURATH, I.; MICKLITZ, H.-W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 300–320 (on the limits of code-based execution and the need for natural-language contractual safeguards). <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

<sup>83</sup> MANTE, J.; MAK, C. “Smart Contracts” versus “Smart Legal Contracts”: Shifting Terminology, 2 October 2023 (on Ricardian contracts as the legal anchor of blockchain transactions), [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com); RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020; REGULATION (EC) No 593/2008 (Rome I), Art. 3. [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>84</sup> MANTE, J.; MAK, C., 2023, [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com) [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com). PINHEIRO, L. *Arbitration, Blockchain and Artificial Intelligence*, 2021, pp. 15–25 (on evidentiary value of blockchain-based contract records). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

<sup>85</sup> RÜHL, G., 2020; DOMURATH, I.; MICKLITZ, H.W. EU Digital Private Law: Tattering or New Beginning? *European Review of Contract Law*, 2024, pp. 300–320. [online]. Available at: <https://www.degruyterbrill.com/document/doi/10.1515/ercl-2024-2014/html>

the weaker party – even in an environment controlled by algorithms and distributed systems. They are not a substitute for law, but its interface to technology. For the purposes of this study, they can therefore be referred to as *Ricardian smart legal contracts*.<sup>86</sup>

Under Article 1(1) of the Rome I Regulation, its scope is limited to determining the law applicable to contractual obligations. The substantive scope is clear from the title of the regulation, the regulation will be applied to contractual obligations under civil and commercial law, if there is a conflict of laws that could be applied to these contractual relationships. In relation to smart contracts, this raises the question of whether they themselves constitute “contractual obligations”. However, it follows from the established interpretation of the Court of Justice of the EU that a contractual obligation is any obligation that one private person voluntarily accepts towards another, regardless of its reciprocity or unilaterality. This approach corresponds to the concept of *Ricardian smart legal contracts* (*Ricardian 2.0*), in which a legal obligation is expressed in text and technically executed in code.<sup>87</sup>

Moreover, there is a more substantive question, or rather a process, than the question of whether Rome I applies to the smart contract as a whole or only to the legal obligations that the code implements. It is the fact that Rome I is used based on methods of legal *qualification* and related criteria, which can also be used to verify its applicability, for example according to the two-stage qualification method. This is an aspect that is often neglected in the literature.<sup>88</sup>

<sup>86</sup> MANTE, J.; MAK, C., 2023, [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com); WETENKAMP, L. IPR and Digitization – Does Private International Law Need an Update? *Contributions to Transnational Business Law*, 2019, no. 161. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

<sup>87</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 1; CJEU, Case C-147/12 ÖFAB; Case C-249/16 Kareda (autonomous EU concept of contractual obligation) [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://eur-lex.europa.eu/eli/reg/2008/593/oj;RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). <i>Blockchain, Law and Governance</i>. Springer, 2020[online]. Available at: <a href=); MANTE, J.; MAK, C. “*Smart Contracts*” versus “*Smart Legal Contracts*”: *Shifting Terminology*, 2 October 2023, [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com)

<sup>88</sup> RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020[online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com); WETENKAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? *Beiträge zum Transnationalen Wirtschaftsrecht*, No. 161, 2019. [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

At the same time, the Rome I Regulation allows for the choice of law based on the autonomy of the will of the parties under Article 3. 3 par. Article 1(1) of the Regulation determines the applicable law for the contract regime to be chosen by the parties. This is either an express choice of law or one that is clearly apparent from the contract itself, or a choice resulting from the circumstances of the case is also permissible. The regulation also works with a split choice of law, where the parties can choose the law applicable to the whole contract or part of the contract.

The regulation also allows for a subsequent change in the chosen legal order, and because of this regulation, the parties may at any time agree that the contract will be governed by a different law than it was governed by the choice of law made earlier. The regulation also allows the parties to a contract to choose the law for a contract that is linked to only one legal order, i.e. the legal system of one state.

