

DECENTRALIZED AUTONOMOUS ORGANIZATIONS
—
INTERNAL GOVERNANCE AND EXTERNAL LEGAL
DESIGN

Wulf A. Kaal**

Abstract

Most of the applications and uses of digital assets are improved and expanded with well-functioning and well-governed DAOs. The article evaluates the technical and internal governance solutions promulgated by DAO projects. Particular emphasis is placed on the duality of feedback effects between internal DOA governance and external DAO legal designs.

Key Words: Decentralized Autonomous Organization, Governance, Legal Design, Digital Assets, Decentralized Finance, Blockchain, Start-up, Decentralized Commerce, Emerging Technology, Token Models, Incentive Design, Tokens, Distributed Ledger Technology, Decentralized Infrastructure, Reputation Staking

JEL Categories: K20, K23, K32, L43, L5, O31, O32

** Professor of Law, University of St. Thomas School of Law (Minneapolis, USA). The author is on the board of directors of the Emerging Technology Association in Zug, Switzerland. The author is also a founding member of the DevDAO. The author is grateful for ongoing discussions about DAO solutions with Craig Calcaterra. The author is also grateful for outstanding research assistance from Hayley Howe and research librarian assistance from Nicole Kinn. The author did not receive any form of financial incentive for authoring this article.

Table of Contents

I.	INTRODUCTION.....	3
II.	DECENTRALIZED AUTONOMOUS ORGANIZATIONS	5
1.	<i>History of DAOs</i>	6
2.	<i>Extending Business Opportunities</i>	12
3.	<i>Addressing Age-Old Problems</i>	13
4.	<i>Value to Efforts Workflow</i>	15
5.	<i>Maintaining the Fluidity of Decentralized Order</i>	19
III.	DAO LIMITATIONS	21
1.	<i>Path Dependencies</i>	22
2.	<i>Regulatory Uncertainty</i>	23
3.	<i>Suboptimal Incentive Design</i>	28
IV.	GOVERNANCE & LEGAL DESIGN EXPERIMENTATION	30
1.	<i>Governance</i>	32
a)	Dynamic Elements.....	35
b)	On-Chain Governance	36
2.	<i>Legal Designs</i>	39
a)	OpenLaw - LAO	40
b)	DAA.....	44
c)	HOPR.....	46
d)	MolochDAO	47
e)	MakerDAO	51
f)	DevDAO	55
V.	CONCLUSION	65

I. Introduction

Blockchain-based businesses are a natural global extension of platform businesses. Blockchain-based smart contracts can standardize business processes and enable autonomous organizations. Decentralized autonomous organizations (DAOs) instantiate the need for truly global borderless entities that coordinate agency relationships and limit liabilities via smart contracts. Given the global nature of commerce through internet-based platform businesses and borderless payment systems, among many others, the global promise of the concept of a DAO as a business vehicle is only truly fulfilled if DAOs can be set up via the internet and are jurisdictionally recognized.

DAOs have the potential to upgrade business and society on multiple levels. The business applications of DAOs are near limitless. For example, most of the applications and uses of digital currencies are improved and expanded with well-functioning and well-governed DAOs. DAOs help upgrade digital assets across the spectrum of applications and uses. This includes digital assets that can be used as mediums of exchange, speculation,¹ payment rail for non-expensive cross-borders money transfer, and non-monetary uses such as time stamping.² Additional use cases of DAOs include financial transactions, secure voting, autonomous organizations, company management, freedom of speech networks, online games, crowdfunding, and speculation, among many other possible

¹ A. ROGOJANU AND L. BADEA, *The Issue of Competing Currencies: Case Study – Bitcoin*, 21 THEOR. APPL. ECON. 103-114 (2014); Paola Ceruleo, *Bitcoin: A Rival to Fiat Foney or a Speculative Financial Asset?* (Apr. 13, 2015) (Master's Degree Thesis) (on file with LUISS Guido Carli Library)

² Robleh Ali et al., *The Economics of Digital Currencies*, BANK OF ENGLAND: Q. BULL., 2014, at 276.

applications that cannot be foreseen at the time of publication of this article.³

DAOs are organizations that run through rules encoded in smart contracts.⁴ DAO smart contracts are executed when the conditions embedded in them are recognized as math by the network.⁵ DAOs can be built on any smart contracting platform. In the 2020s, was still the leading smart contracting platform for DAO creation. Ethereum's programming language, Solidity, enables the development of smart contracts⁶ in conjunction with Ethereum's Virtual Machine (EVM), upon which every Ethereum node runs to maintain consensus. EVM is Turing-complete, meaning that it can perform calculations that any other programmable computer is capable of, enabling execution of code exactly as intended.⁷ This is the unique feature of the Ethereum network that enables smart contracts and a high level of flexibility in digital innovation, which makes the platform attractive to developers. Other networks are developing upgrades to blockchains that enhance smart contracting and associated DAO features.

A core problem in the evolution of DAOs is the applicable legal framework. The concept of a DAO fails if it becomes centralized. Tying the legal existence of a DAO to any forms of existing legal and jurisdictional frameworks typically results in the need for a representative in the chosen legal framework and jurisdiction, which, in turn, centralizes the DAO and results in the failure of the DAO concept. From the perspective of regulatory competition, one jurisdiction may one day offer a DAO legal framework that removes the need for a representative in that jurisdiction. However, even if this should exist one day, a significant risk remains that such DAO entity could be labeled a partnership with joint and several liability

³ Zvezdin Besarabov and Todor Kolev, *Predicting Digital Asset Market Based on Blockchain Activity Data* (Oct. 15, 2018), <https://arxiv.org/abs/1810.06696>;

⁴ CoinMarketCap, *Crypto Glossary*, COINMARKETCAP, <https://coinmarketcap.com/glossary/> (last accessed Jun. 22, 2020).

⁵ Lanouar Charfeddine et al., *Investigating the Dynamic Relationship Between Cryptocurrencies and Conventional Assets: Implications for Financial Investors*, 85 ECON. MODELLING 198, 201 (2020).

⁶ *Crypto Glossary*, *supra*, note 4.

⁷ *Crypto Glossary*, *supra*, note 4.

for its members in a given jurisdiction. Only a jurisdiction that gives the DAO limited liability as an entity and accepts its independent status without the need for representation may truly be favorable for DAO concepts. Such jurisdiction would have to accept that the DAO is a virtual organization based on code that is accessible from any computer with an internet connection and cannot be jurisdictionally captured. The implication is that such DAO on each computer in any country is effective if another computer in a given country connects with and interacts with the code.

DAO structures are evolving lockstep with applicable legal solutions. On the operational side, overcoming bugs that lead to security flaws is a crucial part of the DAO technology evolution. On the legal side, experimentation with different legal arrangements in disparate jurisdictions helps DAO communities innovate for the creation of consumer facing applications in different settings around the globe.

This article examines the existing attempts to establish DAO concepts and legal frameworks. The author evaluates the technical solutions and internal governance solutions promulgated by DAO projects. Particular emphasis is placed on the duality and feedback effects between internal DAO governance and external legal design. The article concludes with an examination of legal DAO frameworks and their existing limitations and potential for future development.

