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THE RISE OF DECENTRALIZED AUTONOMOUS ORGANIZATIONS: OPPORTUNITIES AND CHALLENGES

Aaron Wright*

I. INTRODUCTION

Blockchains are not simply about money. The modern-day alchemists who minted Bitcoin and other digital assets have animated a generation of technologists to reimagine how the financial and commercial world operates. The vision that these technologists aim to bring to fruition is not just about payment systems and other financial instruments. Large blockchain-based ecosystems and projects point to a future where online groups coordinate at arms-length and potentially pseudonymously, relying exclusively or entirely on software.

The shape of this future is rapidly coming into focus and centers around an organization referred to by technologists as “decentralized autonomous organizations,” or DAOs.¹ These DAOs operate with different assumptions than many of today’s traditional legal entities and other business associations. DAOs are not run by boards or managers, but rather aim to be governed by democratic or highly participatory processes or algorithms. Instead of operating in one or a handful of jurisdictions, DAOs seek to stretch across the globe, stitching together thousands—if not tens or hundreds of thousands—of members regardless of their physical location, background, or creed. DAOs often attempt to avoid written agreements or

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¹ Dan Larimer, a software developer, was the first to propose the idea of a decentralized autonomous organization. He initially referred to it as a “decentralized autonomous company.” See Dan Larimer, *Overpaying for Security*, LTB NETWORK (Sept. 7, 2013), <https://letstalkbitcoin.com/is-bitcoin-overpaying-for-false-security>. He contemplated an organization where the “source code defines the bylaws.” *Id.* Since Larimer’s first writings, the concept of a decentralized autonomous company, or DAC, has been generalized to a DAO to accommodate “non-capitalist” organizations. See Vitalik Buterin, THE ETHEREUM WHITEPAPER (July 9, 2020), <https://ethereum.org/en/whitepaper>.

other forms of legal formalities, with members primarily agreeing to abide by and govern their affairs using software and the rule of code.²

At least as compared to existing legal entities, DAOs present certain operational efficiencies and are currently used by organizations managing over \$500m in assets, suggesting that legal regimes should take steps to accommodate their growth and development.³ DAOs are able to rapidly pool and deploy capital, often implement low-cost and streamlined digital voting schemes, and implement internal controls that protect member assets and could help reduce the need for ongoing monitoring to detect fraud or other insider abuses.⁴

Nevertheless, DAOs are not without their challenges. The ideal design of DAOs is still being explored, exposing challenging governance questions which may ultimately stymie their growth and development.⁵ DAOs are not formally recognized and do not fit neatly into existing forms of business associations, making it difficult for DAOs to interact with traditional business entities and imposing personal risk on members.⁶ In certain instances, interests in DAOs may be difficult to classify, raising regulatory concerns when it comes to securities laws.⁷

This Essay explores the nature of DAOs and highlights several areas where states and regulators can adapt existing legal regimes to potentially accommodate DAOs. Part II provides an overview of DAOs and their perceived benefits and includes a taxonomy of DAOs to help understand the different variations currently emerging in the blockchain ecosystem. Part III describes current challenges with DAOs and outlines potential ways technologists or state officials can address these concerns to accommodate and foster the growth of these natively digital entities.

II. DECENTRALIZED AUTONOMOUS ORGANIZATIONS AND THEIR POTENTIAL ADVANTAGES

The evolution from bureaucratic to algorithmic entities represents a logical continuation of a core human activity. For millennia, organizations have emerged to coordinate economic and social interactions in response to novel business challenges of the time. For example, Romans devised a

² See Part II *infra*; see also Usha R. Rodrigues, *Law and the Blockchain*, 104 IOWA L. REV. 679, 707 (2019).

³ DAOpulse Issue #6, *\$500m DAOs Marketcap*, DEEPDAO (Sept. 5, 2020), <https://deepdao.substack.com/p/daopulse-issue-6-500m-daos-marketcap> (noting that DAOs are hitting a milestone of managing over \$500 million worth of digital assets, including 16 DAOs with over \$1m in assets).

⁴ *Id.*

⁵ See Part II, *infra*.

⁶ *Id.*

⁷ *Id.*

variety of commercial entities, such as the *societas peculium* and *societas publicanorum*, enabling parties to engage in a range of commercial activities and to carry out state contracts by enabling profit sharing and limited liability.⁸ During the Middle Ages, Italians pioneered early versions of a limited partnership to finance maritime trade.⁹ The Age of Exploration, during the 1600s, brought to life joint stock companies in England and the Netherlands, as Europe began to look beyond its borders and operate on a more global basis.¹⁰ The Industrial Era in the United States was powered, in part, by the modern corporation, starting in 1811 when New York granted private parties the ability to form their own corporate structures without an extensive approval process.¹¹ In more recent times, the turbulent energy markets of the late 1970s brought to life the limited liability company, enabling parties to explore international oil and gas opportunities when major domestic producers struggled with problems related to Middle Eastern oil supply.¹²

As our world has become increasingly digital, technologists continue to seek to evolve social coordination by using blockchain technology and associated smart contracts to structure—and ultimately automate—key aspects of group decision-making, capital formation, and capital deployment. These digitally native organizations, referred to as DAOs, hold out the hope, at least in the eyes of their creators, to serve as the primary organizational structure for the Internet Age.

A. Overview of DAOs

DAOs are seen as a way to solve a vexing problem faced by software developers today, namely how to manage open source technology that—by design—involves highly autonomous software.¹³ These issues are first

⁸ Henry Hansmann et al., *Law and the Rise of the Firm*, 119 HARV. L. REV. 1333 (2006); Scott Hirst, *Corporate Law Lesson From Ancient Rome*, HARVARD FORUM ON CORPORATE GOVERNANCE (June 19, 2011), <https://corpgov.law.harvard.edu/2011/06/19/corporate-law-lessons-from-ancient-rome>.

⁹ HAROLD J. BERMAN, *LAW AND REVOLUTION: THE FORMATION OF THE WESTERN LEGAL TRADITION* (1983).

¹⁰ JANICE E. THOMSON, *MERCENARIES, PIRATES, AND SOVEREIGNS: STATE-BUILDING AND EXTRATERRITORIAL VIOLENCE IN EARLY MODERN EUROPE* 25-30 (1996).

¹¹ Walter Werner, *Corporation Law in Search of Its Future*, 81 COLUMBIA L. REV. 1611 (1981).

¹² See Susan Pace Hamill, *The Origins Behind the Limited Liability Company*, 59 OHIO ST. L. J. 1459, 1463 (1998) (explaining that the “the LLC’s birth boils down to innovative professionals creating solutions” for “client needs” to explore “increased opportunities in international oil and gas exploration during the turbulent 1970s, when the major producers struggled with problems related to the middle eastern oil supply.”).

¹³ PRIMAVERA DE FILIPPI & AARON WRIGHT, *BLOCKCHAIN AND THE LAW: THE RULE OF CODE* 131-155 (2018).

emerging in the blockchain ecosystem, but as open source technology continues to grow and automated software increasingly seeps into the background of our daily lives, the use of DAOs may expand out of the sole domain of blockchain developers and into a range of industries.