In these cases, however, it will not be possible to deviate from the mandatory provisions of the legal order that would otherwise be decisive for the contract in question. In these situations, the choice of law will concern only the supplementary provisions of the legal order to which it is directed. In this situation, it is also appropriate to analyze the provisions of Article 3 (1) of the Charter. 4 of the Regulation.

The parties can thus subject their contract to the legal order of their choice and thus link it to an advanced national law of obligations capable of addressing digital transaction issues. The chosen legal order then provides a measure of the validity, interpretation and consequences of breaches of smart legal contracts.<sup>89</sup>

However, the choice of applicable law cannot always be effectively expressed by the code itself and must be formulated at an appropriate legal level. The highest degree of legal certainty is therefore provided by an explicit choice of law contained in either a parallel contract or a Ricardian contract – that is, a legally binding text in natural language cryptographically linked to code. Ricardian smart legal contracts thus allow the incorporation of provisions that are not technically feasible, including a conflict of laws clause.<sup>90</sup>

<sup>89</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 3; DILEK, D. *The International Private Law of Digital Values*. Tübingen: Mohr Siebeck, 2024, § 5.

<sup>90</sup> MANTE, J.; MAK, C., 2023 [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com); RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020[online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com); PINH EIRO, L. Arbitration, Blockchain and Artificial Intelligence, 2021, pp. 15–25. [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5272787](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5272787)

In addition to the express choice, Article 3(1) of the Constitution permits. 1 Rome I also an implicit choice resulting from the content of the contract or the circumstances of the case, for example from its systematic link to a particular legal order. However, such a choice must be obvious and demonstrated, i.e. supported by a sufficiently demonstrable real intention of the parties.<sup>91</sup>

In the smart contract environment, the parties often do not make any choice of law, or it cannot be reliably deduced. The algorithmic nature of smart contracts, their standardization and the use of pre-prepared protocols leads to the fact that the intention to subordinate the obligation to a certain legal order is usually neglected or legally illegible. In such cases, the objective conflict-of-law regime under Article 4 of the Rome I Regulation comes into play, the purpose of which is to establish a contractual relationship with the legal order with which it has the closest connection.<sup>92</sup>

Article 4 Rome I forms the basis of objective conflict-of-law resolution in the EU law on conflict-of-law obligations. It is conceived as a hierarchical system in which standardized connecting criteria are applied first for certain types of contracts, then the general rule of characteristic performance and finally the residual criterion of the closest connection corrected by an escape clause. This system combines legal certainty with the possibility of fair correction in atypical cases.<sup>93</sup>

The first step in the absence of a choice of law is the application of Article 4(1) of the Charter. 1 Rome I, which assigns a fixed follow-up factor to selected types of contracts. In the case of purchase contracts, the applicable law is the law of the seller's habitual residence, in the case of contracts for the provision of services, the law of the provider's habitual residence, in the case of real estate contracts, the law of the state in which the property is located, or the law of the parties' joint habitual residence.<sup>94</sup>

<sup>91</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 3(1) [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/ojCJEU>, Case C-184/12 Unamar; Case C-64/12 Schlecker (on implicit choice of law). [online]. Available at:

<sup>92</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 4[online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/ojRÜHL>, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020[online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com); MANTE, J.; MAK, C. "Smart Contracts" versus "Smart Legal Contracts": Shifting Terminology, 2 October 2023. [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com)

<sup>93</sup> RÜHL, G. The Law Applicable to Contracts in the Rome I Regulation. In: DICKINSON, A.; LEIN, E. (eds.). *The Rome I Regulation*. Oxford University Press, 2015, pp. 93–120; WETENKAMP, L. IPR and Digitization – Does Private International Law Need an Update? *Contributions to Transnational Business Law*, 2019, no. 161. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)

<sup>94</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 4(1) <https://eur-lex.europa.eu/eli/reg/2008/593/ojCJEU>, Case C-133/08 Intercontainer Interfrigo; Case C-381/98 Ingmar (on characteristic

