# The Viability of Blockchain in Corporate Governance

Law Working Paper N° 712/2023
June 2023

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We would like to thank Luca Enriques, Giovanni Strampelli and Ger van der Sangen for their many helpful and insightful comments.

## Abstract

Blockchain technology, along with distributed ledger technologies (DLT), has gained recognition as a potential game-changer in corporate governance. Proponents argue that it has the capability to enable the creation of decentralized autonomous organizations (DAOs) that operate without hierarchical structures. However, challenges and uncertainties persist regarding the legal status, governance structures, and liability features of DAOs. This chapter sheds light on the practical implementation and use of DAOs and shows that elements of centralization often emerge despite the goal of decentralization.

Additionally, this chapter examines the impact of blockchain technology on the governance of traditional corporations, with a specific focus on strengthening key corporate functions such as share issuance, trading, and decision-making processes. Blockchain has the potential to address custody chain issues and improve transparency in corporate securities and stock ownership records. However, transitioning from existing systems to blockchain-based solutions, as demonstrated by the ASX CHESS Replacement process, is a complex task. While blockchain shows promise in enhancing shareholder and stakeholder rights, a careful assessment of its limitations and practical considerations is necessary. Additionally, it is important to critically evaluate the necessity of blockchain technology itself in corporate governance applications, as centralized systems with secure and transparent digital record-keeping may also be viable alternatives in various cases.

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Keywords: Corporate governance, DLT, Blockchain, DAO, Corporate voting, Shareholder rights, stakeholder involvement

JEL Classifications: G32, G34, L14, M20

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Blockchain technology, along with distributed ledger technologies (DLT), has gained recognition as a potential game-changer in corporate governance. Proponents argue that it has the capability to enable the creation of decentralized autonomous organizations (DAOs) that operate without hierarchical structures. However, challenges and uncertainties persist regarding the legal status, governance structures, and liability features of DAOs. This chapter sheds light on the practical implementation and use of DAOs and shows that elements of centralization often emerge despite the goal of decentralization.

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**The Viability of Blockchain in Corporate Governance**

Anne Lafarre and Christoph Van der Elst[1]

## 1. Introduction

Blockchain technology is often associated with volatile cryptocurrencies and speculation, leading to concerns about the need for new regulations.[2] Nevertheless blockchain (and distributed ledger technology, DLT[3]) can also significantly impact corporate governance. Several progressive ideas both inspire and question the existing corporate fundaments and paradigms.[4] For example, David Yermack *inter alia* explained the corporate governance impacts of issuing and trading corporate securities on blockchains, and voting in corporate elections.[5] Blockchain technology can enhance transparency of ownership, which in turn may impact shareholder activism and curb insider trading, and accelerate securities' trading and settlement processes leading to improved liquidity.[6] We ourselves were excited about the potential of blockchain for shareholder participation and decision-making in the blockchain-AGM.[7] Other contributions on the use of blockchain technology in corporate law have followed, even including fully decentralized companies in the form of blockchain-based Decentralised Autonomous Organisations (DAOs).[8]

It is questioned whether the use of blockchain technology for these and other corporate governance applications should be further encouraged, or whether it represents only a utopian vision that should be addressed with caution.[9] Although blockchain technology may have the potential to facilitate corporate law and corporate governance in several ways,[10] there is often ambiguity regarding the true value and solutions of blockchain applications and their adherence to legal issues. This chapter delves into some of the present developments in the diverse applications of blockchain technology within corporate governance. After a

[1] We would like to thank Luca Enriques, Giovanni Strampelli and Ger van der Sangen for their many helpful and insightful comments.
[2] At the moment of writing, the European Union is working on a regulatory framework aiming at regulating cryptocurrencies and other crypto assets within the EU (Markets in Crypto-Assets Regulation or 'MiCA'). MiCA aims to provide legal certainty, consumer protection, and promote innovation in the crypto industry while mitigating the risks associated with crypto assets, such as money laundering and terrorist financing. The regulation proposal was released in September 2020, and is expected to be voted in the European Parliament in 2023.
[3] Blockchain technology can be considered an example of a distributed ledger technology (DLT) that uses a block structure to add data. DLT can be considered the umbrella term for distributed technologies like blockchain. Although it should be noted that several of the applications that are discussed in Section 3 and 4 can also use another type of DLT, we mainly refer to blockchain technology.
[4] C.M. Bruner, 'Distributed Ledgers, Artificial Intelligence and the Purpose of the Corporation' 79 *Cambridge Law Journal* 431 (2020); L. Enriques & D.A. Zetzsche, 'Corporate Technologies and the Tech Nirvana Fallacy', *Hastings Law Journal*, 72, 55 (2020).
[5] D. Yermack, 'Corporate Governance and Blockchains', *Review of Finance* 21(1), 7-31 (2017).
[6] *Idem,* section 3.
[7] C.F. Van der Elst & A.J.F. Lafarre, 'Blockchain and the 21st century annual general meeting'. 14 *European Company Law* 4, 167-176 (2017).
[8] For example, M. Fenwick, & E.P. Vermeulen, 'Technology and corporate governance: Blockchain, crypto, and artificial intelligence', *Texas Journal of Business Law*, 48(1), 1–15 (2019).
[9] Enriques & Zetzsche (2020), nt. 4. See for a very critical analysis claiming that the blockchain potential is mostly imaginary, K. Low, E. Schuster and W. Y. Wan, 'The company and blockchain technology', LSE Law, Society and Economy Working Paper 18/2022, 22 p.
[10] I. H-Y. Chiu & E. W-K. Lim, 'Technology vs Ideology: How Far will Artificial Intelligence and Distributed Ledger Technology Transform Corporate Governance and Business?' 18 *Berkeley Business Law Journal* 1 (2021).

brief introduction to blockchain and smart contracting technology in Section 2, [11] in Section 3, we first discuss the governance structures of DAOs that operate on the blockchain in a (fully) decentralized way. In addition, blockchain can also be used to strengthen the basic functions of corporate and financial law, such as facilitating secure and transparent shareholder voting in AGMs. Moreover, decision-making powers that are typically reserved for the board can potentially be shifted to shareholders or other corporate constituencies using blockchain technology. We discuss several of these (potential) applications in Section 3. Section 4 offers concluding remarks.

## 2. Blockchain technology and smart contracts

### 2.1. Blockchain technology

The problem of double spending in electronic transactions, where messages can be duplicated easily, was addressed with the introduction of blockchain. [12] Traditionally, a central authority or intermediary is responsible for controlling and verifying all transactions to prevent double spending. Blockchain technology offers an alternative solution. Blockchain is a *distributed* ledger system that operates in a *peer-to-peer* network, where information is stored in a manner that makes it difficult or even impossible to change (*immutable*).

*Distributed* means that the information (including for instance the proof of each transaction) is stored in multiple locations (in network nodes). Each participant in the network has access to their own replica of the full ledger.