The boundaries of what qualifies as a DAO are still evolving, but in their current form, DAOs rely on blockchains, autonomous smart contracts, and digital assets to support organizations that operate natively on the Internet and have the capability of scaling globally from their birth.¹⁴ Blockchains act as the underlying spine to support these organizations, with the novel technology serving as a central point of coordination to facilitate economic transactions and social interaction. The hope is that DAOs build and improve upon existing legal entities by being entirely digitally native, easy to join, and global in reach.¹⁵

Members rely on smart contracts as the primary glue to manage member-to-member transactions. Smart contracts define tamper-resistant rules that structure and facilitate the operation of the organization.¹⁶ Due to these characteristics, DAOs differ in part from today's existing enterprises and corporations, which rely on statutory laws and often written documents to define the metes and bounds of the organization.¹⁷

For many DAOs, members aim to have smart contract code rule supreme. Parties that join a DAO agree, in substance, to abide not just by the rule of law, but the rule of code.¹⁸ This code forms a cohesive network of hard to change rules that establish the standards and procedures of anyone interacting with, or taking part in, a DAO.¹⁹

With these capabilities, blockchain technology enables the creation of organizations where members collaborate on a peer-to-peer basis—and, if desired, transact value—with less of a need to rely on a centralized entity or intermediary. Inspired by models of open source collaboration, DAOs

¹⁴ A number of DAOs are expected to manage open source blockchain-based software protocols involving financial protocols and projects. For example, dxDAO is a community-run organization that supports several open source projects, including a digital asset portfolio manager, prediction market, decentralized exchange, and swap protocol. *See* DxDAO, <https://dxdao.eth.link> (last accessed Sept. 5, 2020). Another example of an emerging DAO is MStable, which supports an open source protocol to generate and manage tokenized assets, stablecoins, and basic lending functionality. MStable, <https://mstable.org/#about> (last accessed Sept. 5, 2020).

¹⁵ DE FILIPPI & WRIGHT, *supra* note 13, at 131-155.

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ One notable current example of DAO-related smart contracts are the MolochDAO smart contracts. These smart contracts enable members of a DAO to pool funds, keep track of ownership interests, and accept another digital asset back from a third-party in exchange for a transfer of funds. *See* Moloch Ventures, MOLOCH, https://github.com/MolochVentures/moloch/tree/minimal-revenue/v1_contracts (last accessed Sept. 5, 2020).

connect people together through blockchain-based protocols and code-based systems, focusing on achieving a shared social or economic mission. DAOs extend commons-based peer production systems examined by Yochai Benkler.²⁰ They are “decentralized, collaborative, and nonproprietary” organizational structures “based on sharing resources and outputs among widely distributed, loosely connected individuals who cooperate with each other without relying on either market signals or managerial commands.”²¹

At their most basic level, DAOs rely on smart contracts to grant people the ability to control or direct the organization’s assets either directly or indirectly. Smart contracts and an underlying blockchain keep track of members of the organization and membership can be purchased or allocated as a reward (often in the form of a token) in exchange for capital, use, or resources.²² Membership in a DAO gives participants specific rights. Some DAOs give members the right to a portion of an organization’s profits or losses. Other DAOs provide their members with the right to access, manage, or transfer the resources or services that an organization controls. Membership can also be associated with specific privileges, providing people the opportunity to engage in an organization’s decision-making processes.²³

DAOs tend to differ from existing organizational structures in several key respects. First, DAOs often lack formal managers and the implied relationship between DAO members—for many DAOs—is not that of a fiduciary, but rather that members stand on equal footing, at least in terms of the availability to join and gain access to pertinent information related to how a given DAO operates. Second, DAO membership is not viewed as necessarily long lasting and may prove to be transitory in nature. Members may join for limited periods of time, participate in the organization, and exit a DAO due to a lack of interest, a better opportunity, or for other reasons.

Governance in DAOs often is achieved in a less hierarchical manner, and in a way that is generally more reliant on group consensus. These new organizations do not necessarily rely on boards of directors or chief executive officers; rather, an increasing number of DAOs are managed by distributed consensus—using smart contracts to aggregate the votes or preferences of members (i.e., *participatory DAOs*). A second, more nascent camp of DAOs aims to be entirely algorithmic in nature with the underlying smart contracts dictating the entire functionality of a DAO (i.e., *algorithmic DAOs*).²⁴ The ecosystem of DAOs can be visualized as follows:

²⁰ YOCHAI BENKLER, *THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM* 24 (2006).

²¹ *Id.*

²² DE FILIPPI & WRIGHT, *supra* note 13, at 131-45.

²³ *Id.*

²⁴ *Id.*

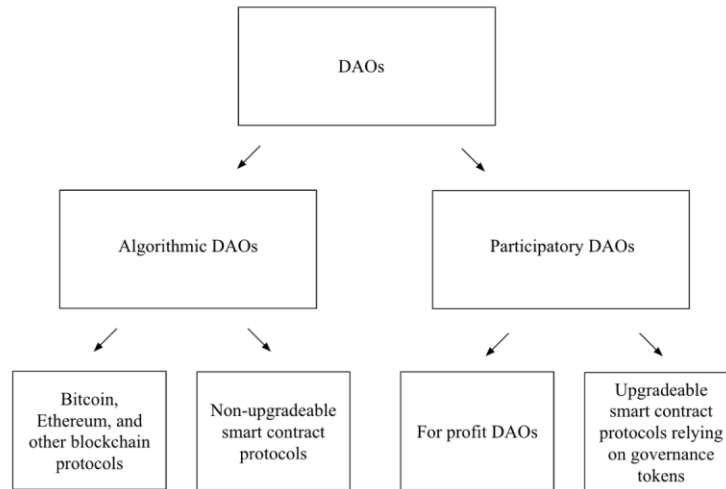


Figure 1: A Taxonomy of DAOs

The above emergent DAOs structures represent two distinct organizational designs deployed by blockchain developers and enthusiasts. *Algorithmic DAOs* defer entirely to software to structure and coordinate social interactions, in the same vein as Bitcoin, Ethereum, and other decentralized blockchain-based protocols.²⁵ *Participatory DAOs* are being used to engage in traditional commercial endeavors—like venture capital financing—and are being explored to manage open source technology involving a smart contract running on the Ethereum blockchain.²⁶

The latter form of *participatory DAO* is perhaps the most significant. Smart contracts by their nature are hard to modify and change once deployed to a blockchain.²⁷ They are tamper-resistant and can be designed to be autonomous, creating regulatory challenges and making it difficult for

²⁵ Ying-Ying Hsieh et al., *Bitcoin and the Rise of Decentralized Autonomous Organizations*, 7 J ORGANIZATION DESIGN 1-16 (2018) (characterizing Bitcoin as “the first real-world implementation of a ‘decentralized autonomous organization’ . . . and . . . a new paradigm for organization design.”). Note an algorithmic DAO is the only DAO that is truly autonomous in the sense that it coordinates human activity and is not dependent on ongoing human decision-making to technically operate.

²⁶ See note 15 for examples of open source blockchain-based projects currently being managed via a DAO. Other *participatory DAOs* engaging in other forms of commercial activity include The LAO and MetaCartel Ventures. See THE LAO, <https://www.thelao.io> (last accessed Sept. 5, 2020); METACARTEL VENTURES, <https://metacartel.xyz> (last accessed Sept. 30, 2020). Note *participatory DAOs* are also referred to as “decentralized organizations.” Indeed, in a previous writing, I have referred to them as such. DE FILIPPI & WRIGHT, *supra* note 13, at 135-41.

²⁷ *Id.*

users of the software to modify the smart contract if there is a bug, issue, or regulatory concern.²⁸

Participatory DAOs help soften some of the downsides that accompany more autonomous smart contracts. By relying on a DAO, the initial developers of the smart contract-based protocol can transfer ongoing decision-making to a disparate group of the software's users and supporters. Members of these DAOs generally have the power to set parameters needed by the underlying smart contract and also have the ability to update the smart contract itself. Governance decisions occur through a vote measured by a "token" that is distributed to users of the smart contract, as well as the smart contract's initial developers and sometimes those developers' investors.