II. Decentralized Autonomous Organizations

DAOs are becoming increasingly popular.⁸ Several global trends can help increase the popularity of DAOs: globalization of talent and transformation of the nature of work (including the units work is measured in); coordination for well-resourced stakeholder networks; emergence of decentralized finance; normalization of

⁸ See, e.g. Nathaniel Whittemore, *Narrative Watch: Why 2020 Will Be the Year of the DAO*, COINDESK (Jan. 9, 2020), <https://www.coindesk.com/narrative-watch-will-daos-break-out-in-2020>.

participation in governance; deplatforming; and an upswing in political/social organization.⁹

Three generations of DAOs can be observed during the evolution of the concept of DAOs.¹⁰ The first generation of DAOs did not have any legal attachments or legal designs associated with it. That includes the original 2015 DAO. The second generation started to consider a legal wrapper on the DAO concept in order to enable it to engage more with the real world. The third generation of DAOs considered an actual association or organization that already has a legal construct with completed administrative paperwork. The DAO itself was then added to the existing legal construct. Most of the experimentation with DAO internal governance and external legal design is happening in that third generation of DAOs, which is the subject matter of this article.

1. History of DAOs

The concept of a DAO was mentioned in the literature as early as 2005.¹¹ More concrete technological attempts to build DAOs

⁹ Stefano Bernardi, *Why 2019 Will Be The Year Of The DAO*, STEFANOBERNARDI.COM (Jan. 17, 2019), <https://stefanobernardi.com/why-2019-will-be-the-year-of-the-dao/>.

¹⁰ MME Switzerland Token Summit, *infra* note 57, at 0:00-2:20.

¹¹ The LAO, *Unpacking The LAO*, MEDIUM (Sep. 23, 2019), <https://medium.com/openlawofficial/unpacking-the-lao-e463f7357b4b> (quoting Charles Stroll, *Accelerando* (2005) <https://en.wikipedia.org/wiki/Accelerando>). “The divested Microsoft divisions have automated their legal processes and are spawning subsidiaries, IPOing them, and exchanging title in a bizarre parody of bacterial plasmid exchange, so fast that, by the time the windfall tax demands are served, the targets don’t exist anymore, even though the same staff are working on the same software in the same Mumbai cubicle farms. Welcome to the twenty-first century . . . Today’s increasingly automated corporations don’t understand mortality.” – Charles Stroll. Matt Ridley, *The Rational Optimist: How Prosperity Evolves*, page 355, “I forecast that the twenty-first century will show a continuing expansion of catallaxy - Hayek’s word for spontaneous order created by exchange and specialisation. Intelligence will become more and more collective; innovation and order will become more and more bottom-up; work will become more and more specialised, leisure more and more diversified. Large corporations, political parties and government bureaucracies will crumble and fragment as central planning agencies did before them. The Bankerdammerung

appeared in the early 2010s. For example, in 2013, Daniel Larimer, CTO of EOS, published an article to introduce a “new metaphor for explaining” cryptocurrencies—the first proposal of the concept that has become a DAO.¹² Larimer asked readers to think of a cryptocurrency as shares in a Decentralized Autonomous Corporation (“DAC”) where the source code defines the bylaws, with a goal to earn a profit for shareholders by performing valuable services for the free market.¹³ The DAC pays for the services it requires to operate—transaction validation, security against double-spend attacks, viral marketing campaign, customer privacy, traffic filtering defense—with shares in the decentralized company.¹⁴ Vitalik Buterin followed up this literature with three blog posts on the DAC concept.¹⁵

of 2008 swept away a few leviathans but fragmented and short lived hedge funds and boutiques will spring up in their place. The collapse of Detroit’s big car makers in 2009 leaves a flock of entrepreneurial startups in charge of the next generation of cars and engines. Monolithic behemoths, whether private or nationalised, are vulnerable as never before to this Lilliputian Assault. They are steadily being driven extinct not just by small firms, but by ephemeral aggregations of people that form and reform continuously. The big firms that survive will do so by turning themselves into bottom-up evolvers. Google, dependent on millions of instantaneous auctions to raise revenue from its Ad Words, is ‘an economy unto itself, a seething laboratory’, says Stephen Levy. But Google will seem monolithic compared with what comes next.”; *see also* VALVE CORPORATION, *New Handbook for New Employees* (2012), [https://steamcdn-](https://steamcdn-a.akamaihd.net/apps/valve/Valve_NewEmployeeHandbook.pdf)

[a.akamaihd.net/apps/valve/Valve_NewEmployeeHandbook.pdf](https://steamcdn-a.akamaihd.net/apps/valve/Valve_NewEmployeeHandbook.pdf)

¹² Daniel Larimer, *The Hidden Costs of Bitcoin*, LTB NETWORK (Sep. 7, 2013), <https://letstalkbitcoin.com/is-bitcoin-overpaying-for-false-security>. *See also* Stan Larimer, *Bitcoin and the Three Laws of Robotics*, LTB NETWORK (Sep. 14, 2013), <https://letstalkbitcoin.com/bitcoin-and-the-three-laws-of-robotics>.

¹³ Larimer, *supra* note 12.

¹⁴ Larimer, *supra* note 12.

¹⁵ *See* Vitalik Buterin, *Bootstrapping A Decentralized Autonomous Corporation: Part I*, BITCOIN MAGAZINE (Sep. 20, 2013), <https://bitcoinmagazine.com/articles/bootstrapping-a-decentralized-autonomous-corporation-part-i-1379644274>; Vitalik Buterin, *Bootstrapping A Decentralized Autonomous Corporation: Part II*, BITCOIN MAGAZINE (Sep. 22, 2013), <https://bitcoinmagazine.com/articles/bootstrapping-an-autonomous-decentralized-corporation-part-2-interacting-with-the-world-1379808279>; Vitalik Buterin, *Bootstrapping A Decentralized Autonomous Corporation, Part III*, BITCOIN MAGAZINE (Sep. 25, 2013), <https://bitcoinmagazine.com/articles/bootstrapping-a-decentralized-autonomous-corporation-part-3-identity-corp-1380073003>.

In 2014, Ethereum¹⁶ was launched, creating two smart-contract addresses—1) issuer functionality 2) membership-shareholder address side¹⁷—which was revolutionary because it allowed token issuers to connect with members (shareholders).¹⁸ Every single aspect listed on the original 2014 version of the Ethereum website actually happened and was used in production today.¹⁹ For example, Ethereum created a simple token that was not ERC 20 at the time.²⁰ The Ethereum website also listed “a decentralized company or organization that operates entirely on the blockchain”.²¹ In November 2015, the Ethereum website described a democratic autonomous organization—“a robot running your organization is guaranteed to execute only what it was programmed to.”²² Ethereum was originally launched as a foundation²³ in order to launch and have sufficient funds to further promote²⁴ and propose the genesis block to the community.²⁵ Yet, the system is cybernetic²⁶ because after it launched, the community had to decide which version of the protocol they would adopt and use.²⁷ The cybernetic system has a new kind of counterparty that does not currently exist.²⁸

In August 2015, Dash, a fork of Bitcoin, added a DAO (pooling) element to its protocol—ten percent of the block rewards went into a pool to fund proposals to grow the Dash network/ecosystem.²⁹

¹⁶ See Vitalik Buterin, *Ethereum Whitepaper*, ETHEREUM, <https://ethereum.org/whitepaper/> (originally published 2013).

¹⁷ MME SWITZERLAND TOKEN SUMMIT, *Beyond DAOs and Foundations: The Decentralized Autonomous Association (DAA Model)*, 16:57-17:30, YOUTUBE (May 28, 2020), <https://youtu.be/tGLiSg5OLzE>.

¹⁸ *Id.* at 16:57-17:30.

¹⁹ *Id.* at 21:00-21:45.