*Peer-to-peer* means that if a participant in the blockchain network wishes to make a transaction, the information is broadcast to the entire network. Participants verify the transaction in their own ledger and provide confirmation. As a result, the network can reach a consensus on the transaction. Participants (operators of a 'node') in the blockchain must be incentivized to verify transactions in a transparent and reliable manner. There are various consensus mechanisms that determine who can verify information and under what conditions. For example, in the Bitcoin-blockchain miners group transactions into blocks and use computing power to find a correct random number (the *nonce*), a process referred to as *proof-of-work* (PoW). The nonce is a random number generated through computational effort and selected in such a way that, when combined with the other data in a block, produces a hash[13] that starts with a specific number of

[11] This explanation involves a simplification of blockchain technology. For a more complete analysis, see for example P. De Filippi & A. Wright, *Blockchain and the Law: The Rule of Code*, Cambridge, Harvard University Press 2019, 312 p. Note that Yermack also provides an excellent and accessible explanation of (Bitcoin) blockchain technology in his 2017 article. Yermack (2017), nt. 5.
[12] S. Nakamoto, 'Bitcoin: a peer-to-peer electronic cash system'. Available at: https://bitcoin.org/bitcoin.pdf (last accessed 29 March 2023).
[13] Hashing in a blockchain converts digital information into a unique and fixed-length string of characters. This ensures data integrity and security because even a small change in the input data will result in a completely different string.

zeros. Once a miner finds this random number and completes the block, the blockchain network validates her solution. When consensus in the network is reached about the solution,[14] the miner is rewarded and the miners start working on the next block. Another consensus mechanism is, for instance, *proof-of-stake* (PoS).[15] A blockchain participant is instructed to verify the information based on her stake, *i.e.* the amount of cryptocurrencies, rather than computing power. More specifically, the blockchain protocol specifies that the network chooses the participant to verify the information based on the amount of cryptocurrencies she puts in a pool and the length of time they are held there.[16] Often, the authority to verify information is limited to particular stakeholders in the blockchain network.[17]

Finally, *immutability* means that once a file is created, it cannot be altered.[18] This is due to the block structure in the blockchain,[19] where hashed information is captured in a container data structure that aggregates transactions for inclusion in the blockchain. Particularly, each block within the blockchain contains data from the preceding block. Therefore, if a blockchain participant attempts to modify any information in a block, the information in the next and all subsequent blocks would change as well. The difficulty of this task explains why information on a blockchain is considered immutable.[20] Because multiple nodes have their own copies of the blockchain ledger, any inconsistency is immediately detected in the network.

In summary, blockchain enables participants to access information from all transactions immediately through their own replica of the ledger. The information is transparent, verifiable, and immutable, as transactions are added to the ledger in blocks in chronological order without overwriting previous transactions. These features of blockchain should enhance transparency and certainty in the network.

### 2.2. Smart contracts

Smart contracts are computer programs that execute the conditions of a contract without an intermediary's involvement.[21] If all preconditions are noticeably met, the smart contract automatically executes the

[14] When multiple miners find a solution, the Bitcoin network determines with a simple majority which miner will receive the reward, typically the one who verified the most transactions. If nodes support different solutions, a 'fork' may occur in the blockchain, and miners will continue to work on the next blocks until one split becomes longer, at which point all nodes will follow this longer chain. Miners essentially vote with their computing power to decide which block to continue working with.
[15] Ethereum converted to PoS with ETH2.
[16] The block hash now contains the signature of the participant responsible for building that block.
[17] See for an extensive discussion of how consensus is reached under PoS; F. Saleh, 'Blockchain without Waste: Proof-of-Stake', *Review of Financial Studies*, 34(3), 1156-1190 (2021).
[18] In fact, it is very difficult to alter the information but not impossible.
[19] Note that blockchain involves blocks, but DLT can also use other data structures.
[20] One would need to control a majority of the mining power or have a much faster computer than anyone else in the blockchain network to be able to alter the information. Also see Yermack (2017), nt. 5.
[21] The proposal for a Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act) defines a smart contract as a computer program stored in an electronic ledger system wherein the outcome of the execution of the program is recorded on the electronic ledger (art. 2 (16) Interinstitutional File 2022/0047(COD) March 17, 2023, 7413/23).

compliance ('when A, then B'). Blockchain technology is often used to execute smart contracts so that their terms are stored in a distributed way and cannot (easily) be altered. The consensus mechanisms that are used in the blockchain should ensure that smart contracts are executed correctly. In turn, smart contracts enable a large variety of applications for blockchain technology.[22] A simple example of a smart contract for a car purchase between a seller and a buyer is the following (written in Solidity[23]):

```
contract CarSale {
    address payable public seller;
    address payable public buyer;
    uint public price;
    bool public sold;

    constructor() {
        seller = payable(msg.sender);
        price = 100 ether; // Set the price of the car to 100 ether
        sold = false;
    }

    function buyCar() public payable {
        require(msg.value == price, "The price of the car must be paid in full.");
        require(sold == false, "The car has not already been sold.");
        buyer = payable(msg.sender);
        seller.transfer(msg.value);
        sold = true;
    }
}
```

This example smart contract sets the car price at 100 ether and defines the seller and buyer addresses. The Boolean variable (‘the sold variable’) is set to false.[24] The buyCar() function checks if the buyer has paid the correct amount and if the car is still available. If both conditions are met, the function sets the buyer variable to the buyer's address, transfers payment to the seller, and updates the sold variable to true, indicating the car has been sold.

[22] See for instance M. Raskin, ‘The law and legality of smart contracts’. *Georgetown Law Technology Review*, 1(2), 305-341 (2017); R. O’Shields, ‘Smart Contracts: Legal Agreements for the Blockchain’, 21 *North Carolina Banking Institute* 1, 177-94 (2017).
[23] Obtained with ChatGPT when asking the question to write a simple smart contract for a car purchase between two parties in Solidity (Ethereum blockchain).
[24] Booleans use ‘true’ and ‘false’ and can control a program’s flow by checking conditions. In this smart contract, the boolean variable tracks whether the car has been sold.

### 2.3. Public and private blockchains

Public blockchains, also known as 'unpermissioned' or 'permissionless' blockchains, are open to participation (including the creation and validation of new blocks) by anyone. There are also 'private blockchains' (also called 'permissioned' blockchains[25]) in which a central organization or a group of participants controls the blockchain and its access.[26] Private blockchains are widely used in various business applications, with IBM's Hyperledger Fabric being a prominent example of a private blockchain administered by the Linux Foundation.[27]

## 3. Applications in corporate governance

Several authors suggest that blockchain technology can revolutionize many aspects of companies and markets, especially in the domains of securities regulation and corporate governance.[28] The applications seem to leverage the technology's capability to generate decentralized tamper-proof records of transactions to ensure transparency and lower costs. Classical hierarchical governance structures may be avoided altogether with the use of peer-to-peer organizations operating on a blockchain and using smart contracts. These DAOs, may – according to some authors[29] – fundamentally reorganize the governance and structures of companies, but they also raise important legal and governance questions. How do DAOs differ from 'classical' corporations? Are these decentralized organizations truly decentral in terms of their ownership and decision-making structures? These questions are addressed in Section 3.1. Afterwards, we turn to the use of blockchain technology for issuing and trading of corporate securities. For instance, to solve existing issues in stock ownership records, digital tokens can be created to represent securities, potentially simplifying existing processes by increasing transparency and reducing time and costs. As its potential and the implications for corporate governance have been discussed elsewhere,[30] we focus on the latest (legal) developments and whether they are able to leverage this potential in Sections 3.2 (share issuing and trading) and 3.3 (corporate decision-making).

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[25] Sometimes a distinction is made between a *private* blockchain and a *permissioned* blockchain, where the latter is considered an intermediate form of the private blockchain and public blockchain. Note that commentators often suggest that these private and permissioned blockchains are not really a form of blockchain technology but fit into the broader range of DLT.

[26] In case a group of participants works with a consensus mechanism by means of a predefined system of approval, this is also called a *consortium blockchain*. V. Buterin, 'On public and Private Blockchain' (2015). Available at: https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains.

[27] Participation in Hyperledger Fabric requires approval from a Membership Service Provider (MSP). See: https://hyperledger-fabric.readthedocs.io/en/release-2.2/blockchain.html (last accessed 29 March 2023).

[28] Fenwick & Vermeulen (2019), nt. 8; Yermack (2017), nt. 5. For shareholder voting and intermediated securities, see in particular: Spencer J. Nord, Blockchain Plumbing: A Potential Solution for Shareholder Voting, 21 *University of Pennsylvania Journal of Business Law* 706 (2019); George S. Geis, Traceable Shares and Corporate Law, 113 *Northwestern University Law Review* 227, 227-278 (2018); A.J.F. Lafarre, & C.F. Van der Elst, 'Shareholder voice in complex intermediated proxy systems: Blockchain technology as a solution?', 4 *The Stanford Journal of Blockchain Law and Policy* 1, 29-52 (2021).