These participatory DAOs point towards a future where open source technology is managed by its users or other governance token holders who are presumably committed to ensuring the continued development of the underlying smart contract-based technology. These governance tokens likely will help keep the smart contract developers in check by preventing them from taking actions that would go against the smart contract's users. At the same time, holders of the governance token can take ready action to account for regulatory requirements, should they arise, or complex technical or organizational issues that may emerge over time.

B. Perceived Advantages of DAOs

Early examples of DAOs indicate several areas where DAOs may present operational advantages, at least as compared to existing legal organizational structures. DAO participants contribute digital assets to a DAO, and join as members, with a few clicks on their mobile phone or a browser-based blockchain wallet. With blockchain technology, the movement of assets occurs in a matter of seconds (and potentially over time even in fractions of a second).²⁹ Digital assets move across blockchain-based networks unobstructed, slowed not by layers of financial institutions but rather by the rates at which validators add blocks to the underlying data structure.

Due to these characteristics, DAOs enable disparate groups of people to pool capital through the Internet, exhibiting comparable abilities as earlier

²⁸ *Id.*

²⁹ Currently blockchains face certain technical limitations that limit the number of transactions that public, blockchain-based networks can process. These "scalability" concerns currently only make it possible to process a digital asset transaction in up to 12 seconds on large blockchains such as Ethereum. Overcoming technical hurdles to these challenges is a major point of inquiry for computer scientists and other technologists working to enhance and improve blockchain technology.

blockchain-based token sales (or initial coin offerings, ICOs). From late 2016 to mid-2018, billions of dollars were collected by entrepreneurs (and sometimes nefarious actors) through token sales to raise funds for the development of new software applications, networks, and platforms.³⁰ These same capabilities are now manifesting with DAOs.³¹ Instead of harnessing the power of blockchain technology to fund an individual software development project, DAOs now are being used to pool capital to engage in venture-style type investments or other forms of investment activity.

Indeed, a number of new DAOs are building on the lessons of one of the first DAO-related experiments, the confusingly named “The Decentralized Autonomous Organization” or “The DAO.” This early DAO-structure raised over \$150 million worth of ether through the sale of blockchain-based tokens in 2016 (now worth several billion dollars).³² Like a traditional venture capital fund, The DAO aimed to invest in young technology projects. But unlike a traditional venture capital fund, The DAO’s investment decisions were democratically managed by its members, not by a small group of upper level managers or general partners.³³ While The DAO had a short life due to technical vulnerabilities,³⁴ The DAO has animated a new generation of technologists to restart similar DAO experiments, in ways that aim to comply with existing laws and regulations.³⁵

Pooling capital is just one of the potential operational efficiencies presented by DAOs. DAOs also streamline group decision-making by either deferring entirely to an algorithmic system or by deploying blockchain-

³⁰ See generally Jonathan Rohr & Aaron Wright, *Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets*, 70 HASTINGS L. J. 463 (2019).

³¹ DAOpulse, note 3 (noting that over \$500m are currently being managed by DAOs).

³² These tokens were eventually found by the Securities and Exchange Commission to constitute securities for purposes of American securities laws. Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO, SEC Release No. 81207 (July 25, 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

³³ See Christoph Jentzsch, *Decentralized Autonomous Organization to Automate Governance*, <https://lawofthelevel.lexblogplatformthree.com/wp-content/uploads/sites/187/2017/07/WhitePaper-1.pdf> (last accessed Oct. 3, 2020).

Specifically, investment decisions were put to a vote of the holders of DAO tokens. Each token entitled its holder to participate in determining how the funds raised by The DAO would be invested. Broadly, tech developers seeking funding for a project could apply to The DAO for funding for a project, and provided certain requirements were met (including approval by a group of individuals known as Curators), the funding decision was put to a vote of the holders of DAO Tokens. If a sufficient number of tokens voted to fund a project, smart contracts transferred virtual currency from the DAO account to the account specified by the developer whose project was approved. The DAO was to receive a percentage of any income generated by the projects it funded.

³⁴ Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO, SEC Release No. 81207 (July 25, 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

³⁵ See *supra* note 26.

based voting schemes. Currently many DAOs are exploring the latter approach, implementing mechanisms for DAO-members to engage in secure digital voting. Participants in DAOs sign a blockchain-based transaction and record evidence of a vote on a blockchain, with comparative voting weights assessed by capital contributions, ownership balances, or ownership of a DAO's native token.³⁶ By relying on a blockchain for voting, members can cryptographically verify the results of member votes,³⁷ and depending on whether identities are correlated with the addresses used for voting, who voted and how. DAO members' decisions are open for public audit by all members of the organization (and potentially even the public), helping to ensure that procedural rules for decision-making have been followed and decreasing potential risks related to miscalculated votes. The smart contracts underpinning some of today's participatory DAOs also provide for vote delegation, reducing the cost of proxy-based voting schemes or alternative voting structures that lower the cost of soliciting member feedback and input.

The impact of these capabilities could be wide-ranging.³⁸ First, by rendering the decision-making process more transparent, secure, and autonomous, DAOs hold out the hope of being more responsive than existing legal entities. By conducting and recording votes on a blockchain, participatory DAOs implement voting procedures that exhibit a high degree of transparency, while also avoiding opportunities for contested decision-making, fraudulent behavior, or simple mistake.³⁹

Second, due to a DAO's inherently digital nature, the mechanics of voting are streamlined and less cost-intensive in participatory DAOs. Votes no longer require paper mailings or secure e-proxy services because they are administered via a blockchain.⁴⁰ As a result, DAO-based voting often occurs on an ongoing basis, not just at predetermined times of the year.⁴¹ More regular and streamlined reliance on member-voting effectuates *privately-ordered*, firm-specific allocations of decision-making power. It becomes economically feasible for DAO-members themselves to assume a greater role in the management of organizations, as opposed to a central manager. As a result, member input often exclusively steers the direction of a DAO.

Third, DAOs that rely on participatory input incorporate information and feedback from a wider group of stakeholders in a wider variety of

³⁶ DE FILIPPI & WRIGHT, *supra* note 13, at 131-45.

³⁷ Anne Lafarre & Christoph Van der Elst, *Blockchain Technology for Corporate Governance and Shareholder Activism*, 15-16 (2018), http://ssrn.com/abstract_id=3135209.

³⁸ *Id.*

³⁹ DE FILIPPI & WRIGHT, *supra* note 13, at 134.

⁴⁰ *Id.*

⁴¹ Lafarre & Elst, *supra* note 37, at 18.

situations and circumstances. Indeed, the technologists building these systems often hope to empower large groups of people to participate in DAO-related decisions, aiming to eliminate the need for one or more central managers. If effective, this approach could draw into question a foundational principle of corporate governance: the allocation of managerial authority to the board of directors and its primacy.⁴²

Beyond holding out the hope of creating more responsive legal entities, smart contracts offer new ways for organizations to improve internal controls over collected or earned assets.⁴³ Many organizations still struggle to implement appropriate safeguards to protect against the misappropriation or the misuse of funds.⁴⁴ Corporations, and other large entities, generally mitigate this risk by segregating duties between different parties within the organization, so as to ensure that no one person can unilaterally transfer or expend assets.⁴⁵

By relying on blockchain-based smart contracts, DAOs appear to reduce the likelihood of self-dealing and opportunistic behavior. As opposed to traditional organizations, DAOs are governed according to rigid rules defined in the code of smart contracts. This makes it possible to structure an organization in a more deterministic manner, with code detailing the rules for how members agree to cooperate.

