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ARTICLE

DAO Token Transferability: Property, Contract, and Technology

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Abstract

A Decentralised Autonomous Organisation (DAO) is a new form of digital enterprise that operates on blockchain networks. It enables a new model of collaboration through diverse capital contributions and equitable sharing of benefits and risks. This paper explores the legal dimensions of DAO token transferability, a vital aspect for the expansion of DAO operations. First, it evaluates how property law (including the proposal by the Law Commission of England and Wales for a third category of digital asset ownership) might apply to DAO tokens so as to mitigate legal risks and ensure smooth transferability. Secondly, it investigates the potential for DAO software protocols to implement contractual transferability restrictions and examines their technological design. Finally, it looks at the legal enforceability of such restrictions and the policies needed to support their legal recognition.

Keywords: blockchain; code as law; DAO; digital asset; smart contract; tokens

I. Introduction

A Decentralised Autonomous Organisation ("DAO") is a novel form of digital enterprise, operating within the blockchain network. It champions a new paradigm of collaboration with diverse capital contributions along with the shared distribution of benefits and risks. Various iterations of DAOs are currently in use, with many more anticipated to emerge. The underlying technological framework, blockchain – a type of distributed ledger technology ("DLT") – is under continuous development, alongside an expanding suite of blockchain-integrated technological solutions known as smart contracts which are aimed at executing transactions autonomously.

Law and regulation play several fundamental roles: directing policy initiatives, establishing standards for risk management, and fostering an environment conducive to experimentation and innovation. Among the significant risks associated with DAOs are those related to governance tokens – including their nature, functionality, and lifecycle, from issuance to extinction.

DAO tokens are governance tokens which grant voting powers or rights within the DAO community. By analogy with shares in companies, this paper will analyse the transferability of DAO tokens, a critical function for scaling up DAO operations. Transferability prompts the formation of secondary markets, thus providing liquidity for the DAO tokens market. This liquidity reduces the risk of holding DAO tokens, subsequently increasing investment appeal. Moreover, a secondary market offers a mechanism for DAO

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governance by market participants, similar to traditional capital markets. However, free transferability can undermine the decentralised and trustless essence of DAOs. To ensure the proper distributed governance of DAOs, transfer restrictions can be implemented in smart contracts.

The analogy between shares in company law and DAO tokens under English law will serve as a basis for this examination, with comparisons to French law. The discussion will extend to the legal frameworks that can support or restrict DAO token transferability. We will investigate the interplay between property law, contract law – specifically the enforceability of DAO token holders' agreements – and blockchain technology. We aim to explain how blockchain technology, particularly through smart contracts and their encoded provisions, provides solutions to address these emerging risks. However, we show that new risks are also created as the rule of law is challenged by the primacy of code ("Code is Law").

Our analysis will first consider to what extent property law (including the Law Commission of England and Wales' proposal for a third category of digital asset ownership) could apply to DAO tokens in order to reduce legal risks and safeguard token transferability. Secondly, we will evaluate the potential for DAO software protocols to impose transferability restrictions and look at the technological design of these constraints. Thirdly, we will assess the legal force of such limitations and the policy considerations that underpin the legal recognition of blockchain-embedded transfer restrictions.

II. Transferability of DAO tokens

1. DAO tokens as personal property

a. Capacity of being objects of property rights

A cryptoasset such as a crypto-token ("token") can be understood as a notional quantity unit[1] being an unique, unreplicable and separable "data string" or "data structure"[2] embodied in the correspondence between several copies of a shared register[3] generated by a transaction on the system.[4]

It has been treated as property in an unbroken line of court decisions[5] and by most commentators.[6] In *Tulip Trading v Van Der Laan,* Birss LJ held that a cryptoasset is personal property but more precisely a thing to which property rights can relate.[7] Tokens indeed present the inherent characteristics of property set out in *National Provincial Bank v Ainsworth* by being definable, identifiable by third parties, capable in their nature of assumption by third parties, and presenting some degree of permanence or stability.[8] Most importantly,[9] tokens can be divestible on transfer and rivalrous.[10] The capacity of the purchaser to necessarily preclude the use of a token by the seller or any other person[11]

[1] Law Commission, *Digital Assets as Personal Property: Supplemental Report and Draft Bill* (Law Com No 416, 2024) para 3.44.

[2] David Fox, "Cryptocurrencies in the Common Law of Property" in Sarah Green and David Fox (eds), *Cryptocurrencies in Public and Private Law* (Oxford University Press 2019) para 6.13.

[3] Patrick Barban et al., "Le Recours à la Technologie Blockchain en Droit des Sociétés" (2021) 178(4) Actes Pratiques et Ingénierie Sociétaire.

[4] Fox (n 4) para 6.13.

[5] Caroline Jackson and Alex Potts, "If the Law Supposes That Crypto Cannot Be Property, Then the Law Is an Ass" (2024) 3 JIBFL 183.

[6] Law Commission, *Digital Assets: Final Report* (Law Com No 412, 2023) paras 3.3–4.57; See also Timothy Chan, "The Nature of Property in Cryptoassets" (2023) 43 Legal Studies 480, 481.

[7] [2023] EWCA Civ 83, [2023] 4 WLR 16.

[8] [1965] AC 1175 [1247]-[1248].

[9] Law Commission, (Law Com No 416, 2024) para 2.22.

[10] Law Commission, *Digital Assets: Consultation Paper* (Law Com No 256, 2022) para 10.136.

[11] *Tulip Trading* (n 9) [24] (Birss LJ).

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resolves the issue of duplication of information[12] and acknowledges its proprietary potential.[13]

Since the 19th century *Colonial Bank v Whinney* case, it is considered that all personal property things are either in possession or in action and that things in action encompass any personal property that is not in possession. The law knows no other personal property ("*tertium quid*") between the two.[14]

A token seems to be excluded from those two categories. It does not present the properties of things in possession which are tangible, moveable, visible, and of which possession can be taken.[15] Crytoassets are virtual in their form[16] and thus cannot be possessed.[17] A token is neither a thing in action narrowly, because it owes its existence to technology, not to recognition by a legal system, like a share. It can be used and enjoyed on the blockchain independently of whether any rights in relation to them may be claimed or enforced by action or proceedings.[18] Nonetheless, legal rights, in the sense of Hohfeldian claim-rights,[19] can be "tokenised" or contractually created by terms and conditions attached to a token within a private permissioned blockchain.[20] Such rights would then be treated as things in action and that use of the token would be enforced by legal action.[21]

Under French law, a statutory definition of tokens has settled the uncertainty by establishing a new type of *sui generis* incorporeal moveable property.[22] It defines a token as "any intangible thing representing, in digital form, one or more rights that can be issued, registered, stored or transferred by means of a shared electronic recording device enabling the owner of the asset to be identified, directly or indirectly."[23]

In *AA v Persons Unknown*, the High Court of England and Wales acknowledged that cryptocurrencies are neither things in possession nor are they things in action.[24] However, despite not fitting in these two categories, the High Court held these cryptoassets are nonetheless a form of property because they met the criteria established in *National Provincial Bank v Ainsworth*.[25] Thefore, the question is then whether to interpret things in action widely to include cryptoassets such as tokens at the cost of subdividing this category[26] or to create a third category but that would contain things that are potentially different.[27]

[12] Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) <bitcoin.pdf> (last accessed 15 July 2024).

