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ARTICLE

Tokenisation of Absolute Rights and Claims: On the Use of Tokens to Transfer Rights in Property Law

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Abstract

Tokens can serve as containers for rights, thereby facilitating the transfer of such rights. On tokenisation platforms, especially in the context of decentralised finance (DeFi), it is assumed that when a token containing a right is transferred, the right itself is transferred as well. This paper uses the "token container model" as a conceptual framework to examine whether European private law frameworks on transfers of rights are compatible with such token-based transfers. Specifically, it explores the rules on the transfer of rights in movables, the rules on the transfer of rights in immovables, and the rules on assignment of claims. This analysis reveals substantial legal obstacles to the use of tokens in transferring absolute rights or claims.

Keywords: Blockchain; digital assets; property law; tokenisation

I. Introduction

Tokenisation enables the creation of platforms that reference assets, manage rights in those assets, and simplify their trading. Many businesses and regulators, especially in financial services, have launched projects based on this technology.[1] The value of applications leveraging this technology is substantial and its growth accelerating.[2] In response, the European Union has enacted the new Markets in Crypto-Assets

[1] T Lobban et al, "The Future of Wealth Management" (2023) available at <www.jpmorgan.com/onyx/documents/portfolio-management-powered-by-tokenization.pdf> (last accessed on 4 April 2025); Hong Kong Monetary Authority, "Bond tokenisation in Hong Kong" (2023) available at <www.hkma.gov.hk/media/eng/doc/key-information/press-release/2023/20230824e3a1.pdf> (last accessed on 4 April 2025); Banco Santander, "Santander Launches the First End-to-End Blockchain Bond" (2019) available at <www.santander.com/content/dam/santander-com/en/documentos/notas-de-prensa/2019/09/np-2019-09-12-santander-launches-the-first-end-to-end-blockchain-bond-en.pdf> (last accessed on 4 April 2025); ABN AMRO, "ABN AMRO Registers First Digital Bond on Public Blockchain" (2023) available at <www.abnamro.com/en/news/abn-amro-registers-first-digital-bond-on-public-blockchain> (last accessed on 4 April 2025).

[2] See for corporeal objects A Baum, "Tokenisation: The Future of Real Estate Investment?" (2021) 47 (10) The Journal of Portfolio Management 41 and for incorporeal objects L Quest et al, *Unlocking the Power of Securities Tokenisation* (UK Finance 2023) available at <www.ukfinance.org.uk/system/files/2023-07/Unlocking%20the%20power%20of%20securities%20tokenisation.pdf> (last accessed on 4 April 2025) and K Kolchin, J Podziemska and D Hadley, *2023 Capital Markets Fact Book* (Securities Industry and Financial Markets Association 2023) 17 available at <https://www.sifma.org/wp-content/uploads/2022/07/2023-SIFMA-Capital-Markets-Factbook.pdf> (last accessed on 4 April 2025).

Regulation.[3] This Regulation creates a harmonised European regulatory framework for crypto-assets.[4] However, as Garcia-Teruel and Simón-Moreno point out, this regulation does not cover the legal nature, effects and admissibility of using tokens to transfer property rights.[5] This creates uncertainty as these technological implementations, both in terms of ownership and transfer of the token, rely on private law concepts. The law of property and the law of contract provide the legal basis for financial contracts and for financial entities, as was demonstrated by Martino, Nabilou and Pacces.[6] Kiskis demonstrates that the introduction of tokenisation technology in financial services necessitates an analysis under private law.[7] This article contributes to that private law analysis and aims to deepen our understanding of the impact of token technology on existing theories on transfers of property. This is important as the private law foundations that form the legal underpinnings of financial services play a crucial role in safeguarding the stability of markets and the protection of investors. As such, the consequences of an unsuitable private law foundation might be severe. For instance, Kokorin examines the recent collapses of prominent crypto trading and lending firms to illustrate the impact of uncertainties in private law within the crypto context and shows how this contributes to existing vulnerabilities.[8] Similarly, one might ask whether transferring a token that represents a right could, in effect, constitute the transfer of the right itself – an important consideration in decentralised finance, where tokenised assets and rights are frequently exchanged on blockchain platforms.[9] From a technical perspective, programming software to achieve exactly this is possible.[10] However, if such transfers are not recognised by the private law frameworks of the relevant legal system, it remains to be seen whether such transfers are capable of generating legal effects.

This paper uses the token container model to examine whether current European private law frameworks on transfers of rights could effectively facilitate token-based

[3] See for example V Lubbersen and P Wierts, "Cryptoactiva: evolutie en beleidsrespons" (2022) 20 (5) De Nederlandsche Bank Occasional Studies available at <www.dnb.nl/media/o10fpkev/dnb-occasional-study-crypto-s.pdf> (last accessed on 4 April 2025), 24 ff; De Nederlandsche Bank and Autoriteit Financiele Markten, "Cryptos: Recommendations for a Regulatory Framework" (2018) available at <www.afm.nl/~/profmedia/files/rapporten/2019/adviesrapport-crypto-eng.pdf?la=en> (last accessed on 4 April 2025); FINMA, "Guidelines for Enquiries Regarding the Regulatory Framework for Initial Coin Offerings" (February 2018) available at <www.finma.ch/en/~/media/finma/dokumente/dokumentencenter/myfinma/1bewilligung/fintech/wegleitung-ico.pdf> (last accessed on 4 April 2025); Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets, OJ L 150/40 (MiCAR).

[4] Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets, OJ L 150/40 (MiCAR), 6.

[5] RM Garcia-Teruel and H Simón-Moreno, "The Digital Tokenization of Property Rights. A Comparative Perspective" (2021) 41 Computer Law & Security Review 105543, 3; C Lemke, 'Function Follows Form or Form Follows Function – The Legal Nature of CBDC" (2024) 13 European Property Law Journal 221, 221–5.

[6] ED Martino, H Nabilou and AM Pacces, "Comparative Financial Regulation: The Analytical Framework (2023) 726 European Corporate Governance Institute – Law Working Paper 3.

[7] M Kiskis, "Private Law Framework for Blockchain" (2024) 7 Frontiers in Blockchain 1, 7–9.

[8] I Kokorin, "The Anatomy of Crypto Failures and Investor Protection under MiCAR (2023) 18 (4) Capital Markets Law Journal 500; see also ED Martino and WG Ringe, "The Social Cost of Blockchain: Externalities, Allocation of Property Rights, and the Role of the Law" (2025) 16(2) European Journal of Risk Regulation (forthcoming) showing that proprietary entitlements need to be clearly defined and allocated; see also J Lee and A Darbellay (eds), *Data Governance in AI, Fintech and LegalTech* (Routledge 2022).

[9] As illustrated by UNIDROIT, "Digital Assets and Private Law" (September 2023) Principle 4, Commentary 4.14 available at <https://www.unidroit.org/wp-content/uploads/2024/01/Principles-on-Digital-Assets-and-Private-Law-linked-1.pdf> (last accessed on 4 April 2025).

[10] See M Haentjes and M Lehmann, "The Law Governing Secured Transactions in Digital Assets" in A Bonomi, M Lehmann and S Lalani (eds), *Blockchain and Private International Law* (Leiden, Brill 2023) pp 456–7 on potential business rationales.

transfers. This examination contributes to a better understanding of current applications of token technology, its impact on existing systems on transfers of rights, and its capacity to produce transfers that hold generate effect, particularly in the context of decentralised finance. The token container model, detailed in section III, forms the foundation of the analysis in this paper. It addresses one central question: how can tokens be used to transfer rights? This question will be explored using the analytical framework proposed by Van Vliet: he identifies two dividing lines that can be used to classify transfer systems.[11] This framework enables a qualitative analysis of consensual, causal tradition, and abstract tradition transfer systems, which, in turn, offers insight into whether the token container model provides a model on the basis of which broader European legal frameworks can give effect to token transfers, thereby determining whether tokens can actually be used to transfer rights.

In order to transfer a token in a manner recognised by the law, it must be recognised by the legal system in question as a transferable object within property law. Furthermore, tokens with certain specific contents might be qualified as a specific financial instrument. As far as the private law rules on transfer are concerned, this is primarily a matter of national laws.[12] However, if the token is qualified as a financial instrument, harmonised European rules regarding the transfer of such instruments might be applicable.[13] In such contexts, the previously mentioned Markets in Crypto Assets Regulation should be considered. It is for these reasons that the qualification of the token is relevant and deserves ample consideration. However, in order to ensure a certain degree of conciseness, this paper will take Principle 3(1) of the Unidroit Principles on Digital Assets and Private Law as its starting point and treat tokens as digital assets that can be subject to proprietary rights.[14] It follows from this that tokens fall within the scope of the law on property as transferable objects. Hence, while the relevant national and European rules stipulate how a specific token must be qualified, this paper takes the premise that tokens are objects for the scope of property law and, as such, can be transferred in a manner recognised by the law. Differentiating between the different types of tokens, analysing how these might be qualified, and examining whether the applicable (harmonised) rules on transfers are compatible with token-transfers is beyond the scope of this current research. Rather than

[11] LPW van Vliet, *Transfer of Movables in Germany, French, English and Dutch Law* (Nijmegen, Ars Aequi Libri 2000).