[29] Including M. Fenwick. J.A. McCahery & E.P.M. Vermeulen, 'The End of 'Corporate' Governance: Hello 'Platform' Governance, 20 *European Business Organization Law Review* 171–199 (2019).

[30] Yermack (2017), nt. 5.

### 3.1. Decentralised Autonomous Organisations (DAOs)

Traditional corporate governance is based on centralized organizations with hierarchical relationships among shareholders, the board of directors, corporate management, and employees.[31] Authority, responsibility and control flows downwards from the principals (the shareholders, via the corporate board or the supervisory board) to the agents (the corporate management), while accountability flows in the opposite direction.[32] This delegated structure creates the risk of opportunistic behavior by corporate management. This problem is exacerbated by information asymmetry and shareholder coordination problems. In recent decades, corporate governance experts have proposed a large variety of mechanisms to mitigate these agency problems and thus to ensure that agents do not pursue their immediate self-interests but perform their tasks and duties in line with the long-term interest of the company, its shareholders and other stakeholders. However, these mechanisms can fall short.[33] Various authors have suggested that modern technologies like blockchain can bring forward new solutions to this classical problem.[34] Fenwick, McCahery and Vermeulen have proposed the idea of 'platform governance' and discuss 'community-driven' organizations as an alternative to existing corporate governance mechanisms, evaporating the principal-agent duality. In their model, platforms have an underlying technology like blockchain that offers peer-to-peer solutions and directly connects 'creators' and 'users'.[35]

DAOs are examples of community-driven blockchain-based organizations: novel types of technology-mediated social structures[36] in which smart contracts that operate together in a (blockchain) protocol are developed, used and controlled by their participants.[37] Setting up a DAO can be simple. An individual or (small) group develops an idea, like some kind of decentralized application, and establishes a community via social media and other channels to support this idea. With the help of DAO startup templates and tools like Aragon, the smart contracts that implement the idea are developed. These toolsets can also help with, for instance, creating and distributing tokens on the blockchain, authorizing the wallets of participants for participation in decision-making, and setting the governance conditions for voting and issuing proposals.[38] Oftentimes, first a founding community is established that receives free tokens,[39] after which the first sales round of tokens starts. The tokens represent participation in the DAO, whose members operate according to the rules defined by the protocol.

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[31] Fenwick, McCahery & Vermeulen (2019), nt. 29.
[32] *Idem*.
[33] Enriques & Zetzsche (2020), nt. 4.
[34] Bruner (2020), nt. 4.
[35] Fenwick. McCahery & Vermeulen (2019), nt. 29.
[36] Call for Evidence for DAOs by the Law Commission for England and Wales of 16 November 2022, p. 9.
[37] P. De Filippi & S. Hassan, 'Decentralized Autonomous Organization', 10 *Internet Policy Review*, 2-10 (2021); Coalition of Automated Legal Applications (COALA), *Model Law For Decentralized Autonomous Organizations (DAOs)*, 57 p. (2021).
[38] Aragon, for instance, recommends simple majority approval of the issued tokens for a proposal to be adopted with a minimum quorum of only 15 percent or less, and an early execution rule, which means that the vote concludes at the moment a proposal reaches the appropriate threshold. See https://aragon.org/how-to/create-a-dao-on-polygon-with-the-aragon-app#7Selectgovernancesettings (last accessed 5 May 2023).
[39] Usually, NFTs (non-fungible tokens) are utilized. Unlike fungible tokens such as Bitcoin, which are interchangeable, NFTs are unique and represent distinct underlying assets, giving them individual value.

The establishment process for DAOs highlights the existence of a governance structure that operates differently from a company's centralized decision-making body. In the founding phase of a DAO, its governance and its structure rely *ab initio* on the founding community participants. The smart contract defines the rules for participant collaboration, voting, distribution of voting rights, admission of new participants, issuance of tokens (NFTs), treasury allocation, addressing rule violations, and other related matters. After the smart contracts and the DAO itself become operational, participants can only propose changes to the DAO's operation and functioning that are agreed upon and verified by other participants, as determined by the smart contract. Particularly, governance rights in DAOs are oftentimes distributed among participants who hold so-called *governance tokens*, enabling them to propose and vote on actions for the DAO to take. Smart contracts of the DAO execute those proposals that meet the pre-determined conditions, including the necessary number of votes.[40]

Many DAOs have intricate voting processes, potentially impacting the decentralized governance structure's efficiency. For instance, *CityDAO*, a Wyoming-based LLC (*cf. infra,* Section 3.1.2), is developing a blockchain-native network city and allowing its token holders to suggest development projects and visit the site.[41] Its governance structure includes three platforms for communication and voting, two levels of decision-making (the entire DAO and subgroups that are called 'Guilds'), various quorum requirements, and objection mechanisms, as described in its charter.[42] To illustrate, CityDAO's charter outlines that token holders, referred to as 'citizens', can propose a CityDAO Improvement Proposal (CIP) that is posted on CityDAO's Forum and must receive 100 likes within three weeks to be eligible for a vote via a tool called Snapshot. The vote is announced to token holders via an announcement channel on Discord and lasts for one week, and if the vote is unsuccessful, a one-month cool-down period is required before resubmitting the proposal.

### 3.1.1. A decentralization fallacy?

DAOs are decentralized in the sense that they bypass the board and management function and thus remove the agent from the corporate order.[43] DAOs avoid legal formalities and written contracts, rather relying on the 'rule of code'.[44] However, it seems that in practice, some sort of agent or centralization of control often remains,[45] meaning that the governance structure should ensure that the algorithm does not optimize the agent's goals, but that of the organization or platform.[46] First, the importance of founders' leadership in

[40] Sarcuni v. bZx DAO, No. 22-618 (S.D. Cal. Mar. 27, 2023), I. Background.
[41] See: https://www.citydao.io/blog/citydaos-mission-and-key-metric (last accessed 29 March 2023).
[42] available at https://charter.citydao.io/ (last accessed 10 May 2023).
[43] Bruner (2020), nt. 4.
[44] U. Rodrigues, 'Law and the Blockchain', *Iowa Law Review* 104(679), 707 (2019).
[45] N. Tse, 'Decentralised Autonomous Organisations and the Corporate Form', Victoria University of Wellington Law Review 2020, 51, 313-356; Enriques & Zetzsche (2020), nt. 4.
[46] Enriques & Zetzsche (2020), nt. 4.

building platforms remains as signaled by Fenwick, McCahery and Vermeulen. For example, in many cases, a founding team establishes the DAO and sets the basic governance structure. In several DAOs, this founding team holds control in the startup phase, and only in a later stage delegate (some of) their powers and rights to token holders.[47]

Second, even when claimed that DAOs have no agent (and hence the participants are not principals), ownership is often centralized, *de facto* providing an agency structure. Notably, although open-source code in public blockchains allows any developer to contribute and propose changes and DAOs utilize various methods to determine voter eligibility and voting procedures,[48] in practice, centralization of control often appears to occur.[49] When the same group consistently holds the majority for decision-making in a DAO, they can be considered as a specific kind of agents for the larger group of DAO participants. Even large public blockchains exhibit oligarchical tendencies as key stakeholders program blockchain applications.[50] An analysis of major cryptocurrency repositories reveals that a significant proportion of code contributions come from a single author.[51]

Third, also decision-making processes within DAOs may exhibit a degree of centralization that may appear incongruous with the decentralized nature of these organizations. Research shows that in many Decentralized Finance (DeFi) protocols less than 10 percent of issued tokens participate in voting proposals, and in some DAOs the participation rate of the token holders is even lower than 1 percent.[52] In 3 DAOs, a small number of participants (between 8 and 18) have the power to dictate governance actions, despite the hundreds of thousands of token holders who authorized delegates to vote on their behalf.[53] The governance of DAOs encounters challenges such a concentration of voting power, high costs associated with voting and delegation, and the possibility of voter coalitions further exacerbating the concentration of control. Specifically, 80% of DAOs have high voting concentration held by delegates representing a single token

[47] See for an example American CryptoFed DAO LLC addressing in its Constitution (https://www.sec.gov/Archives/edgar/data/1881928/000188192821000001/Exhibit1_ACFDAOConstitution.txt, last accessed 5 May 2023): "17.1 Voting Power of MShift Founding Team: Within 3 years beginning from the effective date of this Constitution, the MShift founding team will reduce its collective ownership to 15% or less out of the maximum authorized finite Locke tokens of 10 trillion. Furthermore, starting from the fourth anniversary of the effective date of this Constitution, MShift founding team's collective voting power out of the total Locke tokens outstanding will be reduced 1% annually until the cumulative voting power is reduced to 10% or less, independent of the founding team's total actual ownership of Locke tokens."