By way of illustration, DAOs often divide organizational duties between members and deploy smart contract code that bars any DAO-related transaction from occurring without the express approval of multiple parties.⁴⁶ In this sense, the rigidity of a blockchain serves as an additional

⁴² Stephen M. Bainbridge, *Director Primacy and Shareholder Disempowerment*, 119 HARV. L. REV. 1735, 1745 (2006).

⁴³ Legal scholars like George Triantis have focused on asset portioning as being a core aspect of corporate law, viewing corporate law as a tool to demarcate firm boundaries. See George G. Triantis, *Organizations as Internal Capital Markets: The Legal Boundaries of Firms, Collateral, and Trusts in Commercial and Charitable Enterprises*, 117 HARV. L. REV. 1102, 1104, 1106 (2004). In a sense, smart contracts and the controls implemented in software accomplish this goal.

⁴⁴ Jeffrey Doyle et al., *Determinants of Weaknesses in Internal Control over Financial Reporting*, 44.1 JOURNAL OF ACCOUNTING AND ECONOMICS 193-223 (2007).

⁴⁵ Eugene F. Fama & Michael C. Jensen, *Separation of ownership and control*, 26.2 JOURNAL OF LAW & ECONOMICS 301-325 (1983). Indeed, that is one reason why the board of directors of a corporation generally has a fiduciary obligation to approve large capital expenditures before disseminating funds.

⁴⁶ This can be done through multi-signature smart contracts. See Stuart D. Levi & Alex B. Lipton, *An Introduction to Smart Contracts and Their Potential and Inherent Limitations*, Harvard Law School Forum on Corporate Governance (May 26, 2018), <https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations> (noting that “[m]ulti-signature wallets add a layer of security because they require more than one private key to access the wallet,” while also cautioning that multi-signature wallets and smart contracts could exhibit some security vulnerabilities).

layer of accountability, creating organizational rules that are untethered from the control of the organization and thus cannot be modified, avoided, or otherwise compromised by any insider. Current DAOs that rely on participatory voting also often require a formal vote to determine if and when funds are deployed for a particular purpose.⁴⁷ No single DAO member or other individual has the unilateral ability to transfer funds or defraud the organization of collected assets, unless they are the sole member participating in the decision-making process.

Other DAOs give members control over any assets deposited into the organization. An increasing number of recently launched DAOs provide members with smart contract-enforced mechanisms to withdraw their capital with a swipe of a finger. If a DAO no longer serves a given member's purpose, they can receive back all or a portion of any contributed assets. This process, colorfully branded by technologists as "rage quitting," provides members with strong downside risk protection and a degree of control over any funds deposited into a DAO. Members have the choice to vote to deploy assets for a particular purpose or can withdraw those assets if they disagree with the decision of the group.

Through blockchain-based voting and other mechanisms that protect members from an unexpected loss, DAOs relying on smart contracts decrease the risk that individual members act in their own self-interest. DAOs thus aim to foster greater trust within the organization,⁴⁸ even if members do not know nor have existing relationships with other members, which in turn may result in competitive advantages and the production of more wealth.⁴⁹

These perceived operational advantages point to a future where organizations place greater reliance on privately-ordered, *ex ante* governance mechanisms and less on *ex post* monitoring and enforcement. This trend is already underway in the realm of traditional governance. Shareholders and corporate boards are increasingly looking to bylaws to privately order the governance of large corporations,⁵⁰ and large, publicly traded limited partnerships and limited liability companies rely on complicated operating agreements that eliminate fiduciary duties in favor of

⁴⁷ For example, this is how a popular set of DAO-related smart contracts work. These smart contracts referred to as the Moloch smart contracts. *See* MOLOCH VENTURES / MOLOCH, https://github.com/MolochVentures/moloch/tree/minimal-revenue/v1_contracts (last accessed Sept. 5, 2020).

⁴⁸ FRANCIS FUKUYAMA, *TRUST: THE SOCIAL VIRTUES AND THE CREATION OF PROSPERITY* (1995).

⁴⁹ *Id.*

⁵⁰ George S. Geis, *Ex-Ante Corporate Governance*, 41 J. CORP. L. 609, 610 (2016).

detailed provisions that govern a variety of specific situations, such as the approval of transactions that involve a conflict of interest.⁵¹

Smart contracts offer further opportunities to structure organizations in a more deterministic manner, with code detailing the rules *ex ante* for cooperation among a variety of constituents. A blockchain's rigidity acts as a layer of control. By fostering a substitution of *ex ante* governance in this way, parties will have less need to invest in monitoring and enforcement. With less possibility for parties to act in their own self-interest, blockchain-based governance can decrease uncertainty and increase trust within an organization.⁵²

These perceived operational advantages explain, in part, the interest in DAOs by technologists. If the software underpinning DAOs functions like other software—as it is anticipated and as we are beginning to see—the complexity and costs of creating these new kinds of organizations will likely decrease over time. And as more and more people experiment with these new forms of organizations, a variety of specialized (and vetted) smart contracts could emerge, fostering a growing number of DAOs, which could coordinate an increasing range of market and nonmarket activities.

If the cost of creating and deploying a DAO decreases, DAOs may (at least theoretically) coordinate the operation of a growing number of people. This is not surprising. As Ronald Coase recognized long ago, technological advances “like the telephone and telegraphy, which tend to reduce the cost of organizing spatially, . . . tend to increase the size of the firm” especially in the case of “changes that improve managerial techniques.”⁵³ Centralized, and hierarchical organizations that currently dominate our economic landscape could eventually give way to DAOs mainly consisting of people loosely working together with a shared purpose, coordinated through smart contracts.⁵⁴

⁵¹ Jonathan G. Rohr, *Freedom of Contract and the Publicly Traded Uncorporation*, 14 N.Y.U. J.L. & BUS. 247, 262 (2017).

⁵² DE FILIPPI & WRIGHT, *supra* note 13, at 135-36.

⁵³ RONALD HENRY COASE, *THE FIRM, THE MARKET, AND THE LAW* 46 (2012). Indeed, with the Internet, lower communication costs helped facilitate the creation of large online social networks like Facebook, Twitter, Instagram, and Snapchat, which consist of hundreds of millions—if not billions—of individuals across the globe and which rely on code to actively manage relationships and generate social capital. Before the Internet, it would have been economically impractical to link together people from around the globe in one cohesive network. But, as the Internet spread across the globe, and as trust in the Internet increased, people became accustomed to communicating, connecting, and engaging with others through the Internet. At first these communications occurred bi-laterally on a one-to-one basis—an email to a friend or an instant message. However, over time these relationships solidified into larger networks, linking people together and enabling a greater flow of information across geographic boundaries.

⁵⁴ DE FILIPPI & WRIGHT, *supra* note 13, at 138.

III. LEGAL ISSUES FOR DAOs UNDER U.S. LAW

For DAOs to reach widespread adoption, they will need to overcome a variety of legal challenges and limitations—which could ultimately frustrate their mainstream adoption. These challenges range from governance concerns and questions related to the status of interests in DAOs to concerns related to the lack of a limitation of liability.

A. The Risks of Distributed Governance

Traditionally, the governance of business organizations has taken place “in the boardroom,” pursuant to rules provided by the legal system, the organization’s governing documents, relevant side agreements, and, in some instances, the listing standards of the exchanges on which the organization’s securities trade. With blockchain, and specifically blockchain-based smart contracts, organizations can implement all or parts of their governance rules and procedures using code, in effect memorializing governance in a set of smart contracts that will be stored on a blockchain. As The DAO and other more mainstream implementations of blockchain-based governance show,⁵⁵ some already have. The impact of blockchain technology on organizational governance is not limited to incremental improvements to existing organizational forms with targeted adoption of blockchain technology for specific functions. DAOs rely on blockchain technology and smart contracts as their primary or exclusive source of governance.⁵⁶

From a corporate law perspective, the emergence of blockchain-based governance is significant. Smart contracts hold out the promise of chipping away at practical barriers that stand in the way of the adoption and implementation of a variety of individually tailored governance mechanisms. Smart contract-based voting schemes make it possible to involve a larger number of individuals in decision-making, at least as compared to more cumbersome and expensive systems for collecting and verifying votes. The availability of smart contract voting protocols may make it possible for some enterprises to adopt their own, individually tailored allocation of decision-making power between stakeholders.