[12] See, for example, JG Allen, H Wells and M Mauer, "Cryptoassets in Private Law: Emerging Trends and Open Questions from the First 10 Years" (August 2022) *SMU Centre for AI & Data Governance Research Paper* no 6, III(i) <https://ssrn.com/abstract=4206250> (last accessed on 4 April 2025); JG Allen, "Cryptoassets in Private Law" in I Chiu and G Deipenbrock (eds), *Routledge Handbook of Financial Technology and Law* (1st edn, London, Routledge 2021); JG Allen, "Property in Digital Coins" (2019) 8 European Property Law Journal 64; C Argelich-Comelles, "Towards Proprietary Digital Assets Under European Soft Law" in CP Sempere (ed), *Governance and Control of Data and Digital Economy in the European Single Market,* (Cham, Springer 2025) pp 57–59; T Chan, 'The Nature of Property in Cryptoassets" (2023) 43 Legal Studies 480; I Koumans, "Handel in digitale kunst door middel van NFT's. Do NFT's Make the Internet Ownable?" (2023) 8 Ars Aequi 556; K Low, "Cryptoassets and the Renaissance of the Tertium Quid?" in C Bevan (ed), *Edward Elgar Handbook on Property Law and* Theory (Cheltenham, Edward Elgar Publishing 2024) 154–7; S Omlor, "Blockchain-Token im Zivilrecht: Blockchain, Token, Kryptowährung, Geld, Wertpapier, Sachenrecht" (2023) 45 JURA – Juristische Ausbildung 661, 665–7; S Omlor, "Digital Ownership of Blockchain Tokens: A Comparative Law Guideline' in E Nordtveit (ed), *The Changing Role of Property Law* (Cheltenham, Edward Elgar Publishing 2023); MC Pereira, "The Digital Tokenisation of Non-financial Assets: Challenges to English Private Law" (2023) 7 (2) Católica Law Review 9; J Verstappen, "The Future Is Meow: een verkenning van vermogensrechtelijke en auteursrechtelijke kwalificaties van non-fungible crypto-tokens" (2021) 11 Ars Aequi 9.

[13] E Callens, "Financial Instruments entail liabilities: Ether, bitcoin, and litecoin Do Not" (2021) 40 Computer and Security Law Review 105494; M Lehmann and F Schinerl, "The Concept of Financial Instruments: Drawing the Borderline between MiFID and MiCAR" (2024) 19 Capital Markets Law Journal 330; ESMA, "Guidelines on the Conditions and Criteria for the Qualification of Crypto-Assets as Financial Instruments" (December 2024) available at <www.esma.europa.eu/sites/default/files/2024-12/ESMA75453128700-1323_Final_Report_Guidelines_on_the_conditions_and_criteria_for_the_qualification_of_CAs_as_FIs.pdf> (last accessed on 4 April 2025).

[14] See Unidroit, *supra*, note 9, Principle 3(1).

qualifying a token as more than a transferable object within the law of property, this paper approaches tokens as technical instruments that could streamline and simplify the processes of transferring right. This enables an analysis of whether national rules on transfers of movables, immovables, and claims are compatible with the use of tokens as instruments for transferring rights in these objects. Both the qualification of the token itself under national law or under European law, including MiCAR, is therefore beyond the scope of this research.

The central questions considered in this paper are strongly intertwined with questions of private international law. In this regard, the question on applicable law is especially relevant.[15] It could, for example, be argued that, if the applicable law has adopted the token container model, the rules on transfer of that legal system apply. This paper is concerned with the preliminary matter of whether the context provided by the national rules on transfer are compatible with such token-based transfers. This question is relevant to the risk analysis that industry stakeholders experimenting with this technology make, as well as policymakers who might want to create a regulatory environment that stimulates innovations based on tokenisation technology. As the adoption of this technology increases, the relevance and the importance of that private international law question increases in tandem. This relates first and foremost to the questions whether, and in which circumstances, the applicability of national laws that have adopted the tokenisation model also results in the rules on transfer of that legal system being applicable and whether this offers an effective solution. However, these matters of private international law are beyond the scope of this paper.

Additionally, the scope of this paper is limited in three ways. First, the focus is limited to property law aspects of token transfers alone: the broader private law context is out of scope. Second, this paper is concerned with transfers of movables, transfers of immovables, and assignments of claims. Third, this paper is only concerned with voluntary transfers through legal agreements. Other transfers, such as those in the context of gifts, inheritances, and insolvencies, are beyond the scope of this paper.

Four steps will be taken to address the central research question. First, section II will explain what tokens are and how token technology functions. Second, section III will illustrate the token container model through recent legislative initiatives in the Principality of Liechtenstein and the Republic of Belarus. Third, section IV will provide an overview of European transfer systems as far as absolute rights are concerned. Following this, in subsections IV.3 and IV.4 respectively, an analysis will be performed on whether these rules are such that they can give token-based transfer legal effect. Fourth, section V will provide an overview of European transfer systems as far as the assignment of claims is concerned. Subsequently, subsection V.1 will analyse whether these rules are such that they can give token-based assignments of claims legal effect. By taking these four steps, this paper identifies two fundamental legal obstacles to token-based transfers of rights in European systems of private law. Section VI provides the conclusion.

II. Technology

Regulators typically differentiate between three types of tokens: payment tokens, utility tokens, and asset tokens.[16] This final category is central to this contribution. Tokenisation

[15] See for broader K Takahashi, "Law Applicable to Proprietary Issues of Crypto-Assets" (2023) 18 (2) Journal of Private International Law 339; M Lehmann, "Who Owns Bitcoin? Private Law Facing the Blockchain" 21 (2019) Minnesota Journal of Law, Science & Technology 93; C Wendehorst, "Proprietary Rights in Digital Assets and the Conflict of Laws" in A Bonomi, M Lehmann and S Lalani (eds), *Blockchain and Private International Law* (Leiden, Brill 2023) pp 120–5.

[16] See for example De Nederlandsche Bank and Autoriteit Financiele Markten, "Cryptos: Recommendations for a Regulatory Framework" (December 2018) p 3 available at <https://www.afm.nl/~/profmedia/files/rapporten/

is commonly associated with blockchain technology; however, its underlying goals can also be achieved without relying on a blockchain. Given that tokenisation has gained traction in this specific context, this article will explain tokenisation as a continued development of this technology.

1. Blockchains

A blockchain platform constitutes the foundational layer upon which a tokenisation application is built. The technology was developed by individuals who subscribed to extropianism, an early school of transhumanism. Extropianism asserts that "an anarchistic market creates free and dynamic order, while the state and its life-stealing authoritarianism is entropic."[17] This is illustrated, for example, by the fact that the idea for smart contracts was initially proposed in *Extropy Magazine*, a journal described as 'a journal for transhuman thought'.[18] Many of the individuals who contributed to the early developments of blockchain technology identified as "crypto-anarchists" or "cypherpunks." Consequently, they designed this technology to facilitate interactions and transactions beyond the reach of governments.[19] This technology is deeply rooted in this ideology, exemplified by the decentralised nature of the platform and its relatively anonymous operation. This unique background, combined with its specific goal, differentiates a blockchain platform from centralised platforms and databases in three ways.