[48] D. Qinxu, D. Liebau, W. Zhiguo & X., Weibiao, 'A Survey on Decentralized Autonomous Organizations (DAOs) and Their Governance' (2023). Available at SSRN.

[49] A. Rajendra Sai, J. Buckley, B. Fitzgerald & A. Le Gear, 'Taxonomy of centralization in public blockchain systems: A systematic literature review', 58 *Information Processing and Management* 4, 102584 (2021). The authors describe in their taxonomy various layers, including the 'application layer', 'governance layer', and 'network layer'.

[50] For instance, in the Ripple blockchain the resource allocations and direction of code developments is centralized. Following Y.-Y. Hsieh, J.-P. Vergne & S. Wang, 'The internal and external governance of blockchain-based organizations', in M. Campbell-Verduyn (ed.), *Bitcoin and Beyond*, Routledge: Oxon (2018).

[51] S. Azouvi, M. Maller & S. Meiklejohn, 'Egalitarian Society or Benevolent Dictatorship: The State of Cryptocurrency Governance', in *Financial Cryptography and Data Security*, A. Zohar e.a. (eds.), Springer: Berlin (2019).

[52] R. Feichtinger, R. Fritsch, Y Vonlanthen & R. Wattenhofer, 'The Hidden Shortcomings of (D)AOs- An Empirical Study of On-Chain Governance' (2023). Available at: https://arxiv.org/pdf/2302.12125.pdf (last accessed 29 March 2023).

[53] R. Fritsch, M. Müller, & R. Wattenhofer, 'Analyzing Voting Power in Decentralized Governance: Who controls DAOs?' Available at https://arxiv.org/abs/2204.01176 (last accessed 29 March 2023). Also see: Y.Faqir-Rhazoui, J. Arroyo & S. Hassan, 'A comparative analysis of the platforms for decentralized autonomous organizations in the Ethereum blockchain', 12 *Journal of Internet Services and Applications* 9, 1-20 (2021).

holder.[54] Furthermore, blockchain networks that utilize PoW consensus mechanisms may give rise to the formation of 'blockchain conglomerates'. These companies offer various blockchain-related services and products, such as high-performance computing equipment, and participate in mining pools to increase their influence on protocol proposals.[55]

Some research suggests that many proposals are being launched by participants in DAOs, which may signal a certain level of democracy. For example, *Compound DAO*, a DAO that generates returns on crypto holdings, receives an average of 2.3 proposals per month.[56] However, many of these proposals are initiated by individuals in founding roles, highlighting centralization issues. Research shows that DAOs experiencing centralization issues suffer from conflicts of interest that negatively affect the growth of the platform,[57] as well as issues related to responsibility and liability.[58]

### 3.1.2. DAOs and the law

Over the past years, many thousands of DAOs have been formed in various forms and shapes,[59] dealing with substantial amounts of value and creating their own rules for decision-making.[60] When establishing a DAO, a legally recognized entity like an LLC is often wrapped around (part of) it.[61] If a DAO is operating for profit without any formal legal structure, its token holders are potentially general partners in a *de facto* general partnership (GP) when some conditions are met.[62] In many jurisdictions, a GP does not have legal personality separate from the partners who constitute it.[63] Its partners are jointly and severally liable. DAOs can have numerous anonymous members with transferable tokens, in contrast to GPs where partners know each other and share the collective risk.[64] As a result, the legal qualification of a DAO as a *de facto* GP can lead to undesirable outcomes, notably with regard to representation and liability.

Nevertheless, the *Sarcuni v. bZx DAO* ruling of 27 March 2023 by a US federal district court in California shows that – depending on their features and in absence of a 'legal wrapper' – DAOs can indeed

[54] X. Sun, C. Stasinakis & G. Sermpinis. 'Decentralization illusion in DeFi: Evidence from MakerDAO' Available at: https://arxiv.org/ftp/arxiv/papers/2210/2210.11203.pdf (last accessed 29 March 2023).
[55] D. Ferreira, J. Li & R. Nikolowa, 'Corporate Capture of Blockchain Governance', 36 *Review of Financial Studies* 1364-1407 (2023).
[56] H. Axelsen, J.R. Jensen & O. Ross, 'When is a DAO Decentralized?', 31 *Complex Systems Informatics and Modeling Quarterly* 67 (2022).
[57] J. Han, J. Lee & T. Li, 'DAO Governance' (2023). Available at SSRN.
[58] Like the protocol changes breaching regulatory requirement. See for a preliminary analysis P. Østbye, 'Exploring DAO Members' Individual Liability' (2022). Available at SSRN.
[59] See for a concise overview of different kind of DAOs https://tokenizedhq.com/list-of-daos/ (last accessed 29 March 2023).
[60] According to DeepDAO close to 13,000 DAOs with a treasury of more than $23 Billion with almost 7 million token holders of which 2.1 million are active voters and proposal makers existed early May 2023. See: https://deepdao.io/organizations (last accessed 5 May 2023).
[61] C. Brummer & R. Seira, 'Legal Wrappers and DAOs', available at SSRN (2022); W. Edwards, 'Decentralised Autonomous Organisations: unincorporated companies by another name?' 3 *Journal of International Banking and Financial Law* 147 (2022). For the UK, see Law Commission, Decentralised autonomous organisations (DAOs) Call for evidence, November 2022, p. 23-36; M.A. Schillig, 'Decentralized Autonomous Organizations (DAOs) under English law', *Law and Financial Markets Review* (2023); B. Mienert, 'How Can a Decentralized Autonomous Organization (DAO) Be Legally Structured?' *Legal Revolutionary Journal LRZ* (2021).
[62] Or an unincorporated nonprofit association if the DAO is not operating for profit.
[63] Therefore, in the event that a partner departs the partnership or a new individual becomes a member, the original partnership is legally dissolved and a new partnership is formed with the incoming partner(s) assuming the assets and debts of the dissolved firm while continuing its operations.
[64] M.A. Schillig for the GP under English law. M.A. Schillig (2023), nt. 61.

be characterized as a GP. This case involved a DeFi application called 'bZx Protocol'.[65] Initially, bZeroX LLC controlled this bZx Protocol, but in August 2021, the control was transferred to bZx DAO. In November 2021, a 'hacker'[66] stole around 55 million USD in cryptocurrencies from bZx Protocol users. On 21 November 2021, bZx DAO approved a compensation plan for those impacted by the hack, but complete repayment under this plan would take "thousands of years"[67]. As a result, in May 2022, the Plaintiffs (19 bZx Protocol users who individually lost between 800 and 450,000 USD) filed a putative class action. The plaintiffs' negligence claim was premised on the existence of a GP among all participants holding BZRX tokens.[68] As regards the co-owners requirement for a GP under the California Corporate Code,[69] the plaintiffs alleged that bZx DAO is controlled by those who hold BZRX tokens, and that these token holders have governance rights in the DAO, including the right to suggest and vote on governance proposals.[70] Although the defendants claimed that the governance rights of the token holders are too limited to establish the existence of a GP, the Court considered that a GP can still exist when individual partners only have limited governance rights.[71] The Court established that anyone holding BZRX tokens (that are considered *governance tokens*) is a partner in the partnership.