Even so, while DAOs aim to decrease the technical costs related to the operation and management of an organization by relying on smart contracts and participatory governance, this structure is not without its challenges. By eschewing centralized managers, like a board of directors or managing

⁵⁵ For example, Overstock, Inc. (which runs the popular retail website Overstock.com) has issued classes of common stock as well as debt securities whose ownership is tracked on a permissioned blockchain. See Daniel DeConnick, *Overstock Completes First Public Stock Issuance Using Blockchain*, 36 REV. BANKING & FIN. L. 416 (2017).

⁵⁶ Carla Reyes, *If Rockefeller Were a Coder*, 87 GEO. WASH. L. REV. 373 (2019).

members, DAOs must still grapple with challenges related to governance. And, given their infancy, the shape and dimension of the optimal governance structure for DAOs is far from settled. Smart contracts may provide certain operational efficiencies, but they do not eliminate the social and political dimensions of governance.⁵⁷ Humans do not have an infinite capacity for information and exhibit well-understood bounds to rationality, limiting the capacity of DAO-members to engage fully in an organization's governance structure.

These risks manifest prominently in participatory DAOs. Even if smart contracts streamline decision-making procedures, costs still lurk in the simple task of reaching group consensus, which could in turn frustrate the ability of participatory DAOs to take action. While blockchain technology can improve and lower the cost of democratic processes, direct voting through distributed consensus may be difficult to achieve because it requires people to remain consistently engaged and attentive to an organization's activities on an ongoing basis. For many, gathering all of the information necessary to make a well-informed decision could prove too time-consuming and complex, dissuading participation. Questions thus emerge as to whether DAOs will operate with the same degree of efficiency, or even comparable efficiency, as more hierarchical organizations. The social friction caused by ongoing voting may ultimately hobble these organizations, limiting their ability to generate social and economic gains.

To address these concerns, participatory DAOs are already experimenting with different types of voting mechanisms to encourage participation in governance-related decisions. For example, some DAOs are allocating more weight to decisions based on how long a member supports a given proposal,⁵⁸ aiming to approximate voting "conviction" and rewarding the votes of long-standing members of a DAO. Other approaches incorporate quadratic voting, assessing group consensus based on members' willingness to pay for a given outcome, as opposed to just majority rule.⁵⁹ In the future, DAOs could even conceivably explore the use of prediction markets to reduce the friction of DAO-related decision-making in hopes of stemming potential voter apathy.

Due to these risks, some technologists express a preference for having DAOs managed entirely algorithmically.⁶⁰ Instead of relying on continual

⁵⁷ DE FILIPPI & WRIGHT, *supra* note 13, at 137-38.

⁵⁸ Jeff Emmett, *Conviction Voting: A Novel Continuous Decision Making Alternative to Governance*, MEDIUM (July 3, 2019), <https://medium.com/giveth/conviction-voting-a-novel-continuous-decision-making-alternative-to-governance-aa746cfb9475>.

⁵⁹ Santiago Siri, *Polish, Test and Deploy a Quadratic Voting DAO*, <https://github.com/DemocracyEarth/DemocracyDAO/issues/1> (last accessed Sept. 20, 2020).

⁶⁰ QUINN DUPONT, *BITCOIN AND BEYOND 157-177* (2017) (reporting based on survey results that "most members of the cryptocurrency and blockchain community believed algorithms were more trustworthy and authoritative than existing socio-political institutions.").

voting, these DAOs rely solely on underlying smart contract code to direct social or economic interaction. While superficially appealing, even here governance decisions are not entirely eliminated. DAOs adopting this approach implicitly require that members agree to and abide by the strict rules defined by the underlying code. As a result, the choice to participate—or not participate—in the DAO itself becomes the governance decision.⁶¹

While the simplicity and ease of interacting with a more algorithmic DAO presents a certain appeal, it nonetheless exhibits a degree of fragility and presents a political dimension. If the underlying software structuring the DAO contains a bug, mistake, or other vulnerability, DAO members are presented with a limited set of options. They can either stop participating in the DAO, or they can modify the software of the DAO and set up a “fork” of the DAO with modified rules and hope that members move their attention and potentially assets to the new implementation of the DAO.⁶²

For algorithmic DAOs, decision-making is still present. Group consensus does not occur through votes; it occurs through simple use. Governance decisions often bubble in times of crisis or in times when problems in the underlying software have manifested. At these inflection points, members must choose which software to support. If there is a shock to a DAO due to an unforeseen issue, DAOs may run into a fatal issue, derailing its long-term viability. These risks are especially present in DAOs with smaller roles of members. If there is not a clear path towards addressing the issue, a smaller DAO could fracture and any value accrued to members via a DAO could be lost.

B. Limitation of Liability

Beyond questions of governance, DAOs lack any formal legal recognition, creating potential liabilities for DAO members and exposing members to the organization’s liabilities and responsibilities. DAOs also remain outside of traditional systems, limiting the ability of these organizations to transact with more traditional legal enterprises.

One of the longstanding benefits of creating a legal entity, whether a corporation or limited liability company, is the ability to protect the personal assets of an organization’s owners from creditors. DAOs, by default, do not enjoy these benefits because the legal system does not recognize these structures—by default—as a legal entity eligible for a limited liability regime.

⁶¹ See Carla L. Reyes, *(Un)corporate Crypto-Governance*, 88 *FORDHAM L. REV.* 1875 (2020) (exploring governance in the context of Bitcoin and other blockchains).

⁶² Indeed, an algorithmic DAO fork will be similar to other forking challenges that face protocol level blockchains, like Bitcoin and Ethereum. These forking-related decisions have practical and political dimensions. See DE FILIPPI & WRIGHT, *supra* note 13, at 187-88.

For instance, in the U.S., DAOs formed for the purpose of making a profit likely would be deemed a “general partnership” and consequently lack the ability to shield members’ assets if the organization injures a third-party or is unable to pay its creditors.⁶³ If characterized as a general partnership, DAOs may struggle to attract members, especially those with significant assets. Large businesses, institutional investors, and other regulated commercial entities may be reluctant to invest or otherwise support a DAO for fear that membership would put other assets at risk.⁶⁴

Perhaps unsurprisingly, state law efforts are already underway to adapt traditional business entities to DAOs. Both houses of Vermont’s legislature have passed an amendment to the state’s limited liability company statute which would allow a limited liability company to designate itself a “Blockchain-Based LLC.”⁶⁵ The legislation specifically empowers a Blockchain-Based LLC to “provide for its governance, in whole or in part, through blockchain technology.”⁶⁶ In other words, it specifically authorizes the creation of an LLC that substitutes “blockchain technology” for traditional governance tools. One might argue that, at most, this sort of legislation clarifies the status of something that is already permitted—arguably, there is nothing in currently existing LLC statutes that would prohibit a code-based operating agreement.⁶⁷ Even so, legislative recognition of blockchain-based governance does lend it some legitimacy and offers a clear path for those relying on blockchain-based governance to capture the benefits of legal personhood and limited liability. As blockchain-based enterprises become more mainstream, the creation of a path to limited liability and legal personhood will become more important to entrepreneurs and investors.⁶⁸

Such an approach is widely supported under U.S. law. To a remarkable degree, American business law reflects an enabling approach,⁶⁹ giving parties significant room to organize their commercial affairs in the way they see fit.⁷⁰ The operative statutes that govern corporations and other business associations largely consist of “default” provisions—rules that apply only if parties fail to “opt out” and implement other rules.⁷¹ Mandatory rules,

⁶³ RUPA § 202a (Nat’l Conference Comm’rs of Unif. State Laws 1997).