First of all, the system is immutable. The cryptographic principles that underpin the platform ensure the integrity of the transactions and provide non-repudiation among the parties operating on that platform.[20] Furthermore, these same cryptographic principles offer "record immutability" due to the system's method of ensuring consensus among network participants regarding the state of information on the network.[21]

Second, the system is transparent. In a decentralised environment, the network participants cannot rely on a trusted third party to maintain the state of information. Doing so would go against the overarching goals. Instead, the parties rely on the consensus mechanism to collectively maintain the state of the database. To do so, parties require information about transactions and information contained within transactions. Hence, the decentralised nature of the platform, along with how the state

2019/adviesrapport-crypto-eng.pdf> (last accessed on 4 April 2025); Swiss Financial Market Supervisory Authority FINMA, "Guidelines for Enquiries Regarding the Regulatory Framework for Initial Coin Offerings (ICO's)" (February 2018) p 4 available at <www.finma.ch/en/~/media/finma/dokumente/dokumentencenter/myfinma/1bewilligung/fintech/wegleitung-ico.pdf?sc_lang=en&hash=83EE49D77DA54DD079F314D9EDCBDC3D> (last accessed on 4 April 2025); a slightly different, but equally complete, categorisation is presented in P Hacker and C Thomale, "Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law" (2018) 15 (4) European Company and Financial Law Review 646, 671–86; for more see J Lee, "Law and Regulation for a Crypto-Market: Perpetuation or Innovation" in I Chiu and G Deipenbrock (eds), *Routledge Handbook of Financial Technology and Law* (London, Routledge 2021) pp 359–69.

[17] J Thweatt-Bates, *Cyborg Selves: A Theological Anthropology of the Posthuman* (3rd edn, London, Routledge 2020) pp 46–8; see also N Bostrom, "A History of Transhumanist Thought" (2005) 14 Journal of Evolution and Technology 1, 11; and J Hughes, *Citizen Cyborg: Why Democratic Societies Must Respond to the Redesigned Human of the Future* (Boulder, Westview Press 2004) pp 164–6.

[18] N Szabo, "Smart Contracts: Building Blocks for Digital Free Markets" (1996) 8 (1) Extropy: Journal of Transhumanist Thought 50.

[19] PD Anderson, *Cypherpunk Ethics: Radical Ethics for the Digital Age* (1st edn, London, Routledge 2022) pp 24–72.

[20] See for the public-key fundamentals of such platforms D Chaum, "Blind Signatures for Untraceable Payments" in D Chaum, RL Rivest and AT Sherman (eds), *Advances in Cryptology Proceedings of Crypto "82* (New York, Springer 1983) pp 199–203; and D Chaum and H van Antwerpen, "Undeniable Signatures" in G Brassard (ed), *Advances in Cryptology — CRYPTO' 89 Proceedings* (Springer 1990) pp 212–216.

[21] AM Antonopoulos, *Mastering Bitcoin: Programming the Open Blockchain* (2nd edn, Sebastopol, O'Reilly 2017) 166; K Werbach, *The Blockchain and the New Architecture of Trust* (Cambridge, MIT Press 2023) pp 41–8.

of information in the database is maintained, results in transparency being a key characteristic of the system.[22]

Third, the system is pseudonymous. This is a direct result of the asymmetric cryptography underlying these platforms, indicating that transparency is not absolute. Parties operate on the platform by way of a key pair, which consists of a public and a private key. The public key functions as both an account and an address that can be accessed by using the private key.[23] This is analogous to a person's bank account: the public key can be compared to the bank account number, while the private key can be compared to the PIN.[24] The public key therefore functions as a pseudonym. Whilst it is very difficult to determine the person associated with a public key, it is not impossible. For this reason, the system is considered to be pseudonymous rather than anonymous.

For this contribution, the blockchain is therefore defined as a decentralised database or ledger in which the state of information is maintained by the participants collectively, characterised by a certain degree of immutability, transparency, and immutability.[25]

2. *Smart contracts*

Some blockchains support programming.[26] If the programming language used by the system is sufficiently flexible, it becomes possible to run software on the platform.[27] The term "smart contracts' specifically refers to these software applications.[28] This illustrates why, despite their unfortunate name, smart contracts do not necessarily constitute legal agreements.[29]

Smart contract platforms introduce two additional key characteristics. First, smart contracts execute automatically; as a result of the platform's transparent nature, these software applications can monitor the state of information. As soon as a predefined condition encoded in the software, the smart contract will execute. Second, the enforcement of the conditions outlined in the smart contract is also automated. The smart contract exists on the same database that maintains the parties' assets, allowing the smart contract to automatically intervene in that patrimony. Hence, the two additional key characteristics enjoyed by smart contract platforms are their automatic execution and automatic enforcement.

3. *Tokens*

Smart contracts enable programmers to create applications on the platform. Examples of such applications can be found in supply chains, the Internet of things, and financial

[22] P De Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (Cambridge, Harvard University Press 2018) pp 37–9.

[23] Ibid, pp 38–9.

[24] AM Antonopoulos and G Wood, *Mastering Ethereum: Building Smart Contracts and DApps* (Sebastopol, O'Reilly 2018) p 60.

[25] For a comment on definitional challenges and an explanation on why immutability, transparency, and pseudonymity are not absolute, see KFK Low and E Mik, "Pause the Blockchain Revolution" (2020) 69 International and Comparative Law Quarterly 135, 137–146; for more on this see J Verstappen, *Legal Agreements on Smart Contract Platforms in European Systems of Private Law* (Cham, Springer 2023) pp 15–32.

[26] With regard to Ethereum see Antonopoulos and Wood, *supra*, note 21.

[27] Antonopoulos and Wood, *supra*, note 21, p 8.

[28] For broader exploration of potential definitions see R de Carcia, "Definitions of Smart Contracts" in LA DiMatteo, M Cannarsa and C Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge, Cambridge University Press 2019) pp 19–36.

[29] Smart contracts are technical concepts rather than legal concepts, see V Gatteschi, F Lamberti and C Demartini, "Technology of Smart Contracts" in LA DiMatteo, M Cannarsa and C Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge, Cambridge University Press 2019) pp 41–2; M Vessio et al, "InPerpetuity{Challenging Misperceptions of the Term 'Smart Contract'}" (2024) 15 (2) European Journal of Law and Technology 1; for more on this see Verstappen, *supra*, note 25, pp 55–177.

services.[30] Similarly, smart contracts can be programmed to create tokenisation platforms. These platforms allow for the creation of tokens and facilitate their trade. Such tokens are files that function as units representing a record.[31] One notable use case of this technology that has gained attention in recent years is the NFT trading platform. In this application, the token represents a connection to a specific piece of (digital) art.[32] In such cases the value of the token comes from a source outside the platform, making it exogenous. In contrast, a simple cryptocurrency like Bitcoin is endogenous, as its value derives from the database entry or the data string itself. Low and Megumi note that tokens are essentially entries within a database that associate particular assets with a particular public address and require a corresponding private key to transact, using asymmetric cryptography.[33]

4. Legal challenges

Exogenous tokens function as a connector, linking the on-chain state of information to off-chain reality. Parties might transfer rights in assets by way of tokens.[34] In such scenarios, the tokens are on-chain representations of the rights referenced by the tokens.[35] A tokenisation platform aims to enable parties to trade the tokens, thereby transacting the rights as referenced by the tokens. For a platform to function effectively in this regard, several legal issues must be addressed. These challenges include, for example, the transfer of the token and the effectiveness of that transfer concerning the referenced assets.[36]

III. Token container model

Several legal systems on the European continent have enacted legislative initiatives that provide a legal framework to address such challenges. This section will describe these frameworks and describe how they conceptualise the token as a container of rights or assets. By outlining this 'token container model', this section will illustrate how these legal initiatives align with the technical possibilities provided by this novel technology.

[30] G Amulya and J Johny, "Potential of Blockchain Technology in Supply Chain Management: A Literature Review" (2019) 49 International Journal of Physical Distribution & Logistics Management 881; TM Fernandez-Carames and P Fraga-Lamas, "A Review on the Use of Blockchain for the Internet of Things" (2018) 6 IEEE Access 32979; C Baker and K Werbach, "Blockchain and Financial Services" in Jelena Madir (ed), *Fintech Law and Regulation* (Cheltenham, Edward Elgar Publishing 2019) pp 216–43.

[31] O Konashevych, "General Concept of Real Estate Tokenization on Blockchain: The Right to Choose" (2020) 9 European Property Law Journal 21, 31–8.

[32] See on this A Guadamuz, "The Treachery of Images: Non-Fungible Tokens and Copyright" (2021) 16 Journal of Intellectual Property Law & Practice 1367.

[33] KFK Low and H Megumi, "Cryptoassets and Property' in JHM van Erp and K Zimmermann (eds), *Edward Elgar Research Handbook on EU Property Law* (Cheltenham, Edward Elgar Publishing 2024) pp 146–56.

[34] See for example for proprietary interests Garcia-Teruel and Simón-Moreno, *supra*, note 5, p 8; on intellectual property, see Guadamuz, *supra*, note 32, pp 7–8; on claims, see Hacker and Thomale, *supra*, note 16, p 674.