[13] Jackson and Potts (n 7) 183.

[14] [1885] 30 Ch D 261.

[15] *Armstrong DLW GmbH v Winnington Networks Ltd* [2012] EWHC 10 (Ch), [2013] Ch 156 [44]; *Your Response Ltd v Datateam Business Media Ltd* [2014] EWCA Civ 281, [2015] QB 41; Michael Bridge, Louise Gullifer, Kelvin Low and Gerard McMeel, *The Law of Personal Property* (3rd ed, Sweet & Maxwell Ltd 2021) para 1.016.

[16] Sarah Green, "Cryptocurrencies: The Underlying Technology" in Sarah Green and David Fox (eds), *Cryptocurrencies in Public and Private Law* (Oxford University Press 2019) para 1.20.

[17] *OBG Ltd v Allan* [2007] UKHL 21, [2008] 1 AC 1.

[18] Bridge, Gullifer, Low and McMeel (n 17) para 4.002.

[19] Wesley Newcomb Hohfeld, "Some Fundamental Legal Conceptions as Applied in Judicial Reasoning" (1913) 23(1) Yale LJ 16.

[20] Jackson and Potts (n 7) 185.

[21] Law Commission, (Law Com No 412, 2023) para 4.26.

[22] Nicolas Barbaroux, Richard Baron and Amélie Favreau, "Blockchain et Finance – Approche Pluridisciplinaire," *Répertoire IP/IT et Communication* (Dalloz edn, 2020) para 54.

[23] French Financial and Monetary Code, Art L. 54-10-1.

[24] [2019] EWHC 3556 (Comm), [2020] 4 WLR 35 [55] (Bryan J).

[25] Ibid [61] (Bryan J); Law Commission, (Law Com No 416, 2024) para 2.40.

[26] This is the position supported in particular by the law firm Travers Smith : < https://www.traverssmith.com/knowledge/knowledge-container/the-law-commissions-approach-to-digital-assets-as-property-the-devil-is-in-the-detail/> (last accessed 3 November 2024).

[27] *D'Aloia v Persons Unknown Category A & Ors* [2024] EWHC 2342 (Ch) [153].

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b. Third category of personal property

In the absence of a statutory enshrinement, the Law Commission concludes that "courts have deliberately proceeded in a manner that carves out a third common law-based category of thing to which personal property rights can relate."[28] Thus, reflecting academic and market support,[29] the Law Commission advocated for the statutory recognition of a third category of personal property rights, beside things in action or in possession.[30] Following this recommendation, the Property (Digital Assets etc) Bill[31] has been introduced into Parliament to unlock the development of common law by removing the uncertainty stemming from *Colonial Bank v Whinney*.[32]

However, based on the point that information cannot attract property rights,[33] it has been argued that a cryptoasset is nothing more than information on a system with special features (rivalrousness) by virtue of blockchain technology.[34] Property cannot include anything in relation to which there is no right. Thus, despite being of realisable commercial value,[35] cryptoassets cannot be recognised in law as property as not being the subject matter of any legal right. They are ultimately numbers represented in code within a system operating over the internet without any commercial use.[36]

Still, cryptoassets especially tokens can display the qualities that enable the power-relationships recognised by the law,[37] allowing them to be appropriate objects of personal property rights.[38] Then, the point is neither that the capacity of a cryptoasset to attract property rights depends on whether it already creates other rights[39] nor that all cryptoassets without any legal right identified in relation to them can be property.[40] The point is that courts should be able to recognise, on a case by case analysis, property rights in cryptoassets when they exhibit the indicia required of things qualified in law as property despite no legal right created whether in action or in possession.[41] In *D'Aloia v Persons Unknown Category A & Ors,*[42] Justice Farnhill ruled *obiter* that "the starting point is the test in *National and Provincial Bank v Ainsworth*; that will also, often, be the end point." As a consequence, a cryptoasset is "capable of attracting property rights for the purposes of English law" while being "neither a chose in action nor a chose in possession, but rather a distinct form of property not premised on an underlying legal right."[43]

Specifically, DAO software protocol-specified tokens ("DAO tokens") do display themselves the qualities associated with personal property, regardless of whether or

[28] Law Commission, (Law Com No 412, 2023) para 3.42.

[29] Law Commission, (Law Com No 416, 2024) para 2.3.

[30] Law Commission, *Digital Assets as Personal Property Short Consultation on Draft* (Law Com 2024) para 2.20.

[31] Property (Digital Assets etc) HL Bill (59/1) 31.

[32] Explanatory Notes to the Property (Digital Assets etc) HL Bill (59/1) 31.

[33] *Oxford v. Moss* [1978] 68 Cr App Rep 183; *Your Response v Datateam* [2014] EWCA Civ 281.

[34] Robert Stevens, "Response to the Law Commission's Digital Assets Bill" [2024] <https://ssrn.com/abstract=4746868> accessed 15 Mai 2024.

[35] Sir Roy Goode, "What Is Property?" (2023) 139 LQR 1.

[36] Robert Stevens, "Crypto is Not Property" LQR (2023) 139, 627.

[37] Jackson and Potts (n 7) 184.

[38] Law Commission, (Law Com No 256, 2022) para 10.15.

[39] *D'Aloia* (n 29) [153] where Farnhill J. establishes a general principle from these cases: *Ex parte Huggins; In re Huggins* (1882) 21 Ch D 85; *Attorney-General of Hong Kong v Nai-Keung* [1987] 1 WLR 1339 and *Gwinnutt v George* [2019] EWCA Civ 656.

[40] Joseph Lee and Marc Van de Looverbosch, "Property and Data: A Confused Relationship" in Joseph Lee and Aline Darbellay (eds), *Data Governance in AI, FinTech and Legaltech* (Edward Elgar 2022).

[41] Law Commission, (Law Com No 416) para 2.3 and 2.25.

[42] [2024] EWHC 2342 (Ch) [153].

[43] Ibid [5] and [173].

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not they attach to another right and can therefore fit in this third category of digital assets.[44] In addition, the transactional and social functions of DAO tokens distinguish them from mere data to an asset with intrinsic economic value that can treated as property.[45] Foremost, they present, like all tokens, the capacity to effect new transactions which will be recognised as valid by the rules of the system.[46] According to Farnhill J, this transactional functionality satisfies the "expectation that the transaction will be honoured sufficient form to attract property rights."[47] Moreover, DAO tokens confer, by means of an active operation of software by a network of participants,[48] a bundle of two rights that are combined into a single asset: (i) some kind of economic interest in the protocol's revenue and (ii) the right to participate in governance.[49] A DAO token is at the same time a transaction record (*instrumentum*) and a exercisable content (*negotium*)[50] which are interdependent by virtue of technology. Therefore, a DAO token can be an object of personal property rights, as an asset in its own right (*in rem*),[51] conferring a bundle of technical rights that could, when applicable, qualify as things in action (*in personam*).[52]

2. *The duality of DAO token transfers*

From its very inception, the purpose of blockchain has been to guarantee the transfer of currencies or assets.[53] Legally recognising DAO tokens as objects of property would pave the way for ease of transferability, increased liquidity and increased efficiency in the deployment of capital.[54] However, the legal requirements for an effective ownership title transfer remain unclear.