²⁰ *Id.* at 22:00-22:30.

²¹ *Id.* at 21:45-21:57 (citing Ethereum.org, Jan. 2014).

²² *Id.* at 22:33-23:00 (citing Ethereum.org, Nov. 2015).

²³ *Id.* at 37:51-37:51.

²⁴ *Id.* at 40:21-40:34.

²⁵ *Id.* at 37:51-40:21.

²⁶ *Id.* at 40:38-41:33

²⁷ *Id.* at 40:12-40:21

²⁸ *Id.* at 42:40-43:00

²⁹ Vu Gaba Vineb, *The State of The DAOs*, HACKERNOON (Apr. 17, 2019), <https://hackernoon.com/the-state-of-the-daos-b7cba318460b>.

Hundreds of proposals passed in this DAO, ranging from funding development efforts to marketing and community awareness efforts.³⁰

In May 2016, the first DAO, “The DAO,” was launched on Ethereum, and became “The Mother of all DAOs” and the biggest crowdfunding happening of all time.³¹ Despite several earlier attempts to technically implement a DAO, the first DAO launched in 2015 and was set up as an organization based purely on code and smart contracts. It did not have a conventional corporate structure, no incorporation, and had no physical address or headquarter. The DAO aimed to operate as a venture capital fund for the crypto and decentralized space.³² Its code was open source developed by Slock.It³³ with a governance structure that was entirely on-chain, essentially removing all core control mechanisms typically employed by principals in agency relationships.³⁴

The DAO unexpectedly became the biggest crowdfund ever and gathered 12.7M Ether (worth \$150M at the time).³⁵ The DAO was never expected to have a lot of money, but ended up collecting more than \$100 million and became the biggest crowdfunding campaign of all time.³⁶ During the DAO crowdfunding campaign in May 2016,

³⁰ Gaba Vineb, *supra* note 29; *see also* Dash Central, *Budget*, <https://www.dashcentral.org/budget>.

³¹ MME Switzerland Token Summit, *supra* note 17 at 22:52-23:30 (citing daohub.org, May 2016).

³² *See, e.g.* Nathaniel Popper, *A Venture Fund With Plenty of Virtual Capital, but No Capitalist*, N.Y. TIMES (May 21, 2016), <https://www.nytimes.com/2016/05/22/business/dealbook/crypto-ether-bitcoin-currency.html>.

³³ The LAO, *The LAO: A For-Profit, Limited Liability Autonomous Organization*, MEDIUM (Sep. 3, 2019), <https://medium.com/openlawofficial/the-lao-a-for-profit-limited-liability-autonomous-organization-9eae89c9669c>.

³⁴ Wulf A. Kaal, *Blockchain-Based Corporate Governance* (August 23, 2019), MAX PLANCK INSTITUTE LUXEMBOURG FOR PROCEDURAL LAW (December 2019), Available at SSRN: <https://ssrn.com/abstract=3441904>

³⁵ The LAO, *The LAO Joins Forces with Moloch DAO and MetaCartel to Begin to Standardize DAO-Related Smart Contracts*, MEDIUM (Dec. 13, 2019), <https://medium.com/@thelaoofficial/the-lao-joins-forces-with-moloch-dao-and-metacartel-to-begin-to-standardize-dao-related-smart-b6ee4b0db071>.

³⁶ MME Switzerland Token Summit, *supra* note 17 at 22:52-23:30 (citing daohub.org, May 2016).

all investors could become DAO participants by purchasing DAO Tokens. The DAO raised more than \$168 million from approximately 10,000 “investors”.

The DAO was the founders’ attempt to set up a corporate-type organization without using a conventional corporate structure. The founders’ central idea was that the wisdom of the crowd would lead to smarter and more game-changing investment decisions. DAO Tokens were designed to be fully transferable and tradeable on “peer-to-peer” exchanges, similar to shares in a traditional listed corporation. The automated structure was intended to give “participants” in the DAO direct real-time control over contributed funds. Not in small part due to this great success, The DAO was expected to be at the center of many economies going forward.³⁷

Alas, things went terribly wrong with the DAO. Fundamental flaws in the DAO code enabled hackers to transfer one-third of the total funds to a subsidiary account, which brought down the first DAO initiative.³⁸ Subsequently, The DAO tokens were found to be securities and therefore subject to federal securities regulations.³⁹ The silver lining of the story of The DAO is that it taught developers that “code is not law”—The DAO had a few technical shortcomings, but it effectively demonstrated that it is possible to use decentralized organizations living on a blockchain to manage funds contributed by a large number of people.⁴⁰ The DAO communities have proliferated in the aftermath of the original DAO hack and continue to innovate to create innovative consumer facing applications in different settings around the globe.⁴¹

³⁷ MME Switzerland Token Summit, *supra* note 17 at 23:25-23:39

³⁸ Kaal, *supra* note 34, at 18-19.

³⁹ See, Press Release, U.S. Securities and Exchange Commission, SEC Issues Investigative Report Concluding DAO Tokens, a Digital Asset, Were Securities, (Jul. 25, 2017); *see also*, U.S. SECURITIES AND EXCHANGE COMMISSION, Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO (Jul. 25, 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

⁴⁰ MME Switzerland Token Summit, *supra* note 17 at 23:39-24:45.

⁴¹ Dino Mark, Vlad Zamfir, Emin Gün Sirer, *A Call for a Temporary Moratorium on “The DAO”* (May 26, 2016) (Draft), <https://docs.google.com/document/d/10kTyCmGPhvZy94F7VWyS-dQ4lsBacR2dUGTtV98C40/edit#>.

In November 2016 Aragon, a DAO project focused on decentralized coordination and governance, was introduced.⁴² The network provides infrastructure and services to platform users⁴³ who can create and manage organizations that exist as a set of smart contracts defining the organization's stakeholders and their associated rights and privileges.⁴⁴ In November 2018, a DAO that serves as an online court (the Aragon Network) was launched, acting as a decentralized oracle protocol that resolves subjective disputes with binary outcomes.⁴⁵ Governance authority over dispute resolution is granted to token holders by way of an Aragon association, which handles operational decisions.⁴⁶ Aragon describes DAOs as an unincorporated entity in nature, but can manage funds and participate in the market in the way incorporated entities can.⁴⁷ As such, Aragon believes in DAOs as DAOs without a legal setup.⁴⁸

In December 2017, MakerDAO was launched, created as a DAO to administer the running of its stablecoin Dai.⁴⁹ The Maker system creates a decentralized, open scientific risk management community, which was initially⁵⁰ guided by the Maker Foundation, but eventually will be led by risk teams formally elected by MKR

⁴² Steven McKie, *The Year of the DAO Comeback*, MEDIUM (Mar. 23, 2019), <https://medium.com/amentum/the-year-of-the-dao-comeback-9c888b44980>; see also Luis Cuende, *The Aragon Manifesto*, ARAGON (May 8, 2018), <https://aragon.org/blog/the-aragon-manifesto-4a21212eac03>.

⁴³ *Aragon Network / Whitepaper*, GITHUB, <https://github.com/aragon/whitepaper>.

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ Luis Cuende, *DAOs, the Next Big Thing After Social Media*, ARAGON (Jun. 11, 2020), <https://aragon.org/blog/daos-the-next-big-thing>.