[35] JG Allen, M Rauchs, A Blandin and K Bear, "Legal and Regulatory Considerations for Digital Assets" (2020) Cambridge Centre for Alternative Finance, 19 available at <https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/legal-and-regulatory-considerations-for-digital-assets/> (last accessed on 4 April 2025); M Aquilina, J Frost and A Schrimpf, "Decentralized Finance (DeFi): A Functional Approach" (2024) 10 (1) Journal of Financial Regulation 1, 3.

[36] In this context, distinguishing between the transfer of tokens and the transfer of cryptocurrencies is important. The latter is out of the scope of this contribution. A comprehensive overview of legal obstacles to transfers of cryptocurrencies is given in M Haentjes, T de Graaf and I Kokorin, 'The Failed Hopes of Disintermediation: Crypto-Custodian Insolvency, Legal Risks and How To Avoid Them' (2020) 2 Singapore Journal of Legal Studies 526, 558–61.

However, as will be outlined in sections IV and V, while this model could serve as inspiration for other legal systems, its potential for outright implementation is limited.

1. The Belarusian presidential decree on the development of the digital economy

Presidential Decree No. 8 On the Development of the Digital Economy by the Republic of Belarus ('the Decree') reflects the treatment of tokens as containers for private law.[37] Regarding tokens, the Decree aims to create an environment that facilitates the introduction of blockchain-based technologies into the economy of the Republic of Belarus.[38] Annexed to the Decree is a list of definitions that defines a 'digital sign (token) as a record in a register of transaction blocks (blockchain), (or) other distributed information system, which certifies that the owner of a digital sign (token) has rights to objects of civil rights and (or) which constitutes cryptocurrency.' This definition explicitly states that the token can represent an object of property.[39] Savelyev highlights that this definition should be viewed in light of the objects recognised as objects of civil rights by the Civil Code of Belarus.[40] Article 128 of the Civil Code of Belarus specifies that objects of property include 'tangible things, including money and securities, other property, including property rights, work and services, undisclosed information, exclusive rights to the results of intellectual activity and means of individualisation of participants in civil circulation, goods, works or services; non-material (intangible) benefits.'[41]

2. Liechtenstein token act

The Principality of Liechtenstein published the Law on Tokens and Token Technology Service Providers on 2 December 2019 (hereinafter 'TVTG').[42] This Law states that its overall object and purpose is to "establish a legal framework for all transaction systems based on Trustworthy Technology and in particular governs the basis in terms of civil law with regard to Tokens and the representation of rights through Tokens and their transfer."[43] Tokens are subsequently defined as "a piece of information on a Trusted Technology system which can represent claims or rights of memberships against a person, right to property or other absolute or relative rights."[44] Lastly, the TVTG states that a

[37] О развитии цифровой экономики Декрет № 8 от 21 декабря 2017 г, <https://president.gov.by/ru/documents/dekret-8-ot-21-dekabrja-2017-g-17716> (last accessed on 4 April 2025) (hereinafter 'the Decree').

[38] See paragraph 2 of the Decree, see also; F Teichmann and MC Falker, 'The Token and Blockchain Economy: Risks, Opportunities, and Implication' in EG Popkova and BS Sergi (eds), *Scientific and Technical Revolution: Yesterday, Today and Tomorrow* (Cham, Springer 2020) pp 1523–4.

[39] Garcia-Teruel and Simón-Moreno, *supra*, note 5, p 3.

[40] Available online via de National Center for Legal Information of the Republic of Belarus, <https://etalonline.by/document/?regnum=hk9800218> (last accessed on 4 April 2025); A Savelyev, "Some Risks of Tokenization and Blockchainizaition of Private Law" (2018) 34 Computer Law & Security Review 863.

[41] Ibid; see also article 8 of the Civil Code of Belarus, which holds that "Виды объектов гражданских прав К объектам гражданских прав относятся: вещи, включая деньги и ценные бумаги, иное имущество, в том числе имущественные права; работы и услуги; нераскрытая информация; исключительные права на результаты интеллектуальной деятельности и средства индивидуализации участников гражданского оборота, товаров, работ или услуг; нематериальные блага."

[42] Gesets vom 3 Oktober 2019 über Token und VT-Dienstleister, Liechtensteinisches Landesgesetzblatt 2019 nr 301 (950.6). This contribution uses the English translation of the TVTG provided by the Lichtenstein principality available at <https://www.regierung.li/law#section14480> (last accessed on 4 April 2025).

[43] For more on this, see HSH Prince M Von Und Zu Liechtenstein, "The Tokenization of Assets and Property Rights" (2019) 25 Trusts & Trustees 630.

[44] See article 2(1)c TVTG. Relevant in this context is the definition of "Trustworthy Technology" (or "TT") ex article 2(1)a ("Technologies through which the integrity of Tokens, the clear assignment of Tokens to TT Identifiers and the disposal over Tokens is ensured.") and the definition of "TT identifier" ex article 2(1)d ("an identifier that allows the clear assignment of tokens").

token, when Liechtenstein law is applicable, is considered an asset located in Liechtenstein.[45] The overarching purpose of the Act is "to resolve key legal questions regarding the token economy."[46]

The second section of the TVTG addresses an important private law question: how can rights referenced by a token be transferred to another person? Liechtenstein has responded to this question by introducing what is explicitly referred to as the "Token Container Model." According to this model, the token functions as a shell that, rather than creating new rights, can act as a container that represents rights.[47] When the token that represents a specific right is transferred, that underlying right is transferred in tandem with the token.[48] The proprietary aspects are governed autonomously through the Act.[49] This means that the TVTG serves as a *lex specialis* for tokens in the area of private law, particularly regarding property law and relevant aspects of contract law.

3. Risks of the token container model

Private law seeks to regulate relationships among private parties and has evolved over the centuries in response to various social, political, and economic changes. The purpose and evolution of private law systems, as well as the mutual differences amongst the national European private law systems, present challenges for regimes based on the token container model. Primarily because the laws of property and contract are deeply embedded in their respective national private law systems. The relationship and interactions between a *lex specialis* regime based on the token container model and other relevant areas of private law – such as inheritance law, insolvency law, and consumer protection law – remain unclear. The tokenisation of rights, for example, makes it possible to introduce a right or a legal concept in an area of private that it is not prepared to deal with it. The token container model therefore creates real risks of 'legal irritants'. Unlike legal irritants created in the context of the integration of national laws, which Teubner warned against in 1998,[50] these legal irritants are purely internal and are caused by tokenisation technology enabled by the token container model.

Furthermore, the subject matter that the token container model aims to regulate is defined by its inherently transboundary nature, as tokens can move freely, disregarding natural and legal boundaries. This creates a serious risk of conflict of laws problems.[51]

[45] Art 4 TVTG.

[46] Teichmann and Falker, *supra*, note 38, p 1523.

[47] See Ministerium für Präsidiales und Finanzen, "Vernehmlassungsbericht Der Regierung Betreffend Die Schaffung Eines Gesetzes Über Auf Vertrauenswürdigen Technologien (Vt) Beruhende Transaktionssysteme (Blockchain-Gesetz; Vt-Gesetz; Vtg) Und Die Abänderung Weiterer Gesetze", 44 (hereinafter 'Consultation Report to the TVTG') <https://archiv.llv.li/files/srk/vnb-blockchain-gesetz.pdf> (last accessed on 4 April 2025) and A Layr, "Tokenization of Assets" (2021) 2 Milan Law Review 45, 64–5; See for critical analysis of some aspects of such a model in light of Dutch law EDC Neppelenbroek, "Een Token van de Tijd" (2021) 4 Tijdschrift voor Internetrecht 158.

[48] B Lins and S Praicheux, "Digital and Blockchain-Based Legal Regimes: an EEA Case Study Based on Innovative Legislations – Comparison of French and Liechtenstein Domestic Regulations" (2021) 22 (2) Financial Law Review 1, 5.

[49] Consultation Report to the TVTG, p 47, see also; T Nägele and P Bont, "Tokenized Structures and Assets in Liechtenstein Law" (2019) 25 Trusts & Trustees 633, 636–7.

[50] G Teubner, "Legal Irritants: Good Faith in British Law or How Unifying Law Ends Up in New Divergences" (1998) 61 The Modern Law Review 11.

[51] See for a discussion on this in the context of the TVTG; JHM van Erp, "Land Registration and 'Disruptive' (or 'Trustworthy'?) Technologies: Tokenisation of Immovables Property" in A Fraga and E Ioriatti (eds), *IMOLA II Project: The European Land Register Document (ELRD): A common Semantic Model for Land Registers Interconnection* (Brussels, European Land Registry Association 2019) pp 173–6; for broader see A Bonomi, M Lehmann and S Lalani (eds), *Blockchain and Private International Law* (Leiden, Brill 2023).