a. Factual transfer

From a technical point of view, creating tokens involves crediting a specific user with a certain initial amount of tokens. This user is identified by an address specific to the system, comparable to the identifier of a person on a computer, accessed via a private key. Smart contracts are then used to circulate this initial amount between different addresses.[55] The control of the address grants the transactional ability to effect a blockchain transaction with the specific token held at that public address that will be recognised as valid under the relevant consensus algorithm.[56]

The factual requirement to sell tokens is to access the platform using the blockchain device with the private key. According to the UK Jurisdiction Taskforce ("UKJT"), the transferor's transfer order will modify the public parameter and generate a new one to create a record of the transfer.[57] This new block of signature is then added to the chain by

[44] Law Commission, *Decentralised Autonomous Organisations (DAOs) A Scoping Paper* (Law Com 2024) para 2.73.
[45] Fox (n 4) para 6.44.
[46] David Fox, "Digital Assets as Transactional Power" (2022) 1 JIBFL 3.
[47] *D'Aloia* (n 29) [158].
[48] Law Commission, (Law Com No 416, 2024) para 3.44.
[49] Vitalik Buterin, "Moving Beyond Coin Voting Governance" (Vitalik.eth.limo, 16 August 2021) <https://vitalik.eth.limo/general/2021/08/16/voting3.html> (last accessed 26 May 2024).
[50] Novruz Aliyez, "Les Jetons Participatifs: Contribution au Droit de la Finance Décentralisée," (PhD, University of Rennes, 20 March 2024) para 6 and 9.
[51] Law Commission, *"Decentralised Autonomous Organisations (DAOs)"* (n 46) para 2.74.
[52] Law Commission, (Law Com No 416, 2024) para 2.26.
[53] Dominique Legeais, "L'Apport de la Blockchain en Droit Bancaire" (2017) 1 RDBF 17.
[54] Law Commission, (Law Com No 256, 2022) para 10.136.
[55] Barbaroux, Baron and Favreau (n 24) para 36.
[56] Fox, "Digital Assets as Transactional Power" (n 48).
[57] UK Jurisdiction Taskforce, *Legal Statement on Cryptoassets and Smart Contracts* (2019) para 45.

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the transferor authenticating the reception of the token by the transferee. The state of the blockchain is changed. The data representing the "old" token persists in the network, but it ceases to have any value or function because the token is treated by the consensus as spent or cancelled so that any further dealings in it would be rejected. The "new" token is represented by a new pair of data parameters and controlled by a new private key.

Academics and practitioners are divided between the "extinction/creation" analysis and the "persistent thing" analysis.[58] The first sees a token transfer as the replacement, modification, destruction, cancellation, or elimination of a pre-transfer token by a post-transfer token and the second as the persistence of a notional quantity unit object of property rights through the transaction.[59] Farnhill J has outlined his preference for the "persistent thing" analysis, notably for the sake of potentially tracing and following ownership of a token[60] while the Law Commission supports the "extinction/creation" analysis.[61]

b. Legal transfer

The Law Commission observes that the technical implementations of tokens replicate or mimic some of the effects of a proprietary relationship with an object: "the functionality of crypto-tokens allows a person to control access to the crypto-token and gives that person the ability to exclude others from it."[62] Nevertheless, those who have technical control over a token may not necessarily have legal title because the transfer framework exists technologically, but not yet legally.[63] The parties' dealings may change the factual state of the data entries on the ledger but without some legal recognition of a change of title,[64] it only constitutes a factual, as opposed to a legal, account of transaction.[65]

The Law Commission suggests that the state of the distributed ledger is necessary but insufficient to be regarded as a definitive record of legal title to a token.[66] On the one hand, the legal title should be founded in the state of the blockchain ie the definitive cryptographic records of the links between transactions.[67] The technical features of tokens allow the system to recognise that a particular token belongs to a particular person, thereby "conferring on that individual a technical ability to exclude everyone else from the crypto-token."[68] On the other hand, the state of the blockchain merely records the factual situation and is not therefore constitutive of a participant's legal title to any particular token. A right is "a legal construct, so whether it is 'transferred' need not take reference from the factual mechanism of the transaction"[69] but from the required conditions set by law.

[58] Law Commission, (Law Com No 412, 2023) para 6.25.

[59] Ibid, para 6.28–6.29.

[60] *D'Aloia* (n 29) [205].

[61] Law Commission, (Law Com No 412, 2023) para 6.23.

[62] Ibid, para 3.12.

[63] Mustapha Mekki, "Actifs Numériques" *Répertoire de Droit Commercial* (Dalloz edn, 2024) para 74.

[64] David Fox, "Tokenised Assets in Private Law" [2021] <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3807858> accessed 5 July 2024.

[65] Antoine Brûlé, "Les Crypto-actifs : des Biens Incorporels Pas Comme Les Autres . . ." (2024) 810 Lexbase Affaires.

[66] Law Commission, (Law Com No 256, 2022) para 13.7.

[67] Novruz Aliyez, "Les Jetons Participatifs: Contribution au Droit de la Finance Participative" (2024) 66 Revue Trimestrielle de Droit Financier 2.

[68] Ibid, para 10.136.

[69] Kelvin Low and Ernie Teo, "Bitcoins and Other Cryptocurrencies as Property?" (2017) 9(2) Law, Innovation and Technology 253.

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However, as the law now stands, there is no statute giving legal effect to the parties' dealings on the ledger.[70] Depending on the legal analysis, the transfer could be seen similar to delivery of possession where a thing passes unchanged in the possession of one person to another or to a novation implying the creation of a new thing.[71]

The Law Commission and UNIDROIT recommend the cumulative criteria of (i) "change of control" for offchain transfers and "change of state" coupled with a change of control for onchain transfers, and (ii) intention to transfer title to found a proprietary interest for a valid legal transfer to occur.[72] Ultimately, a legal transfer would be determined by the primary condition of change of control, functionally equivalent to possession, where the transferee has "sufficient positive and negative control" over the asset and can "identify himself as the person with such abilities."[73]

Unfortunately, these conditions provoke uncertainty for parties and grant little guidance to judges.[74] The Law Commission welcomely acknowledges that in certain circumstances such a control-based legal proprietary interest can be separated from (and be inferior to or short of) a superior legal title.[75] The COALA DAO Model Law also proposes conditions by which transfer of legal ownership can be determined in the context of a DAO. The token holder will be considered a member of the DAO "(a) from the time the ownership of the Tokens is established to be in the possession of an address, or (b) from the time when ownership is first acknowledged by the token holder through an on-chain interaction with the DAO, through staking the tokens, voting with the tokens off-chain whereby results are implemented on-chain, submitting a proposal or transferring the tokens to another address, in the event that no action has been taken by a token holder to acquire a token."[76]

III. Restrictions on DAO tokens transferability

1. The context of transfer restrictions

a. DAO as an organisation

"THE DAO", the first DAO to be created, was intended as an investment fund in venture capital with its funding and investments based on the Ethereum blockchain.[77] Many of the actual DAOs created on the Ethereum blockchain are similar to it.[78] These "Top layer" DAOs with a function similar to a traditional organisation[79] can be comparable to a "digital company,"[80] even though the comparison only relates to its function and is not relevant

[70] Fox, "Tokenised Assets in Private Law" (n 66).