⁶⁴ Rodrigues, *supra* note 2, at 688 (noting that general partnerships are “unstable and porous, bringing with it considerable risks both to the individual and to the entity itself.”).

⁶⁵ Vt. Acts & Resolves 1 § 269 (2018).

⁶⁶ *Id.*

⁶⁷ Lynn M. Lopucki, *Algorithmic Entities*, 95 WASH. U. L. REV. 887 (2018).

⁶⁸ Reyes, *supra* note 56, at 400-403.

⁶⁹ Jens Dammann, *The Mandatory Law Puzzle: Redefining American Exceptionalism in Corporate Law*, 65 HASTINGS L. J. 441 (2014).

⁷⁰ STEPHEN M. BAINBRIDGE, *THE NEW CORPORATE GOVERNANCE IN THEORY AND PRACTICE* 28 (2008).

⁷¹ JOHN ARMOUR ET AL., *THE ANATOMY OF CORPORATE LAW: A COMPARATIVE AND FUNCTIONAL APPROACH* 18 (3rd Ed., 2017).

though not unheard of, are not the norm in American business law.⁷² And the few rules that are mandatory often can be avoided through careful structuring or by choosing a different entity.⁷³

Although this enabling approach has dominated U.S. corporate law for decades, it has not always been the case. The history of American business law is littered with the remnants of mandatory rules that have been removed or waived.⁷⁴ In part, this is due to jurisdictional competition for corporate charters that emerged in the late 1880s. New Jersey initially dominated this market by offering a largely enabling statute,⁷⁵ but lost its position after it amended its corporate statute in 1913 to include a variety of new restrictions, including a prohibition on the formation of additional holding companies within the state.⁷⁶ Delaware mirrored New Jersey's corporate law and displaced New Jersey as "the place" to incorporate by refusing to adopt these restrictions. Since then, Delaware and other jurisdictions, like Wyoming, have largely implemented an enabling approach—both on account of Delaware's success in attracting a large number of entity formations and its influence on other jurisdictions' lawmaking.

The enabling approach has not just been implemented in practice; it is supported by an influential school of scholars and commentators through the robust and widely-influential theory of the firm. These contractarian scholars and commentators argue that corporations and other legal entities are fundamentally contractual in nature and are nothing more than "a set of implicit and explicit contracts establishing rights and obligations among the various inputs making up the firm."⁷⁷ For contractarians, the statutes that provide for the formation and governance of business entities are simply form contracts that allow organizers to adopt "off-the-rack" contractual terms, thereby saving the costs involved in negotiating and drafting a fully customized contract.⁷⁸

The contractual approach is not merely descriptive, however. It informs the content of "off-the-rack" contracts and the degree to which parties should be able to stray from them. Because state-supplied, off-the-rack

⁷² Dammann, *supra* note 69; BAINBRIDGE, *supra* note 70, at 30-31.

⁷³ Bernard S. Black, *Is Corporate Law Trivial? A Political and Economic Analysis*, 84 NW U. L. REV. 542 (1990).

⁷⁴ In their canonical account of the separation of ownership and control, Berle & Means bemoan the demise of a variety of formerly mandatory rules, including, for example, preemptive rights. See ADOLF A. BERLE, JR. & GARDINER C. MEANS, *THE MODERN CORPORATION AND PRIVATE PROPERTY* 144-48 (1933).

⁷⁵ Edward Q. Keasbey, *New Jersey and the Great Corporations*, 13 HARV. L. REV. 198 (1899).

⁷⁶ Charles Yablon, *The Historical Race Competition for Corporate Charters and the Rise and Decline of New Jersey: 1880-1910*, 32 J. CORP. L. 323 (2007).

⁷⁷ BAINBRIDGE, *supra* note 70, at 28.

⁷⁸ FRANK H. EASTERBROOK & DANIEL R. FISCHEL, *THE ECONOMIC STRUCTURE OF CORPORATE LAW* 12 (1991).

contracts primarily serve as a vehicle for reducing transaction costs, contractarians argue that they should be comprised primarily of “majoritarian” default rules that “reflect the terms that the majority of well-informed parties would themselves most commonly choose.”⁷⁹ Or, as Easterbrook and Fischel put it in their canonical treatment of the contractual view of the firm, “the terms people would have negotiated, were the costs of negotiating at arm’s length for every contingency sufficiently low.”⁸⁰ Additionally, because these statutes are composed of rules that should be desirable to most but not necessarily all parties, those parties who prefer different terms should be able to adopt them in the absence of third party effects or some market failure.⁸¹ In the law and economics parlance, mandatory terms can be inefficient,⁸² so parties should be allowed to supply their own governance rules in place of the rules provided in the relevant statute.

The pro-private ordering view of business associations has had a significant impact, particularly in the realm of unincorporated business entities, like limited liability companies. Although these entities have long been recognized as providing considerable flexibility when it comes to devising governance structures, the Delaware legislature amended its limited liability company and limited partnership statutes in 2004 to include provisions stating explicitly the state’s policies in favor of contractual freedom⁸³ and also allow expressly for the elimination of fiduciary duties.⁸⁴ With this legislation, the Delaware legislature enunciated a strong and unmistakable preference for private ordering.

DAOs conceptually align with the general goals of U.S. corporate law to support private ordering. By removing many of the practical barriers that stand in the way of the implementation of particular governance mechanisms, DAO-based governance holds out the potential for firms to better match their governance needs with the arrangements they adopt, whether they do so in the context of a traditional associational form or an entirely algorithmic entity.

From a purely contractarian perspective, this could have consequences for the ongoing usefulness of traditional business associations. After all, under the contractarian view they are simply off-the-rack contracts.⁸⁵ If

⁷⁹ ARMOUR ET AL., *supra* note 71, at 18.

⁸⁰ EASTERBROOK & FISCHEL, *supra* note 78, at 15.

⁸¹ *Id.*

⁸² Henry N. Butler & Larry E. Ribstein, *Opting Out of Fiduciary Duties: A Response to the Anti-Contractarians*, 65 WASH. L. REV. 1 (1990).

⁸³ Delaware Limited Liability Company Law, Del. Code tit. 6, s 18-1101(b); Delaware Limited Partnership Law, Del. Code tit. 6, s 17-1101(c).

⁸⁴ Delaware Limited Liability Company Law, Del. Code tit. 6, s 18-1101(c); Delaware Limited Partnership Law, Del. Code tit. 6, s 17-1101(d).

⁸⁵ BAINBRIDGE, *supra* note 70, at 28.

blockchain-based governance can remove—or lower the cost of—practical barriers to more extensive private ordering, maybe firms will not need to rely on the off-the-rack contracts made available to them. As The DAO and other token-based enterprises show, this not mere conjecture. Already, organizers of some types of enterprises do not seem to feel any need to organize a formal legal entity.⁸⁶ The possibility that blockchain-based governance could eventually reduce (and maybe even displace) reliance on traditional business entities as a vehicle for governance cannot be dismissed.