To limit legal uncertainty for DAOs, some jurisdictions have recognized DAOs as a legitimate legal entity, providing DAO token holders with limited liability. For example, Vermont allows for the creation of a Blockchain-Based LLC (BBLLC).[72] Similarly, Wyoming passed the 2021 Act on Autonomous Decentralized Organizations, with a 2022 amendment facilitating the establishment of a DAO as an LLC.[73] One important difference between these legislative initiatives is that Wyoming (like Tennessee) explicitly excludes members of DAOs from fiduciary duties that would exist under a 'normal' LLC.[74] Vermont, on the other hand, does not exempt members from a DAO from any other judicial, statutory, or regulatory provision under Vermont law.[75] In addition, it seems that whereas Wyoming expressly mandates

[65] Sarcuni v. bZx DAO, nt. 40, I. Background.
[66] In the court decision, the hack is described in the following way: "On or about November 5, 2021, an unknown hacker sent a phishing email to a bZx Protocol developer's personal computer […] the hacker was able to access the developer's personal digital wallet, which in turn provided access to the developer's private key." *Idem*, I. Background.
[67] *Idem*, I. Background.
[68] *Idem*, B. Negligence Claim.
[69] Section 16202(a) California Corporate Code.
[70] *Idem*, C. Partnership Liability.
[71] *Idem*. The court also finds the allegation that BZRX token holders may share profits weighs in favor of treating the DAO as a GP.
[72] Subchapter 12: Blockchain-based Limited Liability Companies of Chapter 25 Limited Liability Companies of Title 11 Corporations, Partnerships and Associations of the Vermont Statutes. Also see P. Matera, Delaware's Dominance, Wyoming's Dare. New Challenge, Same Outcome?, 27 *Fordham Journal of Corporate & Financial Law* 1, 73 (2022).
[73] The Wyoming Decentralized Autonomous Organization Supplement. Hereinafter: Wyoming DAO Supplement or 'WDS'. Tennessee also allows for the creation of an LLC as a Decentralized Organization or 'DO' following section 48-250-103 (d) Tennessee Code (TC). Section 48-5 Utah State Code. In Utah an 'LLD' (Limited Liability Decentralized autonomous organization) may be used from 2024 onwards following Section 48-5 Utah State Code. In New Hampshire a similar bill is pending at the moment of writing (May 2023).
[74] Section 17-31-110 WDS; and Section 48-250-109TC.
[75] Section 4176 Vermont Statute. The law allows to reasonably restrict the fiduciary duties.

decentralization of management by stating that the DAO shall be "managed by the members"[76], Vermont seems to require some human involvement in the DAO's organization and governance.[77]

The COALA 'Model Law'[78] for DAOs outlines that blockchain developers, members, and others involved in DAOs should not have an implicit fiduciary status.[79] For instance, COALA argues that blockchain developers, like most open-source developers, do not have control over how their code is used or modified once released.[80] At the same time, the Model Law enables management by consensus as well as the appointment of 'administrator(s)'. An administrator is defined as "a person, irrespective of title, that is appointed in a manner specified in the By-Laws to take discretionary decisions, either individually or collectively with other Administrators, with regard to specific, predefined operations of the DAO"[81]. COALA thus seems to explicitly acknowledge that, on the one hand, also DAOs in many cases need an agent, but on the other hand, the governance is always technically decentralized,[82] and administrators should not have fiduciary duties unless their fiduciary status is made explicit.[83]

The Model Law provides further possibilities for the governance structure of DAOs.[84] It allows for multiple classes of participation rights, and notes that only participants who hold governance tokens should be considered *members* of the DAO.[85] These governance rights include for instance the ability to propose, vote and veto proposals. Token holders with only financial rights are considered participants, but not members.[86] COALA also provides the example of crypto exchanges like Binance: participants that hold tokens via these exchanges do not have governance rights, and therefore are not considered members of DAOs.[87] In contrast to 'traditional' corporations, COALA claims that there should not be any default voting rights for DAOs, "because the distribution of voting rights must be proactively delineated when creating a DAO". This probably explains the complex voting procedures that are extensively outlined in the by-laws or operating agreement (and included in the smart contracts), like for CityDAO (*cf. supra*, Section 3.1). Transactions costs, however, may arise in DAOs since economic actors, including blockchain developers and other DAO participants, are likely to be boundedly rational and cannot anticipate all contingencies,

[76] Section 17-31-104(e) WDS. Section 17-31-109 WDS defines 'management' as follows: "Management of a decentralized autonomous organization shall be vested in its members or the members and any applicable smart contracts."
[77] C.L. Reyes, 'Autonomous Business Reality', 21 Nevada Law Journal 437, 454–55 (2021).
[78] 'Coalition Of Automated Legal Applications'. It considers itself "the leading think tank on the legal and societal aspects of blockchain technologies". See: https://www.legalico.io/author/coala/. COALA states that The Model Law contains substantive and procedural rules that can be adopted in national laws. COALA Model Law (2021), nt. 36, p. 7.
[79] *Idem,* Article 15.
[80] *Idem,* Commentary to Article 15.
[81] *Idem,* Article 3(2).
[82] *Idem,* Commentary to Article 3.
[83] *Idem.*
[84] Aside from the provisions discussed, the Model Law also covers proxy appointments (article 9).
[85] *Idem,* Article 7(1)-(2).
[86] Similar to existing ways to delink shareholder capital and control rights, like the Dutch depositary receipts (article 2:118a Dutch Civil Code). However, less transparent voting methods without related capital interest can lead to empty voting. Yermack (2007) actually suggests blockchain as a solution to this problem. Yermack (2017), nt. 5.
[87] COALA Model Law (2021), nt. 37, p. 31.

leading to incomplete contracts.[88] Incomplete contract theory in the context of corporate governance suggests that contracts must therefore allow for some asset use discretion, with the owner of the firm retaining residual control rights.[89]

To conclude, DAOs present significant uncertainties in many jurisdictions regarding their legal status, liabilities, and complex governance features. Like all organizations, founding and managing a DAO seems to require at least one individual (agent). During its operational life, new governance questions should be addressed in a decentralized manner by its participants, as predetermined by the smart contract with intricate voting processes. This is fundamentally different from traditional corporations. However, in practice, DAOs appear to be more centralized than expected, including in terms of their ownership structures and (delegated) decision-making processes.

### 3.2. Issuing and trading of corporate securities

The COALA Model Law suggests that DAO members receive their governance tokens directly from the DAO, which is usually not the case for shareholders of (large) corporations. In fact, the situation for these corporations is often more complex due to custody chains that have arisen from market arrangements for issuing, trading, clearing, and settling dematerialized securities, including shares. As a result of these chains, shareholders have less control over their shareholder rights and fewer opportunities for engagement, putting corporate governance at risk of being distorted. [90] Kahan and Rock have already noted that the US system is "crude, imprecise, and fragile," [91] while European issuers and shareholders face similar challenges.[92] Blockchain technology may offer a solution to overcome the deficiencies created by custody chains in issuing, trading, and stock ownership records. By continuously tracking ownership throughout the entire settlement cycle, blockchain can increase transparency and mitigate the risks associated with custody chains. Numerous studies have highlighted the benefits of using blockchain technology for these purposes and present it as a promising solution to these challenges. [93]