[71] UK Jurisdiction Taskforce (n 59) para 45.

[72] Law Commission, (Law Com No 412, 2023) paras 5.104 and 6.41; *UNIDROIT, UNIDROIT Digital Assets and Private Law Principle* 2(2) (2023) 51.

[73] Ibid.

[74] Hin Liu, "Transferring Legal Title to a Digital Asset: Shared and Limited Control Arrangements (Part 2)" (2024) 4 JIBFL 251.

[75] Law Commission, (Law Com No 412, 2023) para 5.104.

[76] Coalition of Automated Legal Applications (COALA), *Model Law for Decentralized Autonomous Organizations* (DAOs) (2021) Art. 7(2).

[77] Christoph Jentzsch, "Decentralized Autonomous Organization to Automate Governance" White Paper, 2016, 1, <https://lawofthelevel.lexblogplatformthree.com/wp-content/uploads/sites/187/2017/07/WhitePaper-1.pdf> (last accessed 3 June 2024).

[78] Florence Guillaume and Sven Riva, "DAO, Code and Law – The Technological and Legal Regime of Decentralized Autonomous Organizations" (2021) 4 Revue de Droit International d'Assas 206.

[79] Sven Riva, "Decentralized Autonomous Organizations (DAOs) in the Swiss Legal Order" (2020) 21 Yearbook of Private International Law 601, 616.

[80] Jean Bacon et al., "Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers" (2018) 25(1) Richmond Journal of Law & Technology 202.

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for every DAO.[81] On one side, a DAO is made up of token holders presented by some as "shareholders."[82] The term "members of a DAO" refers in principle to token holders with governance rights relating to the protocol of the DAO.[83] The term "participants of a DAO" refers to persons holding tokens in a DAO without governance rights.[84] On the other side, service providers called "contractors," or other token holders depending on the DAO, can submit to a majority vote their projects or code updates, called proposals, so that they can be funded or implemented.[85] "Curators" are technical watchdogs elected by DAO members. They control the smart contract of the proposal ie the computerised transaction protocol supplied by the contractor,[86] verify if it corresponds to what he is proposing and add its payout address in the DAO whitelist.[87]

A DAO is therefore, first and foremost, a collection of smart contracts encoded in a chosen blockchain, similar to a nexus of contracts following the contractarian theory in company law.[88] These smarts contracts "contain the assets and encode the bylaws of the entire organisation."[89] Taken collectively, they constitute the "software protocol" governing the purpose, operation and governance of the DAO.[90] The software protocol of a DAO is public, transparent and invariable[91] which makes it a form of incorruptible organisation whose code can be verified by anybody.[92] The COALA DAO Model Law also defines a DAO as "smart contracts deployed on a public permissionless blockchain which implements specific decision-making or governance rules enabling a multiplicity of actors to coordinate themselves in a decentralised fashion."[93]

On the primary market (Initial Coin Offerings), the DAO will deliver tokens to investors in return for their investment in cryptocurrencies. The DAO will organise the decision-making rules relating to the project for which the funds have been raised and, more generally, implement the project presented in the white paper, the presentation document of the DAO.[94] Regarding "THE DAO" on the Ethereum blockchain, each token given to an

[81] Aliyez, "Les Jetons Participatifs: Contribution au Droit de la Finance Décentralisée" (n 52) para 95.

[82] Philipp Hacker, "Corporate Governance for Complex Cryptocurrencies? A Framework For Stability and Decision Making in Blockchain-Based Organisations" in Philipp Hacker, Ioannis Lianos, Georgios Dimitropoulos, and Stefan Eich (eds), *Regulating Blockchain: techno-social and legal challenges* (Oxford University Press 2019) 140.

[83] Philipp Kothe, "Governance Tokens – The New Medium Of Power?" (*Datarella*, 16 March 2021) <https://datarella.com/governance-tokens-the-new-medium-of-power/> (last accessed 12 March 2024).

[84] COALA (n 78) Art 3(18); Guillaume and Riva (n 80).

[85] Law Commission, "*Decentralised Autonomous Organisations (DAOs)*" (n 46) para 2.64; Annie Maudouit-Ridde, "L'Organisation Autonome Décentralisée (DAO)" (2018) 117(4) BJB 177, 178.

[86] Nick Szabo, "Smart Contracts in Essays on Smart Contracts" (1994) Commercial Controls and Security <https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html> accessed 28 June 2024; Nick Szabo, "Smart Contracts: Building Blocks for Digital Markets" 16 (1996) EXTROPY: The Journal of Transhumanist Thought 28.

[87] Legeais (n 55).

[88] Michael Jensen and William Meckling, "Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure" (1976) 3(4) Journal of Financial Economics 305, 310.

[89] Vitalik Buterin, "Ethereum White Paper – A Next Generation Smart Contract & Decentralized Application Platform" (*Ethereum.org*, 14 March 2014) <https://ethereum.org/content/whitepaper/whitepaper-pdf/Ethereum_Whitepaper_-_Buterin_2014.pdf> (last accessed 15 June 2024).

[90] Michael Del Castillo, "The DAO: Or How a Leaderless Ethereum Project Raised $50 Million" (*Coindesk.com*, 12 May 2016) <https://www.coindesk.com/markets/2016/05/12/the-dao-or-how-a-leaderless-ethereum-project-raised-50-million/#:~:text=The%20DAO's%20objective%20is%20to,for%20ETH%20or%20other%20returns.> (last accessed 29 May 2024).

[91] Maudouit-Ridde (n 87).

[92] Ben Hitchens, "Decentralised Autonomous Organisations (DAOs): What Are They? And Can They Be Parties To A Claim?" (CMS Law-Now, 31 January 2023) <https://cms-lawnow.com/en/ealerts/2023/01/decentralised-autonomous-organisations-daos-what-are-they-and-can-they-be-parties-to-a-claim#> (last accessed on 3 June 2024).

[93] COALA (n 78) Art 3(33).

[94] Maudouit-Ridde (n 87).