However, focusing exclusively on the potential for blockchain to disrupt traditional internal governance ignores the other reasons business entities are formed. Certainly, capturing the variety of benefits that come with off-the-rack governance arrangements is one reason to form an entity. However, as single-member LLCs and single-shareholder corporations demonstrate, it is not the only reason. Even when governance rules are not needed, entity formation is a way to secure limited liability, to partition assets, and enjoy the convenience of separate legal personhood (for example, being able to sue in the entity's name).⁸⁷ And even if blockchain-based governance decreases the need to form business entities for governance purposes, it does not obviate the other reasons for entity formation, in particular clear limited liability and the convenience of corporate personhood. For blockchain-based governance to go mainstream, participants will need a clear path to limited liability.⁸⁸ Contractual counterparties will want certainty with regard to who and what they are transacting with and which assets are available to satisfy contractual obligations. From a policy perspective, the important question appears to be the degree to which lawmakers should accommodate the substitution of blockchain-based governance for traditional governance in legally recognized, limited liability entities.

These early efforts to combine blockchain-based governance with traditional business entities raise a host of further questions. Traditional governance incorporates a variety of mechanisms that are applied to fill “gaps” in the “contract.” Fiduciary duties are perhaps the best-known gap fillers in traditional corporate law. Under the contractual view, fiduciary duties are pragmatic way of dealing with the impossibility of complete contracting.⁸⁹ Rather than specifying *ex ante* a fiduciary's obligations in all

⁸⁶ Some have argued that at least some decentralized organizations be treated as partnerships, the default business entity under American business law, but this is an awkward fit. Reyes, *supra* note 56, at 392.

⁸⁷ Henry Hansmann & Reinier Kraakman, *The Essential Role of Organizational Law*, 110 YALE L. J. 387 (2000).

⁸⁸ Reyes, *supra* note 56, at 378, 395.

⁸⁹ Frank H. Easterbrook & Daniel R. Fischel, *Contract and Fiduciary Duty*, 36 J. L. & ECON. 425, 427 (1993) (“The duty of loyalty replaces detailed contractual terms, and courts flesh out

situations, fiduciary duties supply general principles that are enforced *ex post*. When legal decisionmakers are called upon to determine whether a particular action violated a corporate director's duty of loyalty, they are both supplying and applying a "contractual" term.⁹⁰ Much of the debate surrounding private ordering in the context of business associations has focused on the degree to which these mandatory gap fillers should be subject to modification or elimination.⁹¹ As discussed above, the advocates for private ordering substantially won this debate in the context of unassociated business associations and have made considerable inroads with piecemeal relaxations of corporate fiduciary duties. But even with regard to unassociated entities where contractual freedom reigns supreme, a mandatory gap filler—the duty of good faith and fair dealing—remains.⁹²

The ongoing role for gap-filling mechanisms is one of the issues raised by DAOs. Because the parties forming and participating in DAOs currently order their affairs through code-based mechanism, it may simply not be possible to provide for an DAO's entire governance scheme, without relying to some degree on open-ended standards and gap fillers, which today sit ill-fitted with the intent and structure of DAOs, or by supplementing smart contract-based rules with a traditional natural language contract to supplement the code-based provisions.⁹³

While incorporating more traditional legal documents into the creation and management of DAOs has some appeal, it creates several downsides. First, the use of legal text to accommodate or describe the underlying mechanics of smart contracts creates the room for potential ambiguity or the mistranslation about how the underlying smart contracts of a DAO actually operate.⁹⁴ Such translation errors create more opportunities for dispute amongst members and force courts, who may be tasked with administering a

the duty of loyalty by prescribing the actions the parties themselves would have preferred if bargaining were cheap and all promises fully enforced.”).

⁹⁰ EASTERBROOK & FISCHER, *supra* note 78, at 92-94.

⁹¹ Henry N. Butler & Larry E. Ribstein, *Opting Out of Fiduciary Duties: A Response to the Anti-Contractarians*, 65 WASH. L. REV. 1, 4 (1990).

⁹² (2013) Del. Code Ann. tit. 6 § 18-1101(c); (2013) Del. Code Ann. tit. 6 § 17-1101(d); *see also* (2013) Del. Code Ann. tit. 6 § 18-1101(b) (2013); (2013) Del. Code Ann. tit. 6 § 17-1101(c).

⁹³ *Id.* This is precisely the point that Chief Justice Leo E. Strine and Vice Chancellor Travis Laster made recently when they argued for reinstatement of a mandatory duty of loyalty for publicly traded unincorporated business associations. According to Strine and Laster—both of whom have considerable experience adjudicating disputes involving operating agreements that have eliminated fiduciary duties—the contractarian experiment in allowing elimination of the gap-filling duty of loyalty should be abandoned. Contracting parties need a more robust gap filler than the duty of good faith and fair dealing because they are not capable of contracting with sufficient completeness.

⁹⁴ *See* Harry Surden et al., *Managing Representational Complexity in Computational Law* (2018),

<https://pdfs.semanticscholar.org/409a/b0eb41a84b7ad790f3bcb3ec5c464d042280.pdf>.

DAO-related dispute, to sort through difficult questions related to assessing whether the code or the natural language provisions in the operating agreement should rule supreme. Second, legal agreements increase the cost of creating and establishing a DAO, which undercuts the potential efficiencies presented by the use of blockchain technology and related smart contracts to create, set up, and administer a DAO. Members of a DAO intend to order their affairs privately using smart contracts as the primary means to do so and often intend to establish entities that vary some of the default rules currently provided in an “off the rack” manner. The need to enlist a lawyer or other legal service to assist in the creation of an agreement that aligns with the intent of DAO members cuts against this very purpose and frustrates their ability to privately order their affairs.

C. Representing Interests in DAOs

Additional challenges with DAOs stem from their ability to represent interests in these organizations as tokens. DAOs provide a laboratory for private ordering through the use of low-cost and globally accessible smart contracts. These smart contracts are not run on a centralized server but are, instead, executed by the network on which the code that comprises the smart contract is hosted.⁹⁵ In the case of DAOs, smart contracts can be combined to form a web of coded relationships that, together, provide the rules under which the organization will be governed.

Participation or affiliation with a DAO often is evidenced through a blockchain-based “token” that is coupled with the smart contracts that govern the organization. Individuals can either purchase tokens⁹⁶ or receive them as a reward for some other contribution, such as computing power. Through smart contracts, tokens can be associated with specific rights that run in favor of their holders, such as the right to receive a portion of the organization’s income or the right to use the network, software, or other service offered by the organization. DAO tokens are also increasingly designed to provide their holders with the right to govern underlying software through a vote.⁹⁷

Typically, when companies raise money from the public, they issue securities that take one of several, familiar forms—such as common stock, preferred stock, bonds, or convertible bonds—which are well understood as debt, equity, or a hybrid of the two. Through the use of smart contracts and blockchain-based tokens, however, businesses have the ability to sell tokens to the public that combine rights in novel ways. Economic rights,

⁹⁵ ARVIND NARAYANAN ET AL., BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES 264-65 (2016).

⁹⁶ Rohr & Wright, *supra* note 30, at 479.

⁹⁷ DE FILIPPI & WRIGHT, *supra* note 13, at 137.

participation rights, governance rights, and utility rights can all be associated with tokens which are then sold to the public in ways that are similar to a traditional initial public offering.⁹⁸ Other DAO tokens can be distributed to users of the platform, only providing members with limited rights that are untethered from the potential for profit.