[88] For a discussion of transaction costs in smart contracts resulting from "the need for adaptation to mutable and unpredictable occurrences" and several possible solutions to this problem, see M. Vatiero, 'Smart contracts vs incomplete contracts: A transaction cost economics viewpoint', 46 *Computer Law & Security Review* 105710 (2022).
[89] S.J. Grossman & O.D. Hart, 'The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration', 94 *Journal of Political Economy* 4, 691–719 (1986). For a discussion of this seminal work, including its criticism, one may refer to: P. Aghion & R. Holden, 'Incomplete Contracts and the Theory of the Firm: What Have We Learned over the Past 25 Years?' 25 *Journal of Economic Perspectives*, 2 (2011).
[90] "[…] despite their undoubted benefits, custody chains complicate shareholder participation in corporate governance by interposing several layers of intermediaries between companies and their end investors", E. Ferran, 'Shareholder Engagement and Custody Chains', 23 *European Business Organization Law Review* 507, 512 (2022).
[91] M. Kahan & E. B. Rock 'The Hanging Chads of Corporate Voting', *Faculty Scholarship at Penn Law,* 2008, 164, pp. 1230-1231, at 1279.
[92] Lafarre & Van der Elst (2021), nt. 27.
[93] Lafarre & Van der Elst (2021), nt. 27; F. Panisi, R. P. Buckley & D. Arner, 'Blockchain and Public Companies: A Revolution in Share Ownership Transparency, Proxy Voting and Corporate Governance? 2 *The Stanford Journal of Blockchain Law and Policy* (2019); Geis (2018), nt. 27. For a discussion of settlement services in a blockchain environment H. Nabilou, 'Probabilistic Settlement Finality in Proof-of-Work

Several developments in blockchain-based securities issuance, trading and settlement can be observed. In the United States, the SEC approved the BSTX stock exchange in early 2022. This allows for shares to be listed and traded with faster settlement times than the usual two days.[94] All trading activities that take place on BSTX are recorded on a private blockchain. Participants can access their own trading activities as well as anonymized and aggregated trading activities with a delay of approximately five minutes.[95] Also the Depository Trust and Clearing Corporation (DTCC) introduced its Ion project, a blockchain-based alternative settlement platform that has been running alongside the traditional system since August 2022, processing up to 160,000 transactions daily.[96] Many stock exchanges closely monitored blockchain developments and were experimenting with its use,[97] but it seems that only the Australian Securities Exchange (ASX) has been undertaking a multi-year effort to fully replace their current settlement platform, 'CHESS', with a blockchain-based system. However, due to its complexity, the launch of the new system has been repeatedly postponed,[98] and eventually been dropped in November 2022.[99]ASX explained that any technology must meet high market standards due to significant technology, governance, and delivery challenges that need to be addressed, giving rise to serious doubts whether blockchain technology can digest the multibillion trading activities of a large stock exchange.[100]

The experience of ASX demonstrates that transforming an existing settlement and trading platform into a blockchain-based system is "a mammoth undertaking" that involves technical complexities, uncertain business cases, and the need to balance innovation with safeguards to protect the public welfare.[101] To ensure a gradual and smooth pace of change, new technologies can initially be adopted to enhance the performance and functionality of the current system. For instance, Regulation (EU) No 2022/858 permits the use of blockchain technology as a potential solution for the quick settlement of the registration and transfer of financial instruments.[102] The regulation mandates that the settlement date must not be later than the second business day after the transaction. However, this regulation upholds the centralized market

Blockchains: Legal Considerations', available on SSRN (2022); Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, 'The use of DLT in post-trade processes' (2021). Available at: https://www.ecb.europa.eu/pub/pdf/other/ecb.20210412_useofdltposttradeprocesses~958e3af1c8.en.pdf (last accessed 29 March 2023); E. Micheler & L. von der Heyde, 'Holding company Clearing and Settling Securities through Blockchain Technology Creating and Efficient System by Empowering Asset Owners', 31 *Butterworths Journal of International Banking and Financial Law* 11, 652-656 (2016); P. Paech, 'The governance of blockchain financial networks', 80 *Modern Law Review* 6, 1073-1110 (2017).

[94] BSTX reports T+1 (and aims at immediate settlement, T+0). See: https://rules.boxexchange.com/browse (last accessed 29 March 2023).

[95] SEC 'Release No. 34-94092; File No. SR-BOX-2021-06', 27 January 2022, at 6.

[96] DTCC, 'DTCC's Project Ion Platform now Live in Parallel Production Environment, Processing over 100,000 Transactions per Day on DLT', 22 August 2022, available via: https://www.dtcc.com/news/2022/august/22/project-ion (last accessed 29 March 2023).

[97] Like the Deutsche Börse Group and the Deutsche Bundesbank. See Schillig 2022, nt. 39; as well as London Stock Exchange Group and Talinn Stock Exchange (Nasdaq). See A. Andhov, 'Corporations on Blockchain: Opportunities and Challenges', 53 *Cornell International Law Journal* 1, 1-40 (2020).

[98] J. Watkins 'ASX's post-trade blockchain project delayed once again', 4 August 2022, available via: https://www.thetradenews.com/asxs-post-trade-blockchain-project-delayed-once-again/ (last accessed 29 March 2023).

[99] See 'Australian stock exchange apologises for dropping botched blockchain upgrade', *Financial Times* 17 November 2022.

[100] *Idem*.

[101] Ferran (2022), nt. 90, p. 534.

[102] Recital 14 Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot scheme for market infrastructures based on distributed ledger technology and amending Regulations (EU) No 600/2014 and (EU) No 909/2014 and Directive 2014/65/EU, OJ. L No. 151 of 2 June 2022.

mechanism and highlights that non-standardized provisions of registration and settlement persist.[103] At present, there are limitations on the size of the issuer and the value of the securities,[104] and strict requirements must be met by blockchain systems,[105] limiting the use of blockchain technology.[106] ESMA provided guidelines to finalize applications for the establishment of blockchain systems in accordance with this Regulation.[107]

Blockchain technology may also allow companies to register their (non-listed) shares and use tokens as digital securities on a permissioned blockchain. Smart contracts can record necessary consents and restrictions on share transfers, which is particularly helpful for private companies. For instance, with 'white listing', digital shares/tokens can only be transferred to parties listed in the blockchain, allowing issuers to not only verify the acquiring party's identity (KYC) and comply with AML rules,[108] but also with contractual shareholder rights like first refusal rights. Other measures, like correction mechanisms for statutory offer obligation violations or even approval schemes in a shareholder agreement, may also be considered.

Some jurisdictions have already developed legal frameworks for this use of blockchain technology. One example is Delaware, which was an early adopter and allows blockchain for the shareholders' register.[109] France established a *dispositif d'enregistrement électronique partagé* (shared electronic registration device, or DEEP) for issuing and trading securities.[110] Under French law there is no difference whether a shareholder holds the shares via a securities account or via a DEEP that meets certain conditions. The issuance and registration of securities in a DEEP is equivalent to the registration of financial instruments in a register kept by the issuer or intermediary.[111] Ownership of securities recorded on a blockchain (including those that are transferred[112]) is equivalent to a classic securities account. The French legislator also facilitates trading on a DEEP.[113] The conditions for a DEEP, however, *inter alia* include that

[103] Recital 45 Regulation (EU) 2022/858. See for a number of legal issues when operational activities take place in different jurisdictions and with nodes operating under different laws, D. Zetzsche, L. Anker-Sørensen, M. Passador & A. Wehrli, 'DLT-Based Enhancement of Cross-Border Payment Efficiency – a Legal and Regulatory Perspective', BIS Working Papers No 1015 (2022).
[104] See Article 3 of Regulation (EU) 2022/858.
[105] Articles 4 to 7 Regulation (EU) 2022/858.
[106] It appears that Euroclear is presently working on a DLT solution for bonds.
[107] ESMA, 'Report on the DLT Pilot Regime', ESMA 70-460-34, 111 27 September 2022 and ESMA, 'Questions and Answers on the implementation of Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures on distributed ledger technology', ESMA 70-460-189, 3 February 2023.
[108] R. Badhwar, *The CISO's Next Frontier – AI, Post-Quantum Cryptography and Advanced Security Paradigms*, Springer: Cham, p. 263 (2021) .
[109] Section 224 DGCL. Starting from 2018, also Wyoming has allowed the shareholders' register to be facilitated on the blockchain, as long as it can be converted into a written form, as stated in Section 17-16-1601 (d) of the Wyoming Business Corporate Act.
[110] The ordinance 2016-520 of 28 April 2016 facilitated this for bonds and the law Sapin II increased this scope to financial instruments. Various laws, ordinances and decrees further supplemented these regulations.
[111] Article L.211-3, par. 2 *Code monétaire et financier.*
[112] *Idem,* Article L. 211-17, I.
[113] *Idem,* Article R. 211-5, par. 3 states that once registered in a blockchain, units or shares of a UCIT and debt securities can be traded on a trading platform without necessarily first being placed on a managed account.

the issuer must draw up a continuity plan, including an external system for the periodic storage of data.[114] Hence, the French legislator still uses external data storage as a backup.