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investor in exchange for their investment in Ether conferred voting rights and financial rights, the number of tokens created being a function of the amount of Ether paid.[95]

b. The rationale of transfer restrictions

On the secondary market, DAO tokens are generally transferable and available on public liquid token markets where there is no prohibition on transfer.[96] It is possible for an internet user with no previous knowledge of, experience with, or involvement in a DAO to acquire DAO tokens, particularly when they are admitted to trading on crypto exchange platforms.[97]

Nevertheless, some authors acknowledge that "the future of property innovation is unlikely to build on wholly transferable private property."[98] There are indeed legitimate reasons to introduce a degree of *intuitu personae* in DAOs by limiting, or even preventing, the transferability of DAO tokens. The founder of Ethereum, Vitalik Buterin, warns that transferability can make governance power "flow away from the meek who are most likely to provide valuable input to governance and toward the power-hungry who are most likely to cause problems": less than 1% of token holders possess 90% of the voting power in the 10 major actual DAOs.[99]

The essence of DAOs being decentralisation, ie the distribution of power among all stakeholders, transferability can be counterproductive as "concentrated interests or incompetent bodies more likely to buy the governance rights up from everyone else would centralise power within the DAO."[100]

Three main governance failures justifying restrictions on transfer can be observed: the arrival of newcomers misaligned with current token holders' interests, concentration of power and vote bribing.[101]

In the first place, the entrance of newcomers can trigger coordination issues.[102] Large financial interests, notably VCs, angels or activist investors are empowered at the expense of other members of the protocol community who use or depend more on it.[103] This situation leads to conflicts of interests where wealthy token holders over-value the goal of making the token price go up in the short term even if that involves harmful rent extraction.[104]

Secondly, free transferability can also lead to concentration of control where large portions of the supply stays in the hands of a tightly-coordinated clique of insiders[105] for instance after a takeover bid.[106] These small groups of wealthy participants called "whales"

[95] Securities and Exchange Commission, "Report on Investigation Pursuant to Section 21(a) of the Securities and Exchange Act of 1934: The DAO (Release No. 81207)" (25 July 2017) 5.

[96] Law Commission, *Decentralised Autonomous Organisations* (DAOs) Call for Evidence (Law Com 2022) para 5.74.

[97] Ibid, para 2.28.

[98] Eric Glen Weyl, Puja Ohlhaver and Vitalik Buterin, "Decentralized Society: Finding Web3's Soul" [2022] <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4105763> (last accessed 14 May 2024).

[99] "Exploring DAOs: Uncovering Web3 Ownership Realities" (*Chainalysis*, 27 June 2022) <https://www.chainalysis.com/blog/web3-daos-2022/> (last accessed 8 July 2024).

[100] Vitalik Buterin, "Soulbound" (Vitalik.eth.limo, 26 January 2022) <https://vitalik.eth.limo/general/2022/01/26/soulbound.html> (last accessed 26 May 2024).

[101] Law Commission, "*DAOs Call for Evidence*" (n 98) para 5.9.

[102] Buterin, "Moving Beyond Coin Voting Governance" (n 51).

[103] Vitalik Buterin, "Governance, Part 2: Plutocracy Is Still Bad" (Vitalik.eth.limo, 28 Mars 2018) <https://vitalik.eth.limo/general/2018/03/28/plutocracy.html> (last accessed 26 May 2024).

[104] Buterin, "Moving Beyond Coin Voting Governance" (n 51).

[105] Ibid.

[106] See the takeover on Steem: <https://decrypt.co/38050/steem-steemit-tron-justin-sun-cryptocurrency-war>.

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are empowered and can more successfully execute decisions than large groups of small-holders.

Finally, DAOs in which voting is based on token ownership are subject of being "governed by their most avid users, irrespective of their financial status, in a fair and verifiable way."[107] The risk is that an attacker could potentially employ a large number of bots to bribe members and take over a majority of the voting power in the system.[108]

Thus, many DAO developers, such as data engineers, early developers or executives involved in the day to day running of a DAO, might want to design governance mechanisms to ensure the DAO works as a proper decentralised structure. The COALA DAO Model Law acknowledges that mechanisms restricting entry and exit such as withdrawal of tokens, akin to the withdrawal of shares, or restricting token transfers to third parties, akin to the transfer of shares in limited liability companies, should be allowed to protect the interests of minority token holders.[109]

2. The content of transfer restrictions

a. The software protocol: receptacle of the restrictions

From a technical standpoint, the software protocol of the DAO records and enforces the technical encumbrances and conditions that regulate how associated tokens can be used, spent or transferred.[110] According to the principle of functional equivalence,[111] it is possible to draw an analogy between articles of association of a company and the software protocol of a DAO in the way they structure the organisation.[112] According to the COALA DAO Model Law, a DAO is governed by its by-laws (we rather refer in this article to the term articles of association), which are the "rules and regulations that govern the procedures followed by a DAO and its interaction of its members and participants." It is proposed that DAO articles are laid down by default in its software code.[113]

To implement the restriction, a smart contract would be added to the software protocol so as to disable the function enabling transferability between public key addresses or to encode a restriction on token transfers based on predetermined conditions.[114] This code update requires consensus to be reached by a majority vote of the members.[115] Subsequently, the smart contract will be distributed across all the nodes of the blockchain on which the DAO is deployed.[116] If the proposed transfer fulfills the conditions precedent set by the smart contract, then a new block will automatically be created accordingly on the blockchain, and the token will pass to the purchaser. If the transfer does not meet the conditions precedent, such as the approval by a majority of members or a trigger event,

[107] Terry Chung, Sandip Nair, Uttara Ravi and Pranav Kajgaonkar, "Proof of Participation Voting for On-Chain Governance" (2021) <https://timroughgarden.github.io/fob21/reports/r7.pdf> (last accessed 12 May 2024).

[108] Ibid.

[109] COALA (n 78) Art 6.

[110] Law Commission, (Law Com No 412, 2023) para 6.11.

[111] COALA (n 78) : "Functional equivalence is characterized when a technological solution not provided for by law fulfills the same function as the legal requirement. The normative objective or purpose of a legal standard must be identified, and it must be demonstrated that this objective or purpose can be achieved both by the statutory requirement and by a technological solution."

[112] Centre de Droit Bancaire et Financier, "Lexique de la Blockchain, Decentralized Autonomous Organisation" (University of Geneva, 2022) <https://cdbf.ch/lexique/organisation-autonome-decentralisee-dao/> (last accessed 15 July 2024).

[113] COALA (n 78) Art 4.

[114] Law Commission, (Law Com No 256, 2022) para 10.103.

[115] Chung, Nair, Ravi and Kajgaonkar (n 109).

[116] Guillaume and Riva (n 80).

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the smart contract will not execute the transfer. The blockchain's state remains unchanged.[117]

In company law, articles of association are a statutory contract[118] empowered by case law to establish and clarify share transfer restrictions.[119] Pursuant to regulatory equivalence,[120] the software protocol, receptacle of the governance rules, could contain restrictions on the transferability of tokens.[121]

b. Contractual freedom

DAO articles written in plain language[122] could be set up along with the software protocol coded on the blockchain. Token transfer restrictions found the DAO articles would fundamentally be of contractual nature and benefit from freedom of contract[123] similarly to share transfer restrictions.[124] In the absence of any *ad hoc* statutory framework, tokens are freely transferable in principle but, the proprietary right to dispose of them could be willingly curbed as well, subject to general property law rules.[125] The COALA DAO Model Law prescribes a high degree of discretion in how DAOs can establish their organisational, governance and capital structure in their articles seeking the flexibility found in limited liability partnerships or private companies limited by shares.[126] Modelled on the UK Companies Act 2006, [127] it could be proposed that "DAO software protocol-specified tokens are transferable in accordance with the DAO's articles." This path has been chosen in particular by Wyoming in DAOs' "Governing Principles."[128]

It is then possible to imagine all possible clauses existing in articles and shareholders' agreements in the context of DAOs.[129] The DeFi ecosystem already offers approaches to limit transferability by technical encumbrances or restrictions with different tradeoffs between security and convenience.[130]

Firstly, there are outright prohibitions on the transferability of tokens, typically found in non-transferable tokens by design (proof of personhood or proof of humanity). One example is "soulbound" tokens[131] that are "publicly visible, non-transferable and possibly revocable-by-the-issuer, tokens."[132] Inalienability can also be temporary in

[117] Law Commission, '*DAOs Call for Evidence*' (n 98) para 5.74.