In relation to smart contracts, the conflict-of-law classification must therefore focus on the legal nature of the obligation and not on the technology used. Given that smart contracts are commonly used to make payments, deliveries, provide digital services or manage rights, most of these relationships can be subsumed under one of the categories listed in Article 4(1) of the Charter. 1 Rome I, which thus provides a direct and predictable determination of the applicable law.<sup>95</sup> Article 4(3) of Rome I allows for a derogation where the contract is manifestly more closely connected with another State than the primary connecting criterion provides, even if it is to be applied exceptionally and its application requires a clear link with another legal order.<sup>96</sup>

Not all contracts implemented through smart contracts can be subordinated to the standardized categories of Article 4(1) of the Convention. 1 Rome I. A typical example is contracts for the transfer of cryptocurrencies or other digital tokens. These do not constitute contracts of sale for goods, as they do not have the subject matter of tangible things, nor usually transactions within multilateral trading facilities.<sup>97</sup>

In such cases, Article 4(2) of Rome I, which links the applicable law to the habitual residence of the party providing the characteristic supply the non-monetary supply, could be applied. In the case of a cryptocurrency transfer agreement, this performance is the transfer of digital value itself, so the applicable law will usually be the law of the transferor's habitual residence. However, this rule is also subject to the corrective of Article 4(1) of the Charter. 3 and may exceptionally be suppressed if the treaty is manifestly more closely connected

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performance and fixed connecting factors). [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/oj>

<sup>95</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 4(1), [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/oj>; RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com); MANTE, J.; MAK, C. "Smart Contracts" versus "Smart Legal Contracts": Shifting Terminology, 2 October 2023 [online]. Available at: [https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm\\_source=chatgpt.com](https://rgu-slss.blog/2023/10/02/smart-contracts-versus-smart-legal-contracts-shifting-terminology/?utm_source=chatgpt.com)

<sup>96</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 4(3) <https://eur-lex.europa.eu/eli/reg/2008/593/oj>; CJEU, Case C-133/08 Intercontainer Interfrigo; Case C-498/16 Schrems (on the exceptional nature of the escape clause). [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/oj>

<sup>97</sup> DILEK, D. *Das Internationale Privatrecht digitaler Werte*. Tübingen: Mohr Siebeck, 2024, § 5 (on token transfers not qualifying as sales of goods under Rome I) [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com); RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020. [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

with another State.<sup>98</sup> If a contract cannot be classified under Article 4(1) or a characteristic service can be determined under paragraph 2, Article 4(4) of Rome I, which refers to the law of the State with which the contract has the closest connection, applies. The case law of the Court of Justice of the EU has developed a two-step test on this provision: the court must first identify all the objective factors characterizing the contractual relationship and then determine which of them are decisive for the location of the relationship.<sup>99</sup>

In addition to traditional criteria such as the parties' habitual residence, place of performance and place of performance, the language of the contract, the currency of the performance, the structure of the contractual arrangement or the economic context of the transaction may also be relevant in determining the closest concentration under Article 4(4) of Rome I. The circle of these factors is not closed and must be assessed functionally regarding the real socio-economic center of gravity of the relationship.<sup>100</sup> In this context, the importance of the geographical distribution of blockchain nodes is also discussed. However, due to their variability, decentralization and often random distribution, the prevailing opinion is that they cannot represent a stable and legally meaningful follow-up determinant. When applying Article 4 para. 4 Rome I will therefore be decisive primarily the actual center of gravity of the contractual relationship between the parties, not the technical infrastructure on which it is implemented.<sup>101</sup>

<sup>98</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 4(2)–(3); CJEU, Case C-381/98 Ingmar; Case C-133/08 Intercontainer Interfrigo (on characteristic performance and the escape clause) [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/oj>RÜHL, G., 2020 (applying characteristic performance to digital asset transfers). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com)

<sup>99</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 4(4), CJEU, Case C-133/08 Intercontainer Interfrigo; Case C-190/11 Mühlleitner (on the two-step test for closest connection). [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/oj>