In conclusion, the token container model establishes a new legal regime specifically designed for tokens. However, how this system will integrate with broader private (international) law frameworks remains to be determined.

IV. Transfers of absolute rights

The initiatives discussed above illustrate how some European jurisdictions have devoted explicit attention to the private law implications of tokenisation. It should be noted that jurisdictions other than the Republic of Belarus and the Principality of Liechtenstein have enacted legislation on tokens and tokenisation.[52] However, many of these legislative initiatives have concentrated on areas other than private law. The Maltese approach, for example, is comprehensive and puts a strong emphasis on the service aspects of the financial industry, the prevention of market abuse, licensing and audit requirements, and the powers of regulators.[53] This reflects the more regulatory approach adopted by many jurisdictions, which indicates a different focus and devotes less attention to the private law aspects of tokenisation.

Generally, the regimes in Belarus and Liechtenstein are exceptions as most European jurisdictions lack specific frameworks addressing the proprietary aspects of tokenisation. Furthermore, for the initiatives in Liechtenstein and Belarus, it remains to be seen how those special regimes on tokenisation will develop and take root in the overarching proprietary and contractual legal frameworks and whether any legal irritants might surface.

This raises a more fundamental question: could the token container model be utilised in these legal systems as a conceptual framework to facilitate such transfers? It should be reiterated here that this paper examines tokens through the lens of Principle 3(1) of the Unidroit Principles of Digital Assets and Private law and therefore views tokens as transferable objects falling within the sphere of property law.[54] Therefore, rather than attempting to classify tokens or attempting to determine the requirements imposed on the transfer of the token itself, this paper analyses whether national rules on transfers are compatible with the use of tokens as an instrument to transfer rights.

Fox conducts a relevant thought experiment and explores how traditional private law aligns with these transfers of tokenised assets. He emphasises that, in attempting to fit these novel constructs in existing private law frameworks, the expectations of the people who deal in tokenised assets need to match the legal reality that underpins their transactions: the token representing the right and the asset to which the right relates must march in step with each other.[55] Building on Fox's thought experiment, the remainder of this article examines the different European transfer systems using the analytical framework proposed by Van Vliet.[56] In doing so, subsection IV.1 elaborates on the transfers of absolute rights in movables. Subsection IV.2 examines transfer systems as they relate to immovable objects. Subsections IV.3 and IV.4 subsequently analyse whether such rules are compatible with token-based transfers of the underlying object. Subsection IV.4, unlike Konashevych's work, which concentrated on the registration of property rights in

[52] See for overview Teichmann and Falker, *supra*, note 38, pp 1522–4.

[53] Virtual Financial Assets Bill of 1 November 2018 available at <https://www.mfsa.mt/wp-content/uploads/2018/12/fintech-main-legislation.pdf> (last accessed on 4 April 2025).

[54] See section I.

[55] D Fox, "Tokenised Assets in Private Law", pp 1–2 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3807858> (last accessed on 4 April 2025).

[56] Van Vliet, *supra*, note 11.

immovables, will concentrate on the substantive rules governing transfers of rights in immovables.[57]

1. Movables

The analytical framework proposed by van Vliet effectively uses a two-axis framework to categorise the different transfer systems for movable objects.[58] The first axis differentiates between systems that require only a legal agreement to effectuate the transfer and systems that require both a legal agreement as well as delivery in order to effectuate the transfer.[59] The former are referred to as consensual systems whilst the latter are referred to as tradition (or delivery) systems. Under a consensual system, simply reaching an agreement among the parties (*solo consensu*) is sufficient to transfer the object. A consensual system therefore does not require the delivery of the movable object to the transferee in order to effectuate the transfer of the right over the object.

A tradition system, contrary to a consensual system, requires both a legal agreement as well as the delivery of the object in order to effectuate a transfer thereof. Hence, the transfer is only completed after the transferee has obtained possession of the object in question. Hence, a transfer of a movable object in a tradition system requires both a legal agreement (or 'title') as well as a delivery of that object to effectuate the transfer.[60] Tradition systems can be further classified along the axis: separating system with a causal nature from systems with an abstract nature.

Causal transfer systems connect the validity of the transfer to the validity of the underlying legal agreement. Therefore, if the underlying legal agreement is avoided, the right over the movable object reverts back to the transferor with retroactive effect.

This is quite apparent in consensual transfer systems: since only a legal agreement is required in order to transfer a movable object, the right in that object reverts to the transferor retroactively upon avoidance of that legal agreement.[61] Abstract systems, on the other hand, disconnect the validity of the underlying legal agreement from the validity of the transfer. Therefore, if the underlying legal agreement is avoided, the right over the movable object does not retroactively revert to the transferor. Instead, the transferor obtains a personal right to have the object retransferred to him.[62]

Three different transfer systems can be identified within the main European civil law traditions: consensual systems, causal tradition systems, and abstract tradition systems.[63] The French transfer system, first of all, is an example of a consensual

[57] Konashevych, *supra*, note 31; O Konashevych, "Constraints and Benefits of the Blockchain Use for Real Estate and Property Rights" (2020) 12 Journal of Property, Planning, and Environmental Law 109; see also M Kaczorowska, "Blockchain-Based Land Registration: Possibilities and Challenges" (2019) 13 Masaryk University Journal of Law and Technology 339; N Nogueroles Peiró and EJ Martinez García, "Blockchain and Land Registration Systems" (2017) 6 European Property Law Journal 296; G von Wangenheim, "Blockchain-Based Land Registers: A Law-and-Economics Perspective" in A Lehavi and R Levine-Schnur (eds), *Disruptive Technology, Legal Innovation, and the Future of Real Estate* (Cham, Springer 2020).

[58] Van Vliet, *supra*, note 11.

[59] V Sagaert, "Consensual versus Delivery Systems in European Private Law – Consensus about Tradition" in W Faber and B Lurger (eds), *Rules for the Transfer of Movables: A Candidate for European Harmonisation or National Reforms?* (Munich, Sellier European Law Publishers 2008) p 10.

[60] LPW van Vliet, "Iusta Causa Traditionis and Its History in European Private Law" (2003) 11 European Review of Private Law 342, 343–6.

[61] Van Vliet, *supra*, note 11, p 24.

[62] S Bartels, "An Abstract or a Causal System" in W Faber and B Lurger (eds), *Rules for the Transfer of Movables: A Candidate for European Harmonisation or National Reforms?* (Munich, Sellier European Law Publishers 2008) p 62.

[63] Van Vliet, *supra*, note 11.

system.[64] Only a legal agreement is required to transfer a movable object. Additionally, this consensual character introduces a causal nature; in other words, the validity of the legal agreement that transfers ownership is necessary to transfer the right over the object.[65] As a result, if the contract is void, the transfer of the property reverts to the transferor with retroactive effect.[66] Second, the Dutch system serves as an example of a causal tradition system. This system requires both a legal agreement as well as a delivery of the movable object to effectuate the transfer. Its causal nature dictates that, as far as the effectiveness of the transfer is concerned, the two are connected. Therefore, if the legal agreement is void, the transfer itself is avoided as well. The object therefore reverts to the transferor with retroactive effect upon avoidance of the legal agreement.[67] Third, the German system on transfers of movables is an example of an abstract tradition system. According to the German rules on transfers, the validity of the transfer of a movable object is determined independently of the legal agreement that underlies it.[68] This means that, unlike in a system that is causal in nature, a transfer according to the German rules on transfer remains valid even if the underlying legal agreement is avoided.

Hence, a key practical difference between causal and abstract systems lies in the claim that the transferor has *vis-à-vis* the transferee following the avoidance of the title. In a causal tradition system, ownership reverts to the transferor automatically after the legal agreement is avoided. Hence, the transferee loses the right of ownership over the movable object whilst still being in possession. This provides the transferor with the right to revindicate: a strong claim based on his right of ownership. An action of revindication entails a claim to have the possession of the object restored to the person making the claim on the basis of him being the owner. In an abstract system ownership does not automatically revert to the transferor. This means that the option to revindicate is not available to him. Instead, the transferor now has a personal right *vis-à-vis* the transferee to have possession of the movable restored to him. This is a personal action that the transferor can only effectuate against the transferee. Consequently, if the transferee has transferred the object to a third party in good faith, the transferor's only recourse is to seek damages.[69]

2. *Immovables*

The rules on transfers of immovables generally reflect the rules on transfer of movables.[70] However, the intrinsic characteristics of immovable objects shape how the relevant legal requirements are applied.