An example of a company that uses blockchain technology to raise financial resources and trade securities digitally is Arca Capital Management that founded the *Arca US Treasury Fund* in April 2022, an American closed-end management investment company that invests in securities issued by the U.S. government. Arca Labs LLC serves as the "administrator" and holds responsibility for the development of services on the Ethereum blockchain, as well as the issuance of the digital securities, known as *ArCoins*. All transactions occur on the Ethereum blockchain and are recorded there. To invest in the fund, each investor must first be added to a pre-approved list. This requires undergoing KYC and AML procedures with a 'transfer agent', who then opens an account for the investor and records her Arcoin ownership. While it may appear that this investment fund relies on the transparency of the blockchain for the ownership record, the transfer agent maintains the official shareholder register.[115] The prospectus indicates that Ethereum charges transaction costs for validating transactions in addition to the standard management and transaction fees.[116] As a result, it is uncertain whether the numerous benefits of using blockchain technology as described by Arca are realized.[117]

In conclusion, while blockchain technology may present a solution to the issues created by custody chains in issuing, trading, and monitoring corporate securities and stock ownership records, practical examples and legal developments demonstrate that migrating an existing system to a new blockchain-based system is a complex process. The available applications are rather limited, and there is still some reluctance to fully rely on the technology.

### 3.3. Corporate Decision-Making

Custody chains complicate the relationship between the issuer and its shareholders: after all, for shareholder identification, information, communication, and voting, issuers and shareholders depend on the transfer of information by intermediaries. In particular, shareholder votes are not always counted correctly. In Europe, these shortcomings have been acknowledged by the Shareholder Rights Directive (SRD) II.[118] The SRD II

[114] *Idem,* Article R. 211-9-7. The DEEP must also be designed in such way to guarantee the registration and integrity of registrations and to allow, directly or indirectly, the identification of the owner of the titles, as well as the type and number.
[115] The process seems to proceed as follows. The transfer agent bears the responsibility for keeping an account of each potential counterparty of the shareholder who acquired the ArCoins. If the counterparty is not 'whitelisted', the transfer of the ArCoins fails. The transfer agent then has a correction possibility and can synchronize the blockchain with its own share register.
[116] The prospectus shows that the average transaction fee was $62, which is a very significant amount for small transactions.
[117] The benefits mentioned in the prospectus are: (i) the use of the peer-to-peer network, (ii) the reduced settlement time, (iii) the possibility of carrying out the transactions on the blockchain and, iv) the reduced costs (p.15). However, the transaction costs are high, and one should note that the settlement period should take into account the registration process of the transfer agent.
[118] Directive (EU) 2017/828. Also see C.F. Van der Elst & A.J.F. Lafarre, 'Blockchain and smart contracting for the shareholder community', 20 *European Business Organization Law Review*, 1, 111-137 (2019).

mandates confirmation to shareholders, at least upon request, that their votes have been correctly registered and counted.[119] The European Commission has suggested to encourage the use of "modern technologies" for this.[120] Similarly, in 2016, Vice-Chancellor Laster of Delaware proposed blockchain as a potential solution for proxy voting in the American context.[121] The use of blockchain technology can facilitate shareholder decision-making by enabling direct and simple exercise of voting rights, which can result in increased shareholder engagement with corporations.

Panisi, Buckley and Arner describe how increased transparency in shareholder voting with the use of blockchain provides substantial benefits, including (i) reducing errors and costs in shareholder voting; (ii) increasing the legitimacy and quality of the shareholder voting process and therefore enhance 'shareholder democracy', and (iii) enhancing 'fairness' between different stakeholders.[122] Our 2021 paper highlights an additional advantage, namely the potential for direct communication between an issuer and its shareholders.[123] Davies explains that UK proxy agents receive voting instructions shortly after meeting notices, but withhold submission until close to the deadline. Issuers prefer receiving this information when proxies are cast, rather than at the last minute, as the late submission offers issuers little value and is unlikely to influence policies or voting decisions.[124] However, research suggests that more transparency in blockchain markets may also lead to less shareholder involvement, discouraging activists and raiders from investing in firms, as they seem to prefer building share positions secretly to avoid higher costs.[125]

#### 3.3.1. Shareholder voting on a blockchain

A permissioned blockchain can be used for voting by shareholders, identifying shareholders and passing on information from the issuer to shareholders, for example using the following model:[126]

The issuer convenes the AGM and uploads the documentation in a standardized form to the blockchain so that the information about the AGM is available to all participants in the blockchain (step 1).[127] In case all transactions are recorded on a blockchain, whereby shares are issued and stored in the

[119] Ferran (2022), nt. 90.
[120] Implementing Regulation (EU) 2018/1212, Preamble 4.
[121] Travis Slander 'CII Keynote Speech: The block chain plunger: using technology to clean up proxy plumbing and take back the vote', 29 September 2016. Available at: https://www.cii.org/files/09_29_16_laster_remarks.pdf (last accessed 29 March 2023).
[122] According to the authors, heightened transparency will make it increasingly challenging to conceal practices like empty voting until voting. This will enable stakeholders to respond promptly and employ opposing strategies to prevent certain actions. Also see Yermack (2017), nt. 5.
[123] Lafarre & Van der Elst (2021), nt. 27. Our paper discusses an additional benefit of blockchain, which is the potential for an improved model for virtual-only AGMs. This is due to the heightened transparency, verifiability, and immutability of recorded information. Virtual-only meetings have been criticized for directors' ability to avoid difficult shareholder questions, but blockchain technology may be able to address this issue.
[124] P. Davies, Investment Chains and Corporate Governance, in L. Gullifer & J. Payne (eds.), *Intermediation and Beyond,* Hart: London (2019).
[125] Yermack (2017), nt. 5; Ferran (2022), nt. 90.
[126] While there may be some differences in implementation, the fundamental element of such a blockchain-based shareholder voting model is the establishment of a secure and transparent digital record of share ownership that facilitates the direct exercise of shareholder rights. Also see Panisi, Buckley & Arner (2019), nt. 92, at. 213.
[127] The use of blockchain technology can enhance transparency regarding the sequence of events occurring between the notice of the meeting and the date of the AGM. Frequently, agenda items are withdrawn, and in numerous instances, the board seems to be cognizant of the development of voting that takes place before the AGM.

wallets of the shareholders, the voting rights attached to the shares can be directly matched with the corresponding shareholders using a KYC process (step 2).[128] In the traditional intermediated model the intermediaries at each level of the intermediated securities chain need to upload a list of their beneficiaries so that the beneficial shareholders can be identified.[129] As a next step, the beneficial shareholders are given access to the documentation of the AGM and the corresponding voting right tokens (step 3). Subsequently, shareholders can use these tokens to vote themselves or to appoint a proxy to vote on their behalf who is added to the blockchain by the issuer (step 4). After the beneficial owners (or their proxies) have cast their votes, the shareholders can verify that their vote is correctly included in the voting results (step 5).[130]

In recent years, several initiatives were introduced to leverage the technology's potential for shareholder voting.[131] For instance, ASX planned to enable shareholders to cast votes on the blockchain. The Spanish company Iberdrola announced it has used blockchain technology for its 2022 AGM.[132] As a major international player, Broadridge has already launched several initiatives, including the cooperation with the Tokyo Stock Exchange (TSE)[133] and Banco Santander.[134] In 2022, Broadridge has announced to provide *end-to-end confirmation* to all shareholders of the listed companies in the US of which Broadridge registers the votes.[135] To our knowledge, although there have been several examples, no issuer has utilized blockchain technology for their AGM more than once, and many of the initiatives that are announced fail to materialize.