⁴⁸ MME Switzerland Token Summit, *supra* note 17 at 37:05-37:50

⁴⁹ Gaba Vineb, *supra* note 29; see also MAKERDAO, *The Maker Protocol: Maker DAO's Multi-Collateral Dai (MCD) System*, [https://makerdao.com/whitepaper/White%20Paper%20-The%20Maker%20Protocol_%20MakerDAO%E2%80%99s%20Multi-Collateral%20Dai%20\(MCD\)%20System-FINAL-%200021720.pdf](https://makerdao.com/whitepaper/White%20Paper%20-The%20Maker%20Protocol_%20MakerDAO%E2%80%99s%20Multi-Collateral%20Dai%20(MCD)%20System-FINAL-%200021720.pdf) [hereinafter *Maker Whitepaper*]

⁵⁰ See MAKERDAO, *Governance Risk Framework (Part 1)*, MAKERDAO: BLOG (July 31, 2018), <https://blog.makerdao.com/makerdao-governance-risk-framework/> (discussion of the The First Risk Construct).

vote, and contributions of independent volunteer risk researchers.⁵¹ The Maker Protocol allows users to generate Dai by leveraging collateral assets approved by “Maker Governance,” the community-organized and operated process of managing the protocol.⁵²

In February 2019 MolochDAO launched, designed to tackle collective action problems. Its design choices have been narrowly focused to coordinate charity grants for Ethereum projects.⁵³ The MolochDAO led to a set of “organizational primitives”— “simple smart contracts that enabled groups of people to pool assets, collectively vote, and direct assets to third parties.”⁵⁴ MolochDAO is entirely on-chain without a legal wrapper.⁵⁵

2. *Extending Business Opportunities*

The evolving decentralization of business and society is an extension of the existing societal organization and human achievement. As organizational centralization reaches natural limitations, decentralized organizational elements become more prevalent. For example, internet-based platform businesses try to make organizational hierarchies flatter to increase creativity and output and instill a culture of “best idea wins.” Similarly, as business reaches natural frontiers, it extends its reach via decentralized structures. Companies like eBay and Amazon provide examples of centralized companies that decentralized the customer experience. These companies use the structure, control, and associated profit optimization of centralized entities and combine it with the bottom-up approach of decentralization in the form of customer reviews. The farthest extension of these ideals is instantiated in the DAO, as an organization that only exists in code. At the beginning of the twenty first century, DAOs epitomize organizational decentralization.

⁵¹ *Id.*; see also MAKERDAO, *Governance Risk Framework (Part 2)*, MAKERDAO: BLOG (July 30, 2018), <https://blog.makerdao.com/makerdao-governance-risk-framework-part-2/>, at “Maker token holder (MTH) and Maker internal risk team (MRT) duties”.

⁵² *Maker Whitepaper*, *supra* note 49.

⁵³ The LAO, *supra*, note 33.

⁵⁴ The LAO, *supra* note 35.

⁵⁵ MME Switzerland Token Summit, *supra* note 17 at 33:53-34:15.

DAOs can use elements of profit generation and redistribution in a way that in effect combines capitalistic and socialistic ideas. DAOs allow for the organization of society in economic structures that generate profit while at the same time redistributing resources. DAOs combine elements of socialistic cooperatives with the meritocracy and incentivization of capitalism. For example, DAOs may provide individual members the ability to sell their personal (e.g. social media etc. consumption) data, preferences, opinions etc. in decentralized systems, including in real time. Such assets, e.g. one's data, preferences, opinions etc. can only limitedly be commercialized in existing centralized structures. In decentralized structures such assets can be tokenized, valued, and mobilized. Similarly, tokenized hard assets, such as real estate, can be tokenized and sold in unprecedented fractional forms. The ability to control one's data and fractionalized (hard) assets enables new forms of consumption for consumers. In the early 2020, several startups were developing a barter system in which services, such as free car rides etc., become available in return for disclosure of consumers' data and personal preferences etc.

3. *Addressing Age-Old Problems*

DAOs provide algorithmic remedies for the age-old principal-agent problem.⁵⁶ Most business organizations, particularly corporations, are to some extent characterized by the separation of ownership and control, leading to many opportunities for agency conflicts.⁵⁷ An agency relationship results from a contract between a principal and agent whereby the agent acts on the principal's behalf, pursuant to the decision-making authority the principal delegated to the agent.⁵⁸

⁵⁶ Philip Boucher, *How Blockchain Technology Could Change Our Lives*, Eur. Parliamentary Res. Serv. Sci. Foresight Unit, Feb. 2017, at 20

⁵⁷ See Wulf A. Kaal, *Blockchain Solutions for Agency Problems in Corporate Governance*, ECONOMIC INFORMATION TO FACILITATE DECISION MAKING (2019) <https://ssrn.com/abstract=3373393> at 3 (citing Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure*, 3 J. FIN. ECON. 305 (1976); Andrei Shleifer & Robert W. Vishny, *A Survey of Corporate Governance*, 737 J. FIN. 737 (1997)).

⁵⁸ *Id.* at 4.

Information asymmetries between the principal and the agent as well as agents' opportunistic behavior resulting from self-interest lead principals to lack trust in their agents.⁵⁹ Because of this lack of trust, principals attempt to control, monitor, and supervise the agent to differing extents,⁶⁰ which leads to transaction costs.⁶¹ Reducing transaction costs is an age-old goal, as outlined by Ronald Coase in 1937.⁶² In 2016, the financial services industry began an effort to automate old processes to cut costs, errors, and friction.⁶³ The blockchain technology of a DAO helps address the principal-agent problem by reducing misconduct and error. Incentives are realigned between otherwise disparate interests of principals and agents because all participants in a DAO share the same goal, which reduces behavior that is contrary to the interests of the organization. This realignment of incentives shifts economic and power dynamics. The technology and incentive designs in DAOs are intended to remove hierarchy, eliminate errors in human judgment and prevent intentional misconduct such as self-dealing.⁶⁴ Because algorithms control large parts of the DAO interaction, DAOs have enhanced opportunities to reduce human error and corruption.⁶⁵ Potentially automated organizational functions include admission of new stakeholders, contracting with third parties, as well as taking other actions that normally require human deliberation.⁶⁶ The ledger is also public, so manipulation of the ledger is an unlikely method to defraud stakeholders.⁶⁷ Once the contract terms are coded in a blockchain, they are very difficult to change⁶⁸ which creates certainty and predictability.⁶⁹ It also increases efficiency, such as

⁵⁹ *Id.* at 5.

⁶⁰ *Id.* at 5-7.

⁶¹ *Id.* at 3, 5-7.

⁶² Ronald Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386 (1937).

⁶³ Tanaya Macheel, *The DAO Might be Groundbreaking, But Is It Legal?* *AMERICAN BANKER* (May 19, 2016, 3:12 PM), <https://www.americanbanker.com/news/the-dao-might-be-groundbreaking-but-is-it-legal>.

⁶⁴ Shawn S. Amuial et al., *The Blockchain: A Guide for Legal and Business Professionals* ch. 4, at 2 (2016).

⁶⁵ Macheel, *supra* note 63, at 1; *see also* Boucher, *supra* note 56, at 20.

⁶⁶ Amuial et al., *supra* note 64, at 2.

⁶⁷ Amuial et al., *supra* note 64, at 3.

⁶⁸ Amuial et al., *supra* note 64, at 2.