[118] *Braton Seymour Service Co Ltd v Oxborough* [1992] BCC [475] (Steyn LJ).

[119] *Re Bede Steam Shipping Co Ltd* [1917] 1 Ch [126] (Eve LJ).

[120] COALA (n 78): "It allows for the establishment of equivalence between the function of a legal rule and the function of a technology."

[121] Haut Comité Juridique de la Place Financière de Paris (HCJP), "Rapport sur la Réception des Organisations Autonomes Décentralisés (ou ' DAO ') en Droit Français" (31 May 2024) para 31.

[122] COALA (n 78) Art 3(5) and 4(1)(f).

[123] *Weston Case (1868)* L.R. 4 Ch. App. 20; *Bordland's Trustee v Steel Bros & Co Ltd* [1901] 1 Ch. 279; *Lindlar's Case* [1910] 1 Ch. 312, CA 316; *Delavenne v Broadhurst* [1931] 1 Ch 234 (ChD) [237]–[238] (Bennett J); *Stothers v William Steward* (Holdings) Ltd [1982] 1 WLR 589.

[124] Printing and Numerical Registering Co v Sampson (1875) 19 Eq 462.

[125] In French law, inalienability clauses on transfer of property must be temporary and justified by a serious and legitime interest, see French Civil Code, Art 900-1.

[126] COALA (n 78) commentary Art 4.

[127] Companies Act 2006, s 544(1).

[128] See DUNA Wyoming Unincorporated Nonprofit DAO's. 24LSO-0104 Bill SF0050 (17-32-120); W.S. 17-31 Decentralized Autonomous Organization Supplement 2022 (17-31-104).

[129] Such as inalienability clauses, pre-emption rights clauses, agreement clauses, drag along and tag along clauses or exclusion clauses.

[130] Buterin, "Soulbound" (n 102).

[131] Ibid.

[132] Weyl, Ohlhaver and Buterin (n 100).

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return for voting rights (timelock)[133] limiting buy-then-vote-then-sell attacks in the short term.[134]

Furthermore, DAO tokens that have not been fully utilised may not be transferable as evidence that the holder has not contributed to or accomplished tasks within the DAO community (proof of participation).[135]

Lastly, in order to vote in favour of a proposal, some DAO protocols require making an enforceable buy-order at a price below the current one. If the proposal has a negative outcome, those who supported it will be forced to buy their opponents out and bear the consequences.[136]

DAO communities are free to invent all types of restrictions as far as it is technologically feasible as put by Vitalik Buterin. Overall, the rationale of token transfers restrictions is a balance between the rationale to limit or prevent transfers and the blockchain ecosystem where so far all the standards are designed around maximum transferability.[137]

IV. Enforceability of restrictions on DAO tokens transferability

1. Performance of the restrictions

a. Binding force by technology

The rules governing a DAO found in the network of smart contracts composing the software protocol are immutable, unbreachable and independent from the legal system. Provisions found in statutes, articles of association or contracts can suffer from breach of contract, whereas DAO's governance rules will benefit from fully efficient performance.[138]

Their execution is perfected by technology because smart contracts (i) automatically, (ii) immutably and (iii) autonomously execute the rules set out in the code like a vendor machine or ATM.[139] Firstly, smart contracts are technically binding on the DAO members[140] since the software can only run according to the predefined and deterministic terms.[141] The use of an automated process perfects the performance of contractual terms by making them self-executing.[142] Secondly, the validated token transfers are irreversible and tamperproof on the blockchain.[143] Thirdly, there is no room for the debtor's unwillingness to execute its contractual obligations neither for bad faith, moral hazard or human error.[144] The performance of rights and obligations does not depend on the parties

[133] Hugo May, "Convex(Curve) = Curve + " (*Medium*, 21 Octover 2021) <https://medium.com/coinmonks/convex-curve-curve-d7e28cd6c1d9> (last accessed 29 June 2024).

[134] Buterin, "Moving Beyond Coin Voting Governance" (n 51).

[135] Chung, Nair, Ravi and Kajgaonkar (n 109).

[136] Buterin, "Moving Beyond Coin Voting Governance" (n 51).

[137] Buterin, "Soulbound" (n 102).

[138] Jean Noël Colin, "Du Bitcoin aux DAO: les Fondations Techniques de la Blockchain" in Hervé Jacquemin, Andra Cotiga-Raccah and Yves Poullet (eds), Les Blockchains et les Smart Contracts à l'Épreuve du Droit (n° 49, Collection du CRIDS 2020) 11.

[139] Szabo, "Smart Contracts: Building Blocks for Digital Markets" (n 88).

[140] Larry A. Di Matteo and Cristina Poncibo, "Quandary of Smart Contracts and Remedies: the Role of Contract Law and Self-help Remedies" (2018) 26(6) European Review of Private Law 805, 818.

[141] Nick Szabo, "Formalizing and Securing Relationships on Public Networks" (1997) 2(9) First Monday; Law Commission, "DAOs Call for Evidence" (n 98) para 5.30.

[142] Robert Herian, "Smart Contracts: a Remedial Analysis" (2021) 30(1) Information & Communications Technology Law 17, 19.

[143] Joseph Lee and Rougang Li, "Law and Regulation for Decentralised Autonomous Organisations (DAOs)" [2023] <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4455052> (last accessed 20 June 2024).

[144] Claire Leveneur, *Les Smart Contracts. Étude de Droit des Contrats à l'Aune de la Blockchain* (Dalloz, "Nouvelle Bibliothèque de Thèses," vol. 236, 2024) 621; Florian Gamper, "A Non-Contractual Approach to Smart Contracts" (2023) 31(3) Int J Law Info Tech 231, 235.

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or a third party but on the encoded protocol. In this respect, smart contracts eliminate counterparty performance risk[145] and cannot be interfered with or frustrated by a token holder.[146]

b. Binding force in law

As Vitalik Buterin concedes, the term "smart contract" is deceptive,[147] they do not necessarily constitute legal agreement. When regulating DAO articles regarding transfer restrictions, the question is whether (i) smart contracts can constitute legally binding contracts and (ii) whether a DAO can be a counterparty to such agreement.

DAO members can decide to what extent their contractual governance structure is implemented in the software protocol with three different types of smart contracts.[148] First, a smart legal contract or "computable contract"[149] is a contract performance method by which some or all of the contractual obligations are performed automatically by computer code.[150] Secondly, a hybrid contract is a smart legal contract in which some contractual obligations are defined in natural language and others are defined in code. Finally, a solely code contract is nothing but code in which all the contractual terms are defined and performed automatically[151] in a "higher-level programming language."[152]

Several states in the United States have recognised the validity of a contract executed on the blockchain by a smart contract[153] and of a smart contract itself.[154] The Law Commission concludes that smart contracts can be legal contracts depending on their configuration provided that the requirements for a legally binding contract are met.[155] In practice, many DAOs use smart legal contracts as a method to perform enforceable obligations under existing legal agreements or solely code contracts to transact without the express intention of the transaction being a function of or creating any legal obligations.[156] The legal force of the restrictions resides then not in the code, but in the natural language terms external to it.