In a consensual system, such as the French system, transfers can, strictly speaking, be effectuated by legal agreement alone.[71] However, the personal nature of such legal acts

[64] L Leveneur and S Mazeaud-Leveneur, *Droit Des Biens: Le Droit de Propriété et Ses Démembrements* (Paris, LexisNexis 2021) 158; G Helleringer, "The Proprietary Effects of Contracts" in J Cartwright and S Whittaker (eds), *The Code Napoléon Rewritten: French Contract Law after the 2016 Reforms* (Oxford, Hart 2017) p 211.

[65] See J del Corral, *De Leveringsplicht Bij de Overdracht van Roerende Lichamelijke Goederen* (Antwerp, Intersentia 2013) on the relationship between the requirement of consensus and delivery in consensual systems.

[66] JHM van Erp and B Akkermans (eds), *Cases, Materials and Text on National, Supranational and International Property Law* (Oxford, Hart Publishing 2012) 823; Van Vliet, *supra*, note 11, pp 73–89.

[67] G Pienaar, "The Real Agreement as Causa for the Transfer of Immovable Property" (2015) 78 Journal of Contemporary Roman-Dutch Law 47, 53; Van Vliet, *supra*, note 11, pp 133–55.

[68] Van Vliet, *supra*, note 11, pp 31–70.

[69] LPW van Vliet, "Transfer of Property Inter Vivos" in S Praduroux and M Graziadei (eds), *Comparative Property Law Perspectives* (Cheltenham, Edward Elgar Publishing 2017) pp 152–3.

[70] The English legal system, lacking a uniform transfer system, is an example of such an exception, see Van Erp and Akkermans, *supra*, note 66, p 783.

[71] JS Borghetti, "The Effects of Contracts and Third Parties" in J Cartwright and S Whittaker (eds), *The Code Napoléon Rewritten: French Contract Law after the 2016 Reforms* (Oxford, Hart Publishing 2017) pp 231–4; A Plegat, 'France' in A von Ziegler and others (eds), *Transfer of Ownership in International Trade* (Deventer, Kluwer 2011) p 183.

dictates that the effect of such transfers is limited to the parties alone.[72] Registration with the land registry is necessary to generate third-party effects. A failure to do so therefore results in a transfer that is ineffective *vis-à-vis* third parties and therefore does not enjoy *erga omnes* effects.[73] To register the sale with the land registry, a notarial act is required. The subsequent registration in the land registry has declaratory, rather than constitutive, effect.[74]

Tradition systems require both a valid title and the delivery of the immovable object to transfer the right in that object from the transferor to the transferee. In voluntary transfers, the title is typically the sales agreement. Additionally, the delivery of the immovable object is done by way of a subsequent legal act. The German rules on transfer require, for example, a *dingliche Einigung* (or a "real agreement") to satisfy the requirement for a valid title.[75] This real agreement is personal in nature and is therefore, generally speaking, not subject to specific form requirements.[76] However, when the transfer in question concerns the transfer of ownership in an immovable object, a special variation of the real agreement is required: the *Auflassung* (or 'conveyance agreement').[77] This requirement is subject to formal requirements, including the stipulation that it must be drawn up by a notary. Such notarial recordation, the *notarielle Beurkundung*, is necessary before the registration of the transfer by the notary in the land registry. This registration of the *Auflassung* serves as the delivery of the immovable, thereby satisfying the second requirement of the German tradition system.[78]

3. *Using tokens to transfer rights in movables*

The transfer of a property right requires a valid title. In a consensual system, where a legal agreement can serve as a title and by itself is sufficient to transfer rights over a movable object, a tokenisation platform could effectively facilitate such transfers. In such cases, the *solo consensu* principle dictates that the transfer takes place the moment agreement is reached. Whether such a tokenisation platform could effectively transfer the right in question is dependent on whether the underlying legal agreement can be incorporated on that platform and within that token in a manner that is recognised by the legal system.

This is different in tradition systems as these systems require a delivery of the movable object in addition to the legal agreement. These systems therefore consist of both a contractual and a proprietary element. The delivery is the proprietary element that, in addition to the title, effectuates the transfer. However, the token merely references an asset. While a legal system might consider a token to be a digital asset in and of itself: such legal qualifications do not change the fundamental nature of the token. A token is, at its very foundation, a reference to an asset. At this point it should be reiterated that such qualification questions are outside the scope of this current research. This paper takes

[72] C Larroumet and B Mallet-Bricout, *Les Biens, Droits Réels Principaux* (6th edn, Paris, Economica 2019) p 228 et seq.

[73] Van Erp and Akkermans, *supra*, note 66, p 901.

[74] LM Velencoso, S Bailey and A Pradi (eds), *Transfer of Immovables in European Private Law* (Cambridge, Cambridge University Press 2017) p 135.

[75] MüKoHGB/Herber/Sager, 5. 2023, HGB § 524 mn. 16–19.

[76] K Thorn, "Germany" in A von Ziegler and Others (eds), *Transfer of Ownership in International Trade* (Deventer, Kluwer 2011) p 206.

[77] U Drobnig, "Transfer of Property" in AS Hartkamp, M Hesselink and E Hondius (eds), *Towards a European Civil Code* (Deventer, Kluwer 2011) pp 1012–13; HA Weirich and M Ivo, *Grundstücksrecht Systematik Und Praxis Des Materiellen Und Formellen Grundstücksrechts* (Munich, Beck 2015) 54.

[78] Van Erp and Akkermans, *supra*, note 66, pp 846–7; note that the BGB prescribes notarial recordation as a requirement for the validity of the contract that provides for the transfer of the interest in the land; MüKoBGB/Ruhwinkel, 9. Aufl. 2023, BGB § 925 mn 15–21, for more see K Zimmermann, *Facilitating Cross-Border Real Estate Transactions in Europe: An Exploration* (The Hague, Eleven International Publishing 2021) p 116 et seq.

principle 3(1) of the Unidroit Principles on Digital Assets and Private Law as its starting point and defines tokens as transferable objects that fall within the scope of the law on property. By doing so, this paper can confront another fundamental question: whether the general rules on transfers are compatible with the use of tokens to transfer rights in movable or immovable objects, and claims. Therefore, while the token might be a digital asset, and perhaps even an object of property laws, as far as the tokenisation of assets is concerned; the token is simply a digital representation of the asset and cannot be equated to the asset itself. Therefore, if a token references a tangible movable object, that token is a digital representation of that movable object. Control over the token can therefore not be equated to possession of the movable object. It follows from this the that transfer of the token from one party to another cannot constitute delivery of the underlying movable object. Hence, the token cannot be equated to the object itself, control over the token cannot be equated to possession of the referenced object, which means that the transfer of the token from one party to another does not generate any change in the physical control over the object that is associated with the token. This means that a transfer of a token from one wallet to another cannot constitute delivery of the object. In other words, the token merely represents a right in an asset; its transfer is, in principle, unable to provide any actual control over the object and therefore has no constitutive effect. As far as tradition systems are concerned, this means that even if the legal system recognises the token or its contents as a valid title, or the transfer of a token as proof of a valid title, the transfer of the token alone cannot constitute the delivery of the referenced object itself. Therefore, in tradition systems, transferring a token that references a right over a movable object cannot result in a valid legal transfer: the proprietary element that tradition systems require in addition to the contractual element cannot be satisfied through a token transfer.

However, tradition systems recognise alternative methods of delivery to effectuate a transfer without transferring possession of the object.[79] These include, for example, the *tradio constitutum possessorium* and the *traditio brevi manu* for Dutch law. Kopalit, Verheul and Verstijlen demonstrate that both these instruments, the *tradio constitutum possessorium* more so than the *tradio brevi manu*, have inherent characteristics that are incompatible with the tokenisation of rights in movable objects.[80] The instrument of *Besitzkonstitut* fulfils a similar role in German law.[81]

While the most common way to deliver a movable object to the transferee is to provide them with physical possession of it, physical custody of the object is not a requirement of possession. Methods to provide possession of an object to the transferee without providing him with the physical custody offer methods to transfer movable objects using tokens. One could provide the transferee possession of the object without giving him actual physical custody over the object by enabling him to exercise actual and exclusive control over the object and ensure that any control by the transferor over the object ceases.[82] If a token can be designed so that its holder has actual and exclusive control over the movable object to which it is connected, then the transfer of that token might satisfy the delivery

[79] See Van Erp and Akkermans, *supra*, note 66, pp 817–22.

[80] D Kopalit, E Verheul and F Versteijlen, "Tokenisation in het Nederlandse Goederenrecht" (2024) 36 Nederlands Juristenblad 2377, 2971–2.