⁶⁹ Primavera De Filippi & Aaron Wright, *BLOCKCHAIN AND THE LAW: THE RULE OF CODE* 152 (2018).

via the collective decision-making ability of a DAO through technology, reducing the costs associated with acquiring sufficient information to actively and efficiently participate in any decision-making process.⁷⁰ DAOs can reduce transaction costs and help align interests for stakeholders in a more decentralized manner.⁷¹ The core common denominator for all DAO token members is a desire to optimize the DAO structure and token value,⁷² which benefits all constituents.⁷³ Even performance assessment removes human error and corruption—instead of politics and hierarchy, assessment is based on value optimization, in an anonymized proposal voting scheme—employing non-discriminatory performance measures.⁷⁴ In the DAO environment, influence is determined by the value of a given token holder's contribution to a project's success.⁷⁵ The governing source code is public and therefore a DAO promotes transparency,⁷⁶ allowing individuals to maintain control over their personal data and their identities.⁷⁷

4. *Value to Efforts Workflow*

The value to effort workflows in DAOs helps address the shortcomings of employee work requirements in hierarchical entities. Traditional hierarchical corporate structures often result in suboptimal outcomes and unsustainable solutions for employees. Work can be pushed down onto an employee who is forced, by economic necessities, to perform a function the employee may not appreciate. Performing tasks one does not like typically does rarely yield appropriate job performance. The supervisor in the traditional

⁷⁰ *Id.* at 152.

⁷¹ Shuai Wang, et. al., *Blockchain-Enabled Smart Contracts: Architecture, Applications, and Future Trends*, 49 IEEE TRANSACTIONS ON SYS., MAN, AND CYBERNETICS: SYSTEMS 2266, 2270 (2019) (citing What is a DAO?, <https://blockchainhub.net/dao-decentralized-autonomous-organization>).

⁷² Kaal, *supra* note 57, at 19.

⁷³ Kaal, *supra* note 57, at 21.

⁷⁴ Kaal, *supra* note 57, at 20.

⁷⁵ Kaal, *supra* note 57, at 22.

⁷⁶ Amuial et al., *supra* note 64, at 2-3.

⁷⁷ Usman W. Chohan, *The Decentralized Autonomous Organization and Governance Issues* Dec. 2017 at 4 (citing Chohan, U.W., *Initial Coin Offerings (ICOs: Risks, Regulation, and Accountability)*, 2017).

hierarchical corporate structure can determine where, what, and when workers have to perform, which often results in attendance of unproductive meetings, facetime, support for suboptimal outcomes to please supervisors, among many other suboptimal outcomes. By contrast, in DAOs, influence and outcomes are not created by hierarchy but rather determined by the value a token holder contributes to a DAO. The value-focused performance in the DAO structure helps optimize workflows and creates sustainable solutions for DAO token holders. Moreover, if a token holder adds substantial value to the DAO, other DAO token holders will want to add their skills in the same context which focuses the token holders' efforts on the highest possible value proposition. This "value to efforts workflows" in the DAO structure has the potential to change the way society works and creates outcomes.

The incentive design for value to effort workflows in DAOs can take two core forms. Economic incentives of DAO members can be the value of the DAO token the members own. The hope that the value of the tokens increases or does not substantially decrease as more members are recruited and the respective DAO grows, incentivizes cohesion, work performance, and long-term engagement. In addition to the potential token appreciation, economic incentives for DAO members can take the form of earning tokens by performing tasks for the DAO. In other words, by supporting the DAO achieve its objectives, DAO token holders can earn a separate income in addition to token value appreciation.

Compensation in the form of token value appreciation originates from supply and demand. In theory, token value appreciation liberates DAO members from the shortcomings of existing corporate compensation practices. The compensation afforded to DAO members can take the form of increases in value of the DAO token the members own. Because the total outstanding and publicly held supply of tokens for any given DAO may be capped and fully transparent and pre-determined in code, the value of the respective DAO tokens could in theory increase with demand. Moreover, because the total supply of tokens can be pre-determined and capped in the DAO code, dilution by central administrators such as government officials or self-interested or biased executives/supervisors/CEOs is less likely, depending on the respective DAO design and code. Moreover, the alignment of

interests between shareholders and management in the existing corporate structures via stock options, among others, and their suboptimal effects on sustainability, reporting, and work environment, is no longer necessary.

The priorities and work schedules of DAO members are not determined in a classical top-down corporate hierarchy. In fact, the traditional forms of command and control, giving and receiving orders does not exist because the functionality of a supervisor, CEO or boss does not exist in a DAO structure. What facilitates the cooperation of DAO token holders is the compensation of DAO members that, in addition to the supply and demand of tokens and token appreciation, can take the form of earning tokens by performing tasks for the DAO. In other words, by supporting the DAO achieve its objectives, DAO token holders can earn a separate income in addition to token value appreciation. While token holders in the DAO community may identify DAO requirements or needs, such as for instance a new or optimized webpage that helps the DAO community, such requirements are not identified in the form of a mandate. In other words, no particular DAO member is tasked with and mandated to perform the identified optimization.

The core common denominator for all DAO token members is the unifying desire to optimize the DAO purpose and the associated DAO token value. If a member-identified optimization has the potential to make the DAO more meaningful, useful, or valuable to the token holder members, the DAO token holders will desire to perform such optimization tasks as it is in their very interest to do so to help increase the value of their DAO tokens. Accordingly, in efforts to increase the value of its tokens, members can make DAO optimization proposals, e.g. optimize the voting procedure, webpage etc., that explain what actions ought to be taken to optimize and what value such actions will add to the respective DAO token holder community. The token holder community then votes on a given optimization proposal. If a proposal passes, the proposing DAO member will receive an award in the form of new tokens. Any such payment is added to the respective DAO blockchain but now requires for the proposing token holder to perform on the proposed parameters of optimization. In other words, once the optimization proponent has made a deal with the DAO, it is in the blockchain and

the proponent is required to deliver on the proposal, or her contract is cancelled.

Performance assessment in the DAO structure is based on value optimization not on hierarchical or political processes. DAO workers' performance is assessed in an anonymized proposal voting scheme which is the only basis for assessment and payment. If DAO members perform well, they will get remunerated regardless of politics, background, or education. The only thing that counts for purposes of assessment of DAO works is their performance of optimization parameters. This is an important difference between classical corporate hierarchies and DAO member performance of optimization proposals, e.g. the DAO's non-discriminatory performance measures.

Non-performance penalties in the DAO structure are free from biases. If DAO community members do not deliver on a proposal that was voted in by the DAO token holder community, they lose credibility or reputation in the DAO token holder community and may be perceived as lacking an ability to add value. In fact, non-performance on proposal comes with significant reputational penalties. Non-performers in the DAO structure will be less likely to have future opportunities to earn tokens because the other token holders are unlikely to approve non-performer proposals. Crucially, non-performance reputational penalties are entirely free from racial or cultural biases and associated implications as the token holders are unlikely to even know each other. Rather, they all work towards a common goal of optimizing the DAO and the token value.

The DAO token holders' focus on adding value benefits all constituents. Because projects that cannot add value take token holders' time away from more productive endeavors, token holders become focused on managing their time and efforts. Unlike in traditional hierarchical organization where face-time and unproductive meetings are the norm, the self-governing DAO token optimizer avoids any such corporate hierarchy inefficiencies and frees herself from top-down inefficiencies and bad outcomes. In essence, the DAO work proposal and value optimization structure allows the avoidance of bad projects, bad colleagues, and unproductive meetings. The only thing that counts is the value proposition. In other words, the focus shifts from political

positioning and supervisor pleasing without performance to a focus on adding active value to a given project. If value can be added, the tasks will be performed, if the assessment of the proposal suggests that the value proposition is in doubt, token holders will try to spend their time and skills on more productive and value-adding tasks. Importantly, because the DAO structure functions without supervisors, DAO token holders who decide they cannot add value on a given task can move to more productive endeavors that better utilize their skills without any penalties that would exist in the traditional hierarchical corporate structure.