The explosion of ICOs in recent years has demonstrated the ability of blockchain-based enterprises to raise large sums of money through the sales of these tokens, but from a regulatory perspective, much uncertainty remains. Whether or not these tokens are all securities is still an open question. A past Chairman of the SEC indicated that, in his view, many are.⁹⁹ Furthermore, even if these tokens are securities, their categorization for regulatory purposes is uncertain. A token, for example, can implicate interests related to both investment and consumption by entitling the holder to use a particular platform or network and also holding out the possibility of generating economic gains through resale on the secondary market.¹⁰⁰

This can matter for a variety of reasons. As an example, consider Section 12(g) of the Securities Act of 1934 and its application to blockchain-based tokens. Under Section 12(g), a company is required to register with the SEC and comply with ongoing disclosure requirements if it has more than \$10 million in assets and a class of *equity* securities that are “held of record” by either 2,000 persons or 500 persons who are not accredited investors.¹⁰¹

The ease with which blockchain-based business enterprises can amass more than \$10 million in assets has become clear, as has the fact that most of the tokens are held by numerous purchasers (certainly more than 500 non-accredited investors) immediately after they are sold to the public. In the event a blockchain-based enterprise sells digital tokens that constitute equity securities, Section 12(g) may require registration at a very early stage in the life of the enterprise. Certainly, if a blockchain-based enterprises sells traditional securities that have simply been digitized, this issue is easy to resolve. But when these enterprises issue non-traditional interests (e.g., a digital token that solely provides governance earned through use), it is not clear that they are securities in the first instance and, if they are, it is not clear that they are *equity* securities. If anything, this type of interest seems more like debt or a commodity than equity, but it is not a perfect fit.

Indeed, there are compelling reasons for DAOs to have governance-related tokens and compelling reasons to not characterize these assets as

⁹⁸ Rohr & Wright, *supra* note 30, at 475-76.

⁹⁹ Jay Clayton, Statement on Cryptocurrencies and Initial Coin Offerings, U.S. SEC & Exch. Comm’n (Dec. 11, 2017), <https://www.sec.gov/news/public-statement/statement-clayton-2017-12-11>.

¹⁰⁰ Rohr & Wright, *supra* note 30, at 475-76.

¹⁰¹ 15 U.S.C. § 781(g).

securities or debt. One of the most obvious objections to the pro-private ordering, contractual view of the firm (at least when it comes to firms with a diverse and dispersed investor base, like publicly traded corporations) is the fact that the governance terms are offered on a purely take-it-or-leave-it basis without negotiation or, in the case of most shareholders, any meaningful awareness of their content or operation. The vulnerability of investors under these circumstances is one longstanding argument in favor of mandatory terms that are designed to protect investors from the imposition of one-sided terms.¹⁰² Perhaps unsurprisingly, contractarians' answer lies in the market, and specifically the market's ability to price governance terms. In the words of Easterbrook and Fischel, "[a]ll the terms in corporate governance are contractual in the sense that they are fully priced in transactions among the interested parties. They are thereafter tested for desirable properties; the firms that pick the wrong terms will fail in competition with other firms competing for capital. It is unimportant that they may not be 'negotiated'" ¹⁰³ In other words, the informational efficiency of capital markets means that investors get what they pay for and also prevents the imposition of unfair or one-sided terms because those terms will be priced into the firm's cost of capital. Under this contractarian account, mandatory terms are appropriate only when private ordering imposes negative externalities or when "the terms chosen by firms are both *unpriced* and systematically perverse."¹⁰⁴ Of course, Easterbrook and Fischel overstate things a bit—there is a body of empirical evidence which shows that the market does *not* always fully price governance terms.¹⁰⁵ Instead, markets display differing degrees of informational efficiency.¹⁰⁶ They incorporate new information at different speeds and to different degrees, but the underlying idea—that the price of a security is indicative of performance (which is impacted by governance) and there is no better indicator available—has ongoing salience for both debates surrounding contractual freedom and theories explaining a variety of current governance practices.¹⁰⁷

In the context of DAOs, governance tokens create a way for the market to price governance terms, and therefore the degree to which private ordering can be justified under the traditional contractarian position remains an open question. The informational efficiency of a market is a function of

¹⁰² Jeffrey N. Gordon, *The Mandatory Structure of Corporate Law*, 89 COLUM. L. REV. 1549, 1556-62 (1989).

¹⁰³ EASTERBROOK & FISCHEL, *supra* note 78, at 17.

¹⁰⁴ *Id.* at 21.

¹⁰⁵ Lawrence A. Cunningham, *Behavioral Finance and Investor Governance*, 59 WASH. & LEE L. REV. 767, 774-76 (2002).

¹⁰⁶ *Halliburton Co. v. Erica P. John Fund, Inc.*, 573 U.S. 258, 134 S. Ct. 2398, 2402, 189 L. Ed. 2d 339 (2014).

¹⁰⁷ BAINBRIDGE, *supra* note 70, at 57.

information costs—when information costs are high, markets are likely to be less efficient.¹⁰⁸ When information is acquired and processed easily, markets are likely to be more informationally efficient.¹⁰⁹ Certainly, with regard to traditional securities that have simply been “tokenized,” there are strong reasons to think that the market will be able to price the terms, provided there is a way to “translate” the code that reflects those governance terms into a format that can be understood by market participants and used to inform their purchasing decisions. Here information costs should be relatively low as compared to their analog counterparts, provided purchasers are able to trust that the blockchain-based governance is an accurate reflection of the traditional governance terms that have simply been transferred from operating agreements, certificates of incorporation and other governing documents to blockchain-based smart contracts.

With regard to non-traditional arrangements that fall within the definition of “security,” however, there is potential for information costs to be significantly higher given that it will be more difficult for market participants to determine both what the code means and how novel private ordering mechanisms should be valued. Because these instruments do not correlate directly with an analog assets, purchasers will not be able to rely on previously accumulated experience and information and will be forced to both (1) determine the meaning of the code and (2) its significance for pricing. With higher information costs come questions related to the informational efficiency of the market, which raises further questions related to the degree to which private ordering is actually appropriate.

It is clearly far too early to draw any conclusions on the informational efficiency of the market for digital tokens. Nevertheless, given the relationship between information costs, market efficiency, and private ordering, it may be appropriate to consider measures to clarify the nature of these tokens, as they relate to DAOs.

IV. CONCLUSION

The disruptive potential of blockchain technology obscures the fact that some use cases for the technology is consistent with existing policies and legal frameworks. As discussed in this Essay, DAOs are growing in importance, and there is early-stage indication that blockchain-based governance will have a significant impact on the way firms are governed—both by digitizing traditional governance mechanisms and by offering fundamentally new ways of organizing business enterprises. Nevertheless,

¹⁰⁸ Ronald J. Gilson Reinier, *The Mechanisms of Market Efficiency*, 70 VA. L. REV. 549, 550 (1984).

¹⁰⁹ *Id.*

the use of DAOs to organize private affairs is largely consistent with American business law's emphasis on private ordering. There is thus a strong argument for American business to accommodate blockchain-based governance and explore whether they can fit within the confines of traditional business associations. Asset partitioning, limited liability, and other conveniences of separate legal personhood are also reasons for forming a business entity, and based on the frequency with which single shareholder corporations and single-member limited liability companies occur, they appear to be relatively strong reasons. For this reason, entrepreneurs and organizers wishing to adopt a system of blockchain-based governance—even highly decentralized forms of blockchain-based governance—will want a way to secure a separate legal existence for their enterprises. To be sure, the emergence and expansion of blockchain-based governance will present challenges as it intersects with traditional business law and the organizational forms that are at their core, but this should not be mistaken as an indication that blockchain-based governance is necessarily hostile to the policies underlying that body of law. Instead, when blockchain is viewed as a tool that allows parties to privately order their arrangements, its consistency with the American “enabling approach” to business law becomes evident.