[81] Van Vliet, *supra*, note 11, pp 53–5; limited research is done on the use of the *Besitzkonstitut* in the context of tokenisation in German law, for Swiss law see M Lehmann and H Meyle, "The Law Applicable to Stablecoins' Assets" in A Bonomi, M Lehmann and S Lalani (eds), *Blockchain and Private International Law* (Leiden, Brill 2023) p 380; A Lombard, "Smart Property and the Blockchain: Tokenisation and Transfer of Tokenised Assets under Swiss Law' in AD Molin-Kränzlin, AM Schneuwly and J Stojanovic (eds), *Digitalisierung – Gesellschaft – Recht: Analysen und Perspektiven von Assistierenden des Rechtswissenschaftlichen Instituts der Universität Zürich* (Zürich, Dike Verlag 2019) pp 252–3.

[82] Asser/Bartels & Van Mierlo 3-IV 2021/145; see also *Ward v Turner* [1921] 2 KB 807 in which Lord Hardwicke illustrates the *traditio symbolica* by way of a transfer of a key that gives access to the goods.

requirement in a tradition system. One could consider, for instance, a token that functions much like a key to the movable object itself or the location where the movable object is stored. This can only occur if three conditions are met. First, the legal system in question recognises the token, its contents, or the smart contract that transfers it as a valid title. Second, the transferor must relinquish actual and exclusive control over the referenced asset upon transferring the token. Third, the transferee obtains exclusive and actual control over the object upon receiving the token. Only then can a tradition system recognise this as a legal transfer of the rights associated with the asset referenced by the token.

a. Retroactivity and the risk of discrepancy in causal systems

The retroactive effect of avoiding the legal agreement in causal systems introduces an additional obstacle. This affects both tradition systems of the causal variation and consensual systems. In these systems, a transfer is considered retroactively null and void if the underlying title is avoided. Practically, this means the transfer is treated as though it never occurred and the right in question never passed. This differs from abstract systems, where the transfer is not deemed retroactively null and void. Instead, the transferor obtains a personal right *vis-à-vis* the transferee to have possession of the object restored to him.

A tokenisation platform does not allow for such retroactivity. If a legal agreement is avoided in a causal system, the law recognises the transferor as the person entitled to the asset. However, the tokenisation platform is unable to access information regarding the avoidance of the title. This creates a discrepancy between the rights recognised by the law and those recognised on the platform. The platform, unable to access information on the invalidity of the legal agreement, will list the transferee as entitled to the asset. After all, the transferee holds the token that represents the asset. However, the law designates the transferor as entitled to the asset. Thus, a discrepancy exists. This discrepancy cannot arise in abstract systems as the transfer is not retroactively avoided. Consequently, unlike abstract systems, causal systems face an additional obstacle: their retroactive nature creates situations in which the law automatically treats a transfer as if it never took place, whilst the tokenisation platform is unable to take account of that information.

4. Using tokens to transfer rights in immovables

Fundamental obstacles exist with regard to token-based transfers of property rights in immovables. Legal systems impose strict requirements on the method and form of the sale and the delivery of immovable objects. As discussed in section IV.2, legal systems impose three requirements for transferring rights in immovable objects with third-party effect. First, the legal agreement must adhere to specific form requirements. Second, the transfer must be authenticated by a competent authority. Third, it must be registered in a public registry.

All three additional requirements for transferring rights in immovable objects create further obstacles to transferring these rights using tokens. First, a token alone cannot satisfy the specific form requirements imposed on the legal agreement. Second, legal systems impose strict requirements on authentication by competent authorities. Again, a token or a transfer thereof is unable to satisfy those requirements and therefore unable to be authenticated by a competent authority. Third, given that these token transfers cannot be authenticated, they cannot be registered in a public registry. Moreover, even if they were authenticated, the specific requirements imposed by legal systems on registration make it impossible for such token transfers to be registered. Therefore, transferring

property rights in immovable objects using tokens is impossible under current legal regimes.[83]

V. Transfers of personal rights: assignment of claims

This final section addresses the use of tokens to transfer claims rather than property rights.[84] Where the previous section discussed the token-based transfers of rights in movables and immovables, this final section will analyse token-based transfers of personal rights by exploring the assignment of claims.

Claims are amalgamates of contractual and proprietary aspects. Fundamentally, a claim represents a right to performance *vis-à-vis* another specific person.[85] These rights are personal in nature, meaning that a claimant with a right to enforce a debt can only do so against his debtor. The value of the claim is equal to the amount of money owed to the claimant. A claimant might wish to transfer his claim to another person. He could, for example, use the claim for security purposes. This might require the transfer of the claim. In such cases, while the claim itself is personal in nature, the transfer of the claim treats the claim as a proprietary object. Therefore, the transfer of a claim takes a contractual relationship and treats it as an object of property law.[86]

Although significant differences exist between the rules on transfers of absolute rights and those governing the assignment of claims, the principles underpinning the rules on transfers of absolute rights are reflected in the rules on the assignment of claims. Generally speaking, an assignment of a claim from one party to another has *inter partes* effect as soon as an agreement is reached. The French *Code Civil*, for example, specifies that a contract for the assignment of a claim must be made in writing.[87] Before the 2016 reform of the French law of obligations, a subsequent action was required to ensure the assignment of the claim was effective *vis-à-vis* the *debitor cessus*. This could be done in one of two ways: the debtor might be given a notification or the assignment could be authenticated.[88] Following the reform, the distinction between the effects of the assignment between the parties and its effects *vis-à-vis* third parties has been maintained, albeit in a more nuanced manner. The effects of an assignment *vis-à-vis* third parties are now linked to the effects between the parties.[89] The claim is enforceable against the debtor from the moment of assignment. In case a dispute arises, the assignee has to establish that the debtor had consented to the assignment, had been notified of the assignment, or had taken note of the assignment.[90]

The causal elements in the French rules on the assignment of claims are also present in the Dutch system. This system recognises two variations of assignment: a public variation

[83] The obstacles that transfer systems create for the transfer of property rights with regard to immovables is but one perspective to the challenges of implementing this technology to immovable property. For a more comprehensive overview, see J Vos, "Blockchain and Land Administration: A Happy Marriage?" (2017) 6 European Property Law Journal; J Vos, "The Impact of 'Disruptive' IT and the Registrar's Role in Future e-Conveyancing" (2017) International Review IPRA/CINDER 68; LJ Arrieta Sevilla, "El uso de tokens en transmisiones inmobiliarias" (2023) 10 Revista de Derecho Civil 71.

[84] See for a different perspective JG Allen, "Negotiability in Digital Environments" (2019) 7 Butterworths Journal of International Banking and Financial Law 459.

[85] Van Erp and Akkermans, *supra*, note 66, 366.

[86] See Asser/Bartels & van Mierlo 3-IV 2021/325; H Kötz, "Assignment" in J Basedow et al (eds), *The Max Planck Encyclopedia of European Private Law* (Oxford, Oxford University Press 2012) p 75.

[87] See Art 1322 *Code Civil*.

[88] G Rabu, *Droit des Obligations* (2nd ed, Paris, Ellipses 2019) p 484.

[89] N Jansen, "Assignment of Claims" in R Zimmermann and N Jansen (eds), *Commentaries on European Contract Laws* (Oxford, Oxford University Press 2018) p 1634.

[90] See Art 1324 *Code Civil*.

and a silent variation. Both variations of assignment require a title and delivery. The title requirement typically requires a legal agreement, whilst the delivery is done through a deed. This deed could either be a notarial deed (*authentieke akte*) or a registered private deed (*onderhandse akte*).[91] Notification of the debtor is a constitutive requirement for public assignments.[92] Therefore, the public assignment is only complete following the notification of the debtor. It is also at this point that the debtor must pay the assignee rather than the assignor. If the parties opt for a silent assignment instead, the assignee becomes the debtor's creditor once the deed – whether authenticated by a notary or registered private deed – is recorded. However, the assignee cannot collect the debt as long as the debtor has not been notified of the assignment. This means that the debtor, who is unaware of the assignment of his debt, is allowed to pay off the debt to the assignor as long as the assignment remains silent.[93] The assignor ceases to be the debtor's creditor only after the debtor has been notified of the assignment. Therefore, before notification, the debtor can pay off his debt to the assignor; afterwards, he must pay the assignee.[94]

The *Burgerliches Gesetzbuch* treats the transfer of a claim as purely a contractual matter.[95] The central requirement imposed by the German system on the assignment of claims is therefore the existence of a legal agreement between the assignor and the assignee. The BGB imposes no formal requirements concerning the form of this agreement.[96] Moreover, the German system does not require any registration thereof or notification to the debtor of the assignment.[97] As a matter of law, the German system on the assignment of claims requires no subsequent legal act in addition to the legal agreement.[98] As long as the debtor has not been notified of the assignment, he can pay the assignor. While strictly speaking, the assignor is no longer the creditor, the German system treats the assignment without notification as an authorisation for the assignor to collect on the new creditor's behalf.[99]

1. Using tokens to transfer claims: tokenised claims

Causal systems, such as those in France and the Netherlands, present challenges to assigning claims using tokens. The French system, for example, requires the legal agreement to be in writing.[100] Any platform under French law that uses tokens to transfer claims must ensure this requirement is met in a manner recognised by the *Code Civil*.