Politics in the DAO structure have a different nature compared with traditional hierarchical corporate structures. In a traditional corporate hierarchy, position in the hierarchy and associated authority determine effort. In other word, the supervisor in the hierarchical structure can determine where, what, and when workers have to perform, resulting in suboptimal outcomes, attendance of unproductive and useless meetings, among many other negative effects. By contrast, in the decentralized DAO environment, influence is determined by the value a given token holder contributed to a project's success.

5. Maintaining the Fluidity of Decentralized Order

The values and core belief systems of DAO members provide cohesion and longevity in decentralized systems. For example, contributors to Wikipedia share a common belief in the power of the crowd, that is, that decentralized collaboration for the pursuit of knowledge creates superior outputs. They collaborate because their values and core beliefs in knowledge creation unite them in a common cause.

The desire to be connected via a DAO to like-minded individuals has two core value propositions. First, individuals elect to join a DAO and thus signal their desire to cooperate in a decentralized network. Second, individuals select their particular DAO based on their values and interests. DAO members will choose to join a DAO if it corresponds with their existing inclinations, values, knowledge base, and belief system. If the DAO also elicits and uses individuals' particular skillsets that reinforces their belief system, such as coding for people who believe in the freedom of

decentralized systems, the DAO can be a very strong force for value reinforcements.

DAOs need values shared by the DAO members to unify them and to guarantee stability of cooperation while maintaining a decentralized structure. The values that unite DAO members are not only a determining factor for membership and cohesion, they also ensure the longevity of the DAO and its continual evolution. Groups that are not united by values disintegrate and perish. DAOs derive unity from common goals and aspirations beyond protocols. For example, in the early 2020s, most DAO initiatives and their respective members were driven by a desire to create some sort of alternative open society that is less controlled by existing power structures. The underlying value and desire for freedom and change unites the DAO communities and as they evolve.

Unifying values increase efficiency in the DAO. The power of the DAO is instantiated and perpetuated through the individualized power centers in DAOs that morph into decentralized organization when the powers become correlated, aligned by a common principle, a transcendental goal. Individual DAO members may begin to partially imitate each other as they seek to progress toward the common goal. Individually and technologically the individuals and nodes of the chaotic network respond to this transcendental calling as they unite in purpose. This newfound harmony makes the group more efficient than before as they find varying ways to cooperate in more complex behaviors.

The longevity of DAOs depends on their ability to maintain the fluidity and decentralized order that was possible in the initial stages of the DAO. Without continual efforts to maintain decentralized order, values that initially unite DAO members have a tendency to result in ever tighter and complex hierarchical structures in the DAO. In the final stage, the harmony and cooperation of the decentralized organization filters the group into an ever tighter and complex hierarchical structure, raising some individuals into positions of power over others. Eventually, a tree structure emerges, a fully centralized organization. This filtering process towards centralization is often the result of competition, calculated allocation of power, or otherwise matching the position to the appropriate individual's talents within the DAO. If the hierarchy is

successfully completed, all individuals find their positions of power statically fixed and the levers of power clear. This end stage is a completely centralized organization, with the top of the hierarchy being the center of power.

III. DAO Limitations

In 2020, DAOs are still subject to significant limitations. Such limitation's origins can be summarized as path dependencies, regulatory uncertainty, lingering suboptimal incentive designs, public policy, as well as market-, economic-, and technical limitations.

For example, a public policy problem would arise if DAOs are used for illicit or otherwise undesirable purposes. The anonymous nature of DAOs opens up the possibility of a DAO being used for undesirable purposes, such as to evade federal regulations, or coordinate social resistance and terrorism.⁷⁸ However, the vast majority of blockchain-driven projects are aimed to serve the common good.⁷⁹

Economic problems that may be associated with DAO concepts include the consequences of decentralized decision making and impact on corporate culture. Decision making driven by consensus can cause problems.⁸⁰ For example, majority voting may lead voters to compromise the lowest common denominator level amongst the group, resulting in mediocre outcomes.⁸¹ Decentralized

⁷⁸ See, e.g. Kyung Taeck Minn, *Towards Enhanced Oversight of "Self-Governing" Decentralized Autonomous Organizations: Case Study of the DAO and Its Shortcomings*, 9 N.Y.U.J. OF INTELL. PROP. & ENT. L. 139, 165-67 (2019).

⁷⁹ See, e.g. forthcoming Kaal publication on *Blockchain for Good* (2021).

⁸⁰ William Mougayar, *Cut the Consensus: You Can't Run a Business Like a Blockchain*, COINDESK (Feb. 27, 2020), <https://www.coindesk.com/cut-the-consensus-you-cant-run-a-business-like-a-blockchain>.

⁸¹ Mougayar, *supra* note 80; see also Philip Ball, 'Wisdom of the Crowd': *The Myths and Realities*, BBC FUTURE (Jul. 7, 2014), <https://www.bbc.com/future/article/20140708-when-crowd-wisdom-goes-wrong>.

business entities may negatively impact corporate culture.⁸² On the market side, the efficiency-driven nature of DAOs could create hypercompetitive markets which would benefit consumers, but if DAOs outperform human-run companies, they could not only become monopolies or oligopolies, but could also skirt regulations prohibiting price fixing or collusion.⁸³

Technical vulnerabilities of DAOs include cyber security, voting procedure, and voter manipulation.⁸⁴ The immutable nature of blockchain ledgers could also make the DAO vulnerable to attacks because it is so difficult to alter the essential construction of the DAO once the system is in operation, should a bug in the code arise.⁸⁵

1. Path Dependencies

The original DAO has a lasting impact on emerging DAO designs. It creates core commonalities and associated path dependencies in futures generations of DAOs. The core common denominator for all DAO token members is the unifying desire to optimize the DAO token value. Accordingly, performance assessment in the DAO structure is based on value optimization not on hierarchical or political processes. On the upside, token holders and contractors work towards a common goal of optimizing the DAO and the token value and non-performance reputational penalties are free from racial or cultural biases and associated implications as the token holders are unlikely to even know each other. Yet, the focus on the value enhancement of fungible tokens can lead to short termism and may ignore ethical and governance issues.

DAO developers are also subject to path dependencies which undermines the evolution of decentralized DAO designs. The communication structures in organizations will invariably influence future designs. While groups of DAO developers certainly influence DAO designs with their collective assumptions about how

⁸² Carla L. Reyes, *If Rockefeller Were a Coder*, 87 GEO. WASH. L. REV. 373, 424-28 (Mar. 2019).

⁸³ For in-depth discussion, see De Filippi & Wright, *supra* note 69, at 154.

⁸⁴ Chohan, *supra* note 77, at 5.

⁸⁵ Chohan, *supra* note 77, at 5.

their intended DAO users will engage with the DAO, the inherent structure and approach of a group of developers building a software solution typically has an even larger impact on DAO design. The collective reasoning process of DAO developers is based largely on their prior experiences with DAO software solutions which form path dependencies. The impact of such path dependencies became apparent in the Ethereum developer community and their attempts at upgrading Ethereum 1.0 to 2.0 in the late 2010s.