The second issue is that transfer restrictions will not bind DAOs[157] because they do not have legal personality without endorsement by a legal system.[158] Hence a DAO cannot be a holder of rights and obligations like a company is bound by its articles of association towards the shareholders.[159] Therefore, no contractual right on an issuer can be identified.[160]

[145] John Lee, "Smart Contracts and the Limits of the 'Rule of Code'" (2022) 10 JIBFL 692, 694.

[146] Guillaume and Riva (n 80).

[147] See Vitalik Buterin's tweet on 13 October 2018 (https://twitter.com/VitalikButerin/status/1051160932699770882?s=20) calling them "persistent scripts."

[148] Lee (n 147) 692.

[149] Harry Surden, "Computable Contracts" (2012) 46 UCDL Rev 629, 658.

[150] Gabriel Olivier Benjamin Jaccard, "Smart Contracts and the Role of Law" (2017) 8 Jusletter IT 7.

[151] Gamper (n 146) 233.

[152] Ciarán McGonagle et Finn Casey Fierro, "For Whom the Code Tolls: an Integrated, Modular Architecture for Smart Derivatives Contracts" (2024) 1 JIBFL 41.

[153] Arizona House Bill 2417 of 29 March 2017; New York Assembly Bill 8780 of 27 November 2017; Tennessee House Bill 1507 of 26 March 2018.

[154] Illinois House Bill 3575 of 23 August 2019.

[155] Law Commission, Smart Legal Contracts Advice to Government (Law Com No 401, 2021) para 1.26.

[156] Law Commission, "DAOs Call for Evidence" (n 98) para 5.55.

[157] Charles Kerrigan, "Laws and Legal Principles Relating to Blockchain and Distributed Ledger Technologies: a Taxonomy" (2019) 5 JIBFL 307, 308.

[158] Primavera De Philippi et al., "The Alegality of Blockain Technology" (2022) 41(3) Policy and Society 358, 365.

[159] Companies Act 2006, s 33(1).

[160] Charles Kerrigan, "The Point of DAOs; and of Crypto Lawyers" (2022) 11 JIBFL 739, 741.

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Given their decentralised and heterogeneous nature,[161] it is inherently challenging to apply traditional legal wrappers to DAOs.[162] The law of England and Wales might characterise this type of organisational structure as an unincorporated association or a general partnership[163] but the assignability of the membership or partnership relation appears at odds with token transferability on DLT-based systems.[164] In French law, the form of a *de facto* company or an undeclared partnership could apply, however it would be unsuitable for transferability purposes.[165] For now, only a few jurisdictions have enacted *ad hoc* DAO regulations.[166] A DAO incorporated under the law of one of these states presents the distinctive features of having legal personality and governance rules that conform to the prescriptions set out in the law of the state under which it is organised.[167] This option is discarded for England and Wales by the Law Commission.[168] Another solution is to superpose to the front-end technological infrastructure a back-end legal architecture which is integrated into the community's decision-making process, and whose legal status enables it to enter into contracts.[169]

2. *Enforcement of the restrictions*

a. Primacy of code

Contractual restrictions find their force in the smart contracts composing the software protocol which relies on *ex ante* governance rather than *ex post* monitoring and enforcement.[170] Thus, the execution of contractual transfer restrictions on the blockchain will depend on whether the relevant smart contract of the software protocol defines and/or executes these transfer restrictions.[171] By so, they will effectively be enforced not because they are legally binding obligations but only because smart contracts compel so. "Code is law" is the rule.[172]

Whatever the smart legal contract does, it will necessarily constitute a "proper performance of the relevant legal obligation"[173] for which the parties have agreed to be bound to. The inscription of restrictions in the software protocol would allow to dispense with the various stipulations intended to ensure their effectiveness, such as penalty clauses and unilateral promises.[174] By way of example, a preemption clause in a smart contract will block for a stipulated period any order wrongfully transmitted in favour of a third party and redirect it to the token holders so that they can exercise it.[175]

[161] Ibid.
[162] Lee and Li (n 145).
[163] Kerrigan (n 162) 739.
[164] Law Commission, "*Decentralised Autonomous Organisations (DAOs)*" (n 46) paras 3.73 and 4.20.
[165] Hugo Bordet, "DAO: une Nouvelle Forme d'Activisme Pour les Associations?" (2022) 670 Juris associations 27, 29.
[166] Maltese Bill No C 689, Innovative Technology Arrangements and Services Act (2018); Vermont, An Act Relating to Blockchain Business Development, 2018, No 205, (S.269); Wyoming Act No 73 (SF0038), Wyoming Decentralized Autonomous Organization Supplement, SF0038, No 73; Marshall Islands, 2022 Amendment Non-Profit Entities Act; Tennessee, Public Chapter No 852/Senate Bill No 2854/House Bill No 264.
[167] Guillaume and Riva (n 80).
[168] Law Commission, "Decentralised Autonomous Organisations (DAOs)" (n 46) para 5.51.
[169] See DAOlink in Olivier Martin, "DAO : un Nouveau Mode de Gouvernance Associative?" (2022) 670 Juris Associations 20.
[170] Katrin Schuler, Ann Sofie Cloots and Fabian Schär, "On DeFi and On-Chain CeFi: How (Not) to Regulate Decentralized Finance" (2024) 00 Journal of Financial Regulation 1, 6.
[171] Lee (n 147) 693.
[172] Lawrence Lessig, "Code is Law – On Liberty in Cyberspace" (2000) Harvard Magazine 1.1.00.
[173] Ibid.
[174] Barban et al. (n 5).
[175] Ibid.

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On the contrary, when technology and law are not aligned, a major concern arises around the ability of the law to be enforced since code is given primacy.[176] The software protocol takes precedence over the contractual terms and conditions, even if they diverge.[177] If a token transfer is performed or restricted in breach of a contractual transfer restriction, the transaction will be considered valid on the blockchain environment but invalid in the legal world or *vice versa*. As a result, an legally invalid transfer can be validly performed and cause a breach of contract requiring *ex post* enforcement. The enforcement of the contract would require determining somebody responsible within the DAO to change the blockchain's state, which is incompatible with the absence of legal personality, DAOs' inherent decentralisation and the immutability of smart contracts.