[91] Art 3:94 *Burgerlijk Wetboek*.

[92] Asser/Bartels & van Mierlo 3-IV 2021/327; HR 14 October 1994, ECLI:NL:HR:1994:ZC1488 (*Spaarbank Rivierenland/Gispen qq*.).

[93] Asser/Bartels & van Mierlo 3-IV 2021/342; Asser/Sieburgh 6-I 2020/220.

[94] J Biemans, *Rechtsgevolgen van stille cessie* (Deventer, Kluwer 2011) 67; on French law, see J Ghestin, M Billiau and G Loiseau, *La Régime Des Créances et Des Dettes* (Paris, LGDJ 2005) pp 346–7.

[95] The provisions on *übertragung einer Forderung* fall under book two of the BGB on *Recht der Schuldverhältnisse*; H Baele and WG Ringe, "Transfer of Rights and Obligations" in G Dannemann and S Vogenauer (eds), *The Common European Sales Law in Context: Interactions with English and German Law* (Oxford, Oxford University Press 2013) p 527.

[96] MüKoBGB/Kieninger, 9. 2022, BGB § 398 mn. 3; note that with regard to certain specific types of claims, the law introduces exceptions to this principle. This is, for example, the case with regard to claims secured by mortgages (see §1154(1) BGB).

[97] EM kieninger, "Das Statut der Forderungsabtretung im Verhältnis zu Dritten" (1998) 62 Rabels Zeitschrift für ausländisches und internationales Privatrecht 678, 683; note that an assignment does not affect the debtor's ability to make payments to the assignor. Only after the debtor has been notified will the assignee become the creditor.

[98] C Uhlmann, in: Dannemann/Schulze, German Civil Code (BGB), §398 mn. 5.

[99] MüKoBGB/Kieninger, 9. 2022, BGB §398 mn. 20.

[100] Article 1321 *Code Civil*: "*La cession de créance est un contrat par lequel le créancier cédant transmet, à titre onéreux ou gratuit, tout ou partie de sa créance contre le débiteur cédé à un tiers appelé le cessionnaire* [.]"; article 1322 *Code civil*: '*La cession de créance doit être constatée par écrit, à peine de nullité*'.

To enable the use of tokens to actually transfer claims, this requirement can be met in satisfied one of two ways: either the legal agreement exists on-chain, or it remains off-chain in a way that allows the platform to accurately interface with it. This approach ensures that all necessary information for the assignment is readily available. To transfer a claim, details such as the validity of the agreement, the identities of the parties, and notification to the debtor might be required. If a platform does not meet this requirement, it cannot be used to assign claims directly; instead, it can only serve as an administration for claims that have been assigned.

It should be noted though that, with the 2016 reform, the French system appears to be more accommodating to token-based assignments of claims. As discussed in the previous section, since the reform, the assignment of a claim has been enforceable against the debtor from the moment of the assignment. This introduced the principle that, in the event of a dispute, the burden of proof for establishing that the debtor was notified or consented to the assignment rests with the assignee. This principle aligns better with token-based transfers. The transparent nature of the underlying technology, combined with the automatic execution and automatic enforcement of the software, enables a platform to be programmed so that the debtor can be notified the moment the assigning parties decide to assign his claim.

In Dutch law, public assignment and silent assignment offer similar opportunities. However, as was discussed above, the Dutch system imposes more formal requirements compared to French law. A distinctive requirement for silent assignments under Dutch law is the obligation to register a private deed with the tax authorities. Although this deed does not require a specific form, it must be made in writing and signed by the parties. Given these requirements, it is unlikely that a token could qualify as a private deed. Furthermore, the tax authorities require a physical deed. Therefore, a token, a smart contract or an agreement embedded in a token or expressed through a token transfer, cannot be registered as a private deed. Consequently, the formal requirements under Dutch law present additional obstacles to the transfer of tokenised claims.

The German system, which regulates the assignment of claims through the law of contract rather than the law of property, creates opportunities for tokenisation platforms that enable the transfers of claims. Since the assignment of claims is governed by contract law, the principle of freedom of contract is central. This places greater emphasis on the autonomy of the parties compared to the formal requirements of the abstract tradition system.

VI. Conclusion

The paper set out to examine whether European transfer systems are compatible with the use of tokens to transfer rights in objects. It has used the token container model as a conceptual framework by which token-based transfers of rights could be introduced into existing systems of law. Whilst the token container model aligns well with the opportunities offered by the technology, fundamental legal obstacles exist that prevent European transfer systems from accommodating token-based transfers.

This paper has identified three fundamental obstacles that bar the use of tokens for transferring rights in movable and immovable objects, as well as claims, within European transfer systems. First, the delivery requirement in certain transfer systems provides obstacles to the accommodation of token-based transfers. In order to transfer a right in a movable object to the transferee, the actual movable object must be delivered. This requirement cannot be satisfied by providing the transferee with a token rather than with the actual object of the transfer. Hence, the delivery requirement in tradition systems provides an obstacle to their compatibility with the use of tokens to transfer rights in

movables. However, legal instruments that recognise the conferral of actual and exclusive control over a movable object on the transferee—rather than providing physical possession—may serve to satisfy the delivery requirement in tradition systems. In order to do so, the token must be programmed to grant its holder actual and exclusive control over the object. This means that the person who transferred the token to another person loses actual control over the object, whilst the other person gains actual control. It should be noted though that, even if such a software solution could be conceived, only tradition systems of an abstract nature could potentially accommodate such token transfers. After all, tradition systems of a causal nature are affected by the second obstacle: the compatibility of transfer systems with the use of tokens to transfer rights is limited by the manner in which they address the potential avoidance of the underlying legal agreement. A token-based transfer in a consensual system, provided the token-transfer is reflective of the consensus between the parties, might be effective in transferring the underlying movable object. However, causal systems, including both consensual and causal tradition systems, prevent the token from providing an accurate reflection of the right in the object. This is caused by the possibility of retroactive avoidance: if the legal agreement that effectuated the transfer is avoided, the right in question automatically reverts to the transferor. It seems impossible to reflect such a legal construct on a tokenisation platform. Third, the formal requirements imposed by certain transfer systems limit their compatibility with the use of tokens to transfer rights. This is particularly evident in the context of transfers of rights in immovables and, to a lesser extent, in the context of the rules on the assignment of claims. With regard to the latter, systems on assignment of claims that have a proprietary character, such as those in France and the Netherlands, introduce certain formal requirements that token-based transfers are unable to meet. These formal requirements bar the use of tokens to transfer claims, at least under the general rules on the assignment of claims. However, other systems—such as the German system—approach the assignment of claims from a contractual rather than a proprietary perspective. In those systems no such formal requirements exist. These systems are therefore more compatible with token-based assignments of claims.

The proprietary transfer systems within the scope of this research, in their current form, provide little, if any, room for the use of tokens to transfer rights. However, certain specific implementations of the technology may require tokens with a particular design and particular content. Such specific technology applications, and the context in which they are used, might make those particular tokens eligible for certain legal qualifications that introduce specific rules regarding their transfer. To illustrate, one could imagine a tokenised claim bearing particular resemblance to, for example, promissory notes or commercial papers. Depending on the design and implementation of the technology, as well as the context in which it is used, specific rules on transfer that apply to such instruments could provide a different level of compatibility for tokens. These might include the rules on transfers of transferable securities, but might also include the rules on the transfer of bearer instruments. Other examples of more specific qualifications that might make available more tailored rules on transfers exist as well. One could imagine movable objects in carriage being tokenised. Such tokens could bear a certain resemblance to bills of lading. This is another example of a situation in which a token might enjoy a specific qualification that provides specific rules on transfer. Future research is needed to map the types of scenarios in which tokens might enjoy a qualification that provides tailored rules on transfer and to analyse whether those rules on transfer are compatible with the use of tokens to transfer rights.

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