2. *Regulatory Uncertainty*

Regulatory uncertainty is holding back the development of DAOs and the optimization potential of DAOs for digital assets. For example, the original DAO claimed to be a crowdfunding contract and made unregistered offers and sales of DAO tokens in exchange for Ether.⁸⁶ However, the SEC began an investigation and determined that, although the DAO claimed to be a crowdfunding contract, it did not meet the SEC's requirements for a Regulation Crowdfunding exemption because the DAO is neither a broker-dealer nor a funding portal registered with the SEC and the Financial Industry Regulatory Authority.⁸⁷ In July 2017, following this investigation, the SEC issued an investigative report stating that virtual coins or tokens may be securities and subject to securities laws, depending on the facts and circumstances including the economic realities of the transaction. The SEC stated that federal securities laws apply to those who offer and sell securities in the United States, regardless of whether the issuing entity is a traditional company or a decentralized autonomous organization, regardless of whether securities are purchased using fiat or virtual currency, regardless of whether they are distributed in certificated form or through distributed Ledger technology. Federal securities laws provide disclosure requirements and regulatory scrutiny aimed at investor protection.⁸⁸

⁸⁶ Press Release, U.S. SEC. & EXCH. COMM'N, *SEC Issues Investigative Report Concluding DAO Tokens, a Digital Asset, Were Securities* (Jul. 25, 2017) (citing to U.S. Securities and Exchange Commission, *Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO* (Jul. 25, 2017)).

⁸⁷ *Id.*

⁸⁸ *Id.*

Perhaps the most common and the broadest legal issue associated with DAOs pertains to the selection of an applicable jurisdiction. Jurisdictional issues for DAOs include the government's ability to enforce relevant regulations and DAO accountability through civil liability.

DAO participants can be held personally liable for the DAO's liabilities if the DAO is not properly legally formed. DAOs historically did not incorporate or officially create a corresponding legal entity off-chain for their on-chain existence. The lack of legal recognition of DAOs creates uncertainty as to how they would be treated by a court should they be sued. That is, the average DAO participants might not expect to be held liable for liabilities or obligations of the DAO. However, a very serious risk is associated with DAO membership in the sense that if the DAO members do not formalize a structure for their human-created entity, courts are very likely to impose one for the members of the DAO.⁸⁹

It is possible that a DAO can be legally construed as a general partnership or joint venture.⁹⁰ Under US law, DAOs are most likely to be treated as partnerships. A partnership is "an association of two or more persons to carry on as co-owners a business for profit."⁹¹ Such basic action legally forms a partnership, regardless as to whether or not the persons intend to form a partnership.⁹² If no legal entity is involved, partnership rules are default rule that apply to all interactions between parties trying to achieve a common goal.⁹³ No US statute authorizes the creation of a legally distinct entity in the form of a DAO.⁹⁴ Many courts and lawyers would describe the relationship between members of a DAO and their investors as the default general partnership which puts every stakeholder of a DAO

⁸⁹ Stephen Palley, *How to Sue a DAO*, LINKEDIN (Mar. 14, 2016), <https://www.linkedin.com/pulse/how-sue-dao-stephen-palley>; see also Reyes, *supra* note 82, at 398-400.

⁹⁰ See Laila Metjahic, *Deconstructing the DAO: the Need for Legal Recognition and the Application of Securities Laws to Decentralized Organizations*, 39 CARDOZO L. REV. 1533, 1554 (2018).

⁹¹ U.P.A. §102 (11) (amended 2013).

⁹² *Id.* at §202(a)

⁹³ MME Switzerland Token Summit, *supra* note 17 at 6:00-6:30.

⁹⁴ Amual et. al., *supra* note 64, at 1.

as liable for any debts or legal actions that the DAO may face.⁹⁵ Even not-for-profit DAOs can run into legal gray areas where participants may individually face legal liability for the activity of the organization if a court were to consider them partners should a litigation ensue.⁹⁶ The original DAO was arguably a partnership—a public, permission-less community-based, with on-chain governance, and a very specific investment purpose.⁹⁷ By interacting with a smart contract, DAO members unite their efforts and resources to achieve a certain goal, which satisfies the legal definition of a simple partnership.⁹⁸

As partners, DAO participants are potentially liable jointly and severally for all debts, obligations, and other liabilities of the partnership.⁹⁹ That could mean that any known participants in the DAO may be targets for regulatory enforcement or civil actions.¹⁰⁰ However, some believe that the way in which people come together to fund, participate, and interact with a DAO is significantly different than that of a general partnership.¹⁰¹ By contrast, a limited liability company is the only party that is liable for debts, obligations, or other liabilities of the company.¹⁰² A member or manager is not personally liable, directly or indirectly, by way of contribution or otherwise, for a debt, obligation or other liability of the company solely by reason of being or acting as a member or

⁹⁵ OpenLaw, *The Era of Legally Compliant DAOs*, MEDIUM (Jun. 26, 2019), <https://medium.com/@OpenLawOfficial/the-era-of-legally-compliant-daos-491edf88fed0>.

⁹⁶ The LAO, *supra* note 33.

⁹⁷ MME Switzerland Token Summit, *supra* note 17, at 4:10-5:30. For full discussion of The DAO as a general partnership, *see* Metjahic, *supra* note 90, at 1546.

⁹⁸ MME Switzerland Token Summit, *supra* note 17, at 5:30-6:00.

⁹⁹ U.P.A., *supra* note 91, at §306 (a).

¹⁰⁰ Chohan, *supra* note 77, at 3.

¹⁰¹ For full discussion of business organizations and DAOs, *see* Amuial, et al., *supra* note 64; *see also* Alexandra Sims, *Blockchain and Decentralised Autonomous Organisations (DAOs): The Evolution of Companies?*, NEW ZEALAND UNIVERSITIES L. REV. (forthcoming 2019); on capitalization structures and DAOs, *see* Reyes, *supra* note 82 at 414-18, 419-22 (discusses DAO as business trust).

¹⁰² U.L.L.C.A. § 304(a) (Unif. Law Comm'n 1997).

manager.¹⁰³ In order to form an LLC, a certificate of organization is filed with the Secretary of State.¹⁰⁴

The application of the legal concept of fiduciary duties is less clear in DAOs. Fiduciary duties may require a fund manager to act in the best interests of their client.¹⁰⁵ In the traditional regulatory infrastructure fiduciary duties often function to overcome the corporate governance problems associated with the separation of ownership and control.¹⁰⁶ However, in a DAO, because of the value-to-effort focus of workflows in the DAO structure, supervision and imposition of legal duties are less clearly applicable. DAO token holders optimize the DAO together according to their individualized value propositions in accordance with their unique skillsets, backgrounds, and training.

Another legal risk associated with DAOs pertains to the legal recourse for third parties who contract with a DAO. In lieu of partner liability, it is less clear who a liable party may be in a DAO. Without clearly defined liability rules, third parties and investors in DAOs may have less clearly defined legal recourse.¹⁰⁷ While DAO dispute settlement is relatively predictable on-chain,¹⁰⁸ settlement off-chain is less predictable.¹⁰⁹ Parties may be able to limit remedies to DAO assets through private agreements. But, if the DAO should face a tort suit such an agreement is unlikely to be upheld.¹¹⁰

¹⁰³ *Id.*

¹⁰⁴ *Id.* at § 201 (a). For more on limited liability protection and blockchain, see De Filippi & Wright, *supra* note 69, at 141-42.