<sup>100</sup> REGULATION (EC) No 593/2008 (Rome I), Art. 4(4) [online]. Available at: <https://eur-lex.europa.eu/eli/reg/2008/593/oj>DILEK, D. Das Internationale Privatrecht digitaler Werte. Tübingen: Mohr Siebeck, 2024, § 5. [online]. Available at: [https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm\\_source=chatgpt.com](https://www.mohrsiebeck.com/en/book/das-internationale-privatrecht-digitaler-werte-9783161639364?utm_source=chatgpt.com)

<sup>101</sup> WETENKAMP, L. IPR und Digitalisierung – Braucht das internationale Privatrecht ein Update? *Beiträge zum Transnationalen Wirtschaftsrecht*, 2019, no. 161 (rejecting node location as a connecting factor [online]. Available at: [https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR\\_161.pdf?utm\\_source=chatgpt.com](https://opendata.uni-halle.de/bitstream/1981185920/80366/1/BeitraegeTWR_161.pdf?utm_source=chatgpt.com)RÜHL, G. Smart (legal) contracts, or: Which (contract) law for smart contracts? In: CAPPIELLO, B.; CARULLO, G. (eds.). *Blockchain, Law and Governance*. Springer, 2020 (on the irrelevance of blockchain topology for Rome I localization). [online]. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3552004&utm\\_source=chatgpt.com](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3552004&utm_source=chatgpt.com);

## 9. Conclusion

An analysis of the legal status of blockchain technologies and smart contracts in the legal order of the European Union confirms that the European regulatory approach is consistent, but structurally incomplete. The EU has not consciously recognized blockchain or smart contracts as autonomous legal institutes, but has subordinated them to existing categories of law through sector-oriented regulation, especially in the financial area thanks to MiCA, the DLT Pilot Regime and DORA, and in data protection through the GDPR and the Data Act, while the private law dimension remains regulated by the general rules of contract and conflict of laws.

However, the decentralized architecture of the blockchain weakens traditional territorial localization criteria. This led to proposals such as *lex systematis*, i.e. linking to the protocol or rules of the network. However, such an approach is complicated in the EU PIL, the blockchain protocol is not a legal order and cannot replace the normative authority of states or the Union, it can only serve as a factual reference framework for the interpretation of the treaty.

Tokens require special attention. As digital units, they have a problem with physical localization and are not things in the traditional sense. Therefore, the *lex rei sitae* is only applied indirectly, in relation to the asset that the token represents. Tokenization does not change the conflict-of-law regime of the represented property and is not intended to create new substantive effects outside the applicable substantive law, which is key to preventing circumvention of mandatory norms.

A fundamental limitation of smart contracts is their inability to carry normative content. The code, without additional interventions, does not express legal terms, value corrections or conflict of law agreements. Ricardian contracts, especially their eventual well-grasped concept of the second generation of Ricardian 2.0, can therefore represent a systemic solution, as they connect legal text in natural language with machine-readable representation and code, with Ricardian 2.0 modeling rights and obligations as a state machine synchronized with the blockchain.

From the point of view of the PIL, this makes it possible to preserve the choice of law, consumer protection, judicial interpretation and application of mandatory norms, without sacrificing the effectiveness of automation. Ricardian 2.0 is thus a legally compatible architecture for the integration of smart contracts into the EU conflict of laws system without replacing the *lex contractus* with purely technological rules.

The European blockchain framework is in a stage of controlled adaptation, public regulation is more advanced than private regulation, which is based on

the interpretation and application of existing conflict-of-law instruments. In the future, we can expect further development of CJEU case law and the adoption of inspirational elements from UNIDROIT. The public regulation of blockchain is already relatively mature, while the private and conflict-of-law dimensions remain based on the discretion of the application of traditional instruments, Rome I, Rome II, Brussels Ia or CISG. This approach provides flexibility, but at the same time generates legal uncertainty in cross-border relations. In the future, it can be expected that the pressure of practice will lead to the development of the case law of the Court of Justice of the EU and to the gradual adoption of inspirational elements from international model rules, especially UNIDROIT, but without abandoning the basic principles of private international law. However, it is crucial that this development does not erode the basic principles of PIL.

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