### 3.3.2. Stakeholder Involvement

Blockchain technology can also present possibilities to engage stakeholders in corporate decision-making.[136] As previously mentioned, shareholders can utilize blockchain to exercise their voting rights, and

[128] See Panisi, Buckley & Arner (2019), nt. 92, at. 212. The authors describe the e-voting project in Estonia led by Nasdaq and the Tallin Stock Exchange.
[129] Every relevant intermediary can run a node. But of course, the ultimate goal of using blockchain in shareholder voting is to disintermediate the current system. See Lafarre & Van der Elst (2021), nt. 28.
[130] In order to guarantee privacy, shareholders should have access only to their own voting decisions and overall voting results. However, institutional investors may find it desirable to disclose their voting decisions due to various (voluntary and compulsory) requirements related to the disclosure of their active ownership behavior.
[131] We refer to previous work for an overview of these initiatives. See A.J.F. Lafarre & C.F. Van der Elst 'Legal tech and blockchain for corporate governance and shareholders', in *Research Handbook in Data Science and Law* (2018).
[132] See: https://www.iberdrola.com/press-room/news/detail/iberdrola-first-company-to-use-blockchain-to-certify-shareholdings-general-shareholders-meeting (last accessed 29 March 2023). In addition Iberdrola has used Metaverse to let shareholders take a virtual tour along its latest projects.
[133] See: https://www.broadridge.com/intl/press-release/2019/icj-and-broadridge-execute-the-proxy-voting-process (last accessed 29 March 2023).
[134] See: https://www.broadridge.com/intl/press-release/2018/santander-and-broadridge-completed-practical-use-of-blockchain (last accessed 29 March 2023).
[135] See: https://www.broadridge-ir.com/news/news-details/2022/Broadridge-Enhances-Trust-in-Proxy-Voting-Results-with-Extension-of-End-to-End-Vote-Confirmation-Services/default.aspx (last accessed 29 March 2023). Broadridge and the SEC have had end-to-end confirmation on their agenda for many years. See: Broadridge, 'Report of Roundtable on Proxy Governance: Recommendations for Providing End-to-End Vote Confirmation', August, 2011, available via: https://www.broadridge.com/_assets/pdf/broadridge-report-on-roundtable-on-proxy-governance.pdf; SEC 'End-to-End Vote Confirmation Announcement: Conclusions from the Securities Industry End to End Vote Confirmation Steering Committee' 2016, available from: https://www.sec.gov/comments/4-681/4681-6355043-196249.pdf. At the time of writing this contribution, Broadridge has not yet reported on the results of these vote confirmations of the 2022 AGM season.
[136] Chiu & Lim 2021, nt. 10.

this approach may be extended to other stakeholders who may, for instance, be provided an advisory role in certain decisions. It provides limitless possibilities to reconsider the distribution of decision-making powers within the corporation and the inclusion of stakeholders in the process. For example, different classes of stakeholders could submit and evaluate proposals within their respective groups or networks, like the 'Guilds' in the governance structure of CityDAO (*cf. supra,* Section 3.1). After a certain predetermined level of agreement is achieved within a specific class of stakeholders, for example through a vote of that stakeholder class with predetermined majority and quorum requirements, the proposal can be presented to the corporate board and/or the AGM, or even to other stakeholder classes. Albeit interesting, the discussion of whether stakeholders should have voting rights and, if so, which ones, is not within the scope of this chapter. Blockchain technology and the decentralized governance structures of DAOs with their various token classes and (complex) voting procedures can perhaps inspire corporate law and governance scholars and regulators to rethink current corporate governance models and the division of powers in corporations. At the very least, corporate boards can use modern technology like blockchain to consult their stakeholders directly on issues they are dealing with, such as ESG matters. Stakeholder dialogue is an important pillar of corporate sustainability (human rights) due diligence,[137] and seems to become more embedded in corporate governance. For instance, the Dutch Corporate Governance Code 2022 indicates in Principle 1.1.5 that companies should discuss with relevant stakeholders about the sustainability aspects of the strategy and its implementation.

Finally, blockchain technology can also be used in the relationship between institutional investors and ultimate beneficiaries. For example, research has led to the beneficiaries of Dutch pension fund *Pensioenfonds Detailhandel* being able to participate in the decision-making process about whether to add a SDG to the sustainability policy of this institutional investor.[138] By means of a technology such as blockchain, beneficiaries could regularly advise or co-decide on the investment and voting policy of institutional investors. Institutional investors, in turn, would also be able to communicate their voting preferences directly and in a transparent manner to their asset managers via the blockchain. Asset managers like BlackRock nowadays allow (part of) their clients to directly exercise their stewardship preferences through pass-through voting platforms.[139] Blockchain technology can offer the required transparency and reliability to guarantee asset owners that their shares are correctly voted, thereby enabling them to make credible claims about their engagement strategies to their beneficiaries. However, like with every blockchain application, it is essential to critically evaluate the necessity of blockchain technology itself, as

[137] For instance, see the OECD Due Diligence Guidance for Responsible Business Conduct on meaningful stakeholder engagement.
[138] R. Bauer T. Ruof & P. Smeets, 'Get Real! Individuals Prefer More Sustainable Investments', 34 *The Review of Financial Studies* 8, 3976–4043 (2021).
[139] See, for example, Blackrock's announcement: https://www.blackrock.com/corporate/newsroom/press-releases/article/corporate-one/press-releases/2022-blackrock-voting-choice (last accessed 29 March 2023).

centralized systems with secure and transparent digital record-keeping might perhaps offer comparable outcomes in these cases.[140]

## 4. Concluding Remarks

Advocates widely recognize blockchain technology and distributed ledger technologies (DLT) as transformative influences in corporate governance. They believe that these technologies enable the creation of decentralized autonomous organizations (DAOs) that operate fully decentralized, without hierarchical structures. Additionally, literature suggests that DLT can address inefficiencies arising from intermediated securities models by providing transparent shareholder identification and end-to-end verification of shareholder voting. The technology also holds the promise of enhancing shareholder participation and offers opportunities for stakeholder involvement.

However, despite the initial hype, serious questions remain about the practicality and viability of DLT-based corporate governance initiatives. The emergence of DAOs operating on the blockchain has garnered significant attention, but challenges and uncertainties persist regarding their legal status, complex governance structures, and liability features. Practical implementation often reveals elements of centralization and the presence of agents despite their intention to decentralize decision-making and ownership.

This chapter also examines the impact of blockchain and DLT on corporate governance, focusing on how they can strengthen various corporate functions, such as share issuance, trading, and decision-making processes. While blockchain technology has the potential to address custody chain issues and enhance transparency in corporate securities and stock ownership records, the transition from existing systems to blockchain-based ones is complex, as evidenced by the ASX CHESS Replacement program. Although blockchain technology has the potential to provide advantages in the realm of shareholder and stakeholder rights, it is essential to consider the significant caveats and practical limitations.

In conclusion, while blockchain technology offers significant advantages for corporate governance, understanding its limitations and legal implications is essential. The ongoing development of blockchain applications in corporate governance presents both opportunities and challenges in integrating this technology into existing frameworks.

[140] E. Schuster, 'Cloud Crypto Land', 84 *Modern Law Review* 5 (2020), p. 974-1004.

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