¹⁰⁵ Patrick Eha and Tanaya Macheel, *What the Attack on the DAO Means for Banks*, AMERICAN BANKER (Jun. 20, 2016) (quoting Kirill Gourov, Expand Research analyst and “early bitcoin adopter.”)

¹⁰⁶ Kaal, *supra* note 57, at 23.

¹⁰⁷ Eha & Macheel, *supra* note 105 again quoting Kirill Gourov; see also Chohan, *supra* note 77, at 4.

¹⁰⁸ Peter Van Valkenburgh, *What Does It Mean to Issue a Token “On Top Of” Ethereum?*, COINCENTER (May 10, 2017), <https://www.coincenter.org/education/crypto-regulation-faq/what-does-it-mean-to-issue-a-token-on-top-of-ethereum/>.

¹⁰⁹ *Id.*

¹¹⁰ Ross Campbell, *E-Commerce with Legal and Blockchain Security*, MEDIUM: GOOD AUDIENCE (Jan. 26, 2019), <https://blog.goodaudience.com/e-commerce-with-legal-and-blockchain-security-6f2ba6c244a3>

Applying a common legal anchor and traditional jurisdictional principles to cybernetic systems is near impossible because the status of the cybernetic system is constantly changing. Cybernetic systems are constantly changing and less amenable to jurisdictional reach. For example, Ethereum was launched as a foundation¹¹¹ in order to have sufficient funds to further promote¹¹² and propose the genesis block to the community.¹¹³ After it launched, the community had to decide which version of the protocol they desired to adopt and use.¹¹⁴ Such community choices make the application of jurisdictional principles and a legal anchor governance structure¹¹⁵ less clear for cybernetic systems. Exacerbating things, cybernetic systems often involve counterparties that do not concurrently exist.¹¹⁶ Therefore, web interfaces add centralization elements which make a legal anchor more critical because that is what traditional lawyers look for to analyze the system and apply jurisdictional principles.¹¹⁷ For example, with The DAO, the financial markets authority in Switzerland did not look at the functionality of the smart contract but how the DAO was sold, promoted, and displayed.¹¹⁸

The application of securities laws is less clear for DAOs. Traditional organizations are subject to risk and compliance controls around fund withdrawal.¹¹⁹ Under current laws, DAOs solely governed by smart contracts are restricted in their ability to pool assets and generate profit because securities laws limit their ability to fund ecosystem development and deploy capital efficiently.¹²⁰ The SEC published a report finding that the DAO's tokens were securities, meaning that they were required to register with the SEC and be subject to federal securities regulations.¹²¹ A security ("investment contract") is defined as "an investment of

¹¹¹ MME Switzerland Token Summit, *supra* note 17 at 37:51-37:51.

¹¹² MME Switzerland Token Summit, *supra* note 17 at 40:21-40:34.

¹¹³ MME Switzerland Token Summit, *supra* note 17, at 37:51-40:12

¹¹⁴ MME Switzerland Token Summit, *supra* note 17, at 40:12-40:21

¹¹⁵ MME Switzerland Token Summit, *supra* note 17, at 40:34-40.

¹¹⁶ MME Switzerland Token Summit, *supra* note 17, at 42:40-43:00

¹¹⁷ MME Switzerland Token Summit, *supra* note 17, at 43:00-43:30.

¹¹⁸ MME Switzerland Token Summit, *supra* note 17, at 43:30-43:49.

¹¹⁹ Eha & Macheel, *supra* note 105 (quoting Kirill Gourov).

¹²⁰ The LAO, *supra* note 33.

¹²¹ Press Release, SEC, *supra* note 86.

money in a common enterprise with a reasonable expectation of profits to be derived from the entrepreneurial or managerial efforts of others.”¹²² This is a very fact-specific analysis, which requires thorough investigation or discovery in litigation to even determine whether a given token meets the definition of a security.¹²³ Certain ICOs have since been classified as securities offerings, but in addition to federal securities laws, state law may treat the issuance of tokens differently.¹²⁴ In essence, for participants in a DAO, all of these factors combined lead to uncertainty, and potential liability for failing to comply with federal securities regulations, which are designed to protect investors.¹²⁵

3. *Suboptimal Incentive Design*

Despite the abovementioned seemingly optimized DAO governance structures, lacking decentralized governance solutions affect the application of decentralized systems on multiple levels. Decentralized networks depend on dynamic governance. As blockchains protocols evolve in a given market, they require updates. At the beginning of the 2020s, basic standards for the governance of digital assets were still missing. Efforts to provide more legal certainty through regulatory carve-outs were mostly tentative and lacked sufficient regulatory support or voting majorities in the regulatory agencies. The evolution of the digital asset market necessitates certainty for market participants. Without standards and governance, certainty and the associated market confidence cannot develop.

Chain forks with all their negative effects were still a reality and common practice for blockchain protocol upgrades in the early

¹²² *SEC v. W.J. Howey Co.*, 328 U.S. 293, 301 (1946).

¹²³ Timothy Nielsen, Note, *Cryptocorporations: A Proposal for Legitimizing Decentralizing Autonomous Organizations*, 2019 UTAH L. REV. at 8-9 (forthcoming 2019-20).

¹²⁴ Sven Riva, *Decentralized Autonomous Organizations (DAOs) as Subjects of Law – the Recognition of DAOs in the Swill Legal Order* (Oct. 2019) (unpublished master’s thesis, University of Neuchatel (one file with author) (citing SEC Spotlight on ICOs and Dewey Josias, USA, p. 479).

¹²⁵ See also Joel S. Telpner & Thomas M. Ahmadifar, *ICOs, The DAO, and the Investment Company Act of 1940*, 24 INVESTMENT LAWYER, 16, (2017); Amual, et al., *supra* note 64, at § 4.5.

2020s. While sometimes forks were merely used to test a process or upgrade, forking was most often used to implement new characteristics for digital asset or to create a fundamental protocol change. The bifurcation of nodes in a given decentralized network can lead to significant economic loss, errors, confusion, and bugs. For example, the bifurcation of network nodes can result in the reemergence of the double spend problem that the previous network had overcome. Users running the pre-fork code consider the post-fork code invalid, they cannot detect the spending on the post-fork code. Correspondingly, cryptocurrencies spent in a post-fork block could be spent again on a pre-fork block. Similarly, fork-related changes in protocol parameters such as the block size or the difficulty of the cryptographic puzzle can result in certain blocks being accepted by the post-fork protocol but rejected by the pre-fork versions of the protocol which may result in the loss of funds. The economic loss associated with such parallel existence can be quite significant. Finally, the fork that created Bitcoin Cash illustrates the risk of contention and the associated social and political turmoil post fork that necessitates blockchain reorganization. Post Bitcoin Cash fork, the Bitcoin community could not agree on the chain that provided the most survivable protocol. As a result of contention, two blockchains, e.g. Bitcoin and Bitcoin Cash compete in perpetuity with the resulting social and economic loss for each chain.

DAO governance lacked proper incentive designs at the beginning of the 2020s. At the beginning of the 2020s, most DAOs utilized centralized forms of master nodes to institute blockchain protocol and DAO upgrades. Human nature and any effective machine derivatives of human engagements in institutional form require a duality of incentives in order to overcome attempts of rational and opportunistic internal and external constituents to game the governance design of a given DAO. The duality of incentives consists of a) incentives for actors to improve their own utility, while at the same time b) actors' actions benefit the entirety of the institution and its constituents for the long run.

DAO designs at the beginning of the 2020s did not effectively master this duality. Moreover, then existing DAO designs did not effectively use non-fungible assets to