In company law, articles of association have a greater legal force than shareholders' agreements, which are simple contracts. In private companies, directors cannot register a transfer of shares if they know it is in breach of the articles of the company and the proprietary title cannot pass.[178] In French law, transfers violating clauses in articles of association can be declared void.[179] The legislator could thus recognise and impose DAO articles as a multi-party statutory legal smart contract enforcing transferability provisions in order to ensure alignment between legal obligations and smart contracts while supporting private ordering, which grants DAOs flexibility in applying statutory legislation.

b. Enforcement by a third party

When contractual terms are defined by self-executing code, no dispute can theoretically arise about whether the particular obligation has been performed in accordance with its terms.[180] Consequently, an enforcement mechanism through the legal system will theoretically never be needed.[181] But if smart contracts prove to be useful for mechanical or mathematical instructions, they can hardly express in code sophisticated terms and conditions or verify or assess if these are fulfilled.[182] Contractual transfer restrictions may refer to legal terms of art,[183] common law doctrines[184] or concepts with interpretative content that are incompatible with the binarity of smart contracts.[185] Hence, need for human discretionary judgment might be needed to ascertain whether such conditions are fulfilled even though the relevance of a decentralised blockchain-based software protocol would be eluded.[186]

A court might classically award remedies for breach of contract[187] and grant an interim proprietary injunction[188] or restitution order.[189] These judicial tools might find themselves obsolete since the transfers are irreversible and tamper-proof due to the fundamental

[176] Liu (n 76).
[177] HCJP (n 123).
[178] CA 2006, s 171(a); Tett v Phoenix Property & Investment Co Ltd [1986] B.C.L.C. 149.
[179] French Commercial Code, Art. L. 227-15 applicable to simplified joint stock companies.
[180] Lee (n 147) 693.
[181] Gamper (n 146) 234.
[182] Agata Ferreira, "Regulating Smart Contracts: Legal Revolution or Simply Evolution?" (2021) 45 Telecommun. Policy 3.
[183] Maya Chilaeva and Pia Dutton, "Smart Contracts: Can They Be Aligned With Traditional Principles or Are Bespoke Norms Necessary?" (2018) 8 JIBFL 479, 481.
[184] Gamper (n 146) 234.
[185] Mustapha Mekki, "Les Mystères de la Blockchain" (2017) 37 Recueil Dalloz 2160.
[186] Mustapha Mekki, "Le Contrat, Objet des Smart Contracts (Partie 1)" (2018) 7–8 Dalloz IP/IT 409.
[187] Llewellin v. Grossman (1950) 83 Ll.L.Rep. 462; Woodlands v. Hind [1955] 1 W.L.R. 688.
[188] AA v Persons Unknown (n 26) [61] (Bryan J).
[189] Armstrong DLW GmbH (n 17).

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issue of immutability of the blockchain.[190] A court could then merely order restitution in value or an "equal and opposite" second transaction reversing the effects of the first transaction still recorded on the blockchain state.[191] Even if such order was rendered to reverse a token transfer, its enforcement could also depend on a favorable vote from the token holders or on the willingness of software developers or miners to take such action. It is then impractical for a court itself to unwind a validated transaction and to restore the parties to their pre-contractual positions.[192]

When a flaw was discovered in a smart contract of "THE DAO" and millions of Ether "stolen," the only solution to restore the initial situation and cancel the fraudulent transaction was a code "hard fork." A new DLT was created for the members who voted for the rescission of the said smart contract's transactions. But the members who did not vote in favour of the hard fork could continue with the DLT considering the transaction both legally and technically valid.[193] The legal risk is ultimately constitutive of a risk to the DAO itself where DAOs would split. The multiplication of hard forks could cause the DAO market to collapse.

To avoid the perverse effects of a lawsuit without neglecting the dangerous effects of a hard fork, smart contracts could be conceived as smart "Ricardian contracts,"[194] mechanisms by which natural language contracts delegate legal authority to an on-chain arbitration association.[195] The "smart" arbitration agreement could trigger reference to arbitration when conditions constituting a dispute on a DAO token transfer are met or at the request of a party.[196] The dispute would be submitted to a "digital arbitration" with a power to pause performance of the contract, reverse or complete transactions on the blockchain and even operate or modify the smart contract itself.[197] The prerequisite for this power is that a "soft fork" functionality is encoded in the smart contracts, provided the blockchain is permissioned, at the benefit of the digital arbitration authority. The software protocol could then provide for the first smart contract encoding the restriction to be short-circuited by another smart contract in the event of a dispute.[198] It could also include a "self-destruct" or "auto-recission" feature by which the smart contract would delete its code executing the invalid transfer from the blockchain state and transfer the tokens to the specified recipient address.[199] To that end, awards upholding contractual transfer restrictions would be effectively enforced on the blockchain state.[200] For example, the Aragon DAO code is conceived with an "Aragon Network Jurisdiction," a multilevel arbitration system handling claims between DAOs and their members.[201]

In that sense, the COALA DAO Model Law requires DAOs to "refer to or provide a Dispute Resolution Mechanism that the DAO, Members and Participants will be bound by."[202]

[190] Kerrigan (n 159) 310.

[191] Nik Yeo and Aaron Taylor, "Avoiding blockchain contracts" (2019) 9 JIBFL 586.

[192] Law Commission, (Law Com No 256, 2022) para 19.40.

[193] Chilaeva and Dutton (n 185) 482.

[194] Ian Grigg, "The Ricardian Contract" (San Diego, IEEE International Workshop on Electronic Contracting, 2004) <https://iang.org/papers/ricardian_contract.html> (last accessed 19 July 2024).

[195] Chilaeva and Dutton (n 185) 483.

[196] Sam Brown, "Arbitration of cryptoasset and smart contract disputes: arbitration unchained?" (Thomson Reuters Practical Law UK 2023).

[197] Ibid.

[198] Mekki, "Le Contrat, Objet des Smart Contracts (Partie 1)" (n 188) 417.

[199] Bill Marino and Ari Juels, "Setting Standards for Altering and Undoing Smart Contracts" in Jose Julio Alferes et alter (eds) Rule Technologies. Research, Tools, and Applications (vol 9718, Springer 2016); Hossein Nabilou, "Bitcoin Governance as a Decentralized Financial Market Infrastructure" (2021) 4(2) Stan. J. of Blockchain L. & Pol. 1.

[200] Chilaeva and Dutton (n 185) 483.

[201] Aragon, "Aragon Network Jurisdiction Part 1: Decentralized Court" (5 May 2020) <Aragon Network Jurisdiction Part 1: Decentralized Court> accessed July 2.

[202] COALA (n 78) Art 4.

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A clause submitting all disputes to an *ad hoc* arbitration mechanism could then be inserted in the DAO articles to which all token holders agree. However, putting in place a single global agreement catering for all disputes between all participants under the significant power of arbitrators could be "legally challenging" but furthermost "inconsistent with the key tenets of decentralised governance."[203]

V. Conclusion

There are three key observations in this article. First, DAO tokens can be recognised as objects of property rights which can facilitate the secondary trading market, thereby scaling up both DAOs and the DAO market. Whether treated as a new third category or residual things in action, the goal is to provide legal certainty in the transfer of such tokens. However, a proper legal framework would fully ensure that the transferee receives a valid proprietary title enforceable by law. Secondly, in company law, articles of association can limit the transferability of shares, a practice recognised and enforced by the law. Policymakers and legislators should consider whether a similar organisational law is needed for DAOs, which can take into account the protection of a DAO as an entity and DAO members. Thirdly, blockchain technology, particularly code-as-law, is a game changer. It automates and restricts token transfer transactions irreversibly. It not only impacts the functionality of legal contracts, but also alters or even removes the traditional role of the judiciary and its remedial powers. Hence, on-chain remedies may be necessary to enforce legal rights and obligations in the digital sphere. Smart contracts could comprise both legally organised soft fork features along with dispute resolution mechanisms to reverse or unlock token transactions, in accordance not only with the code but also with the law.

[203] Brown (n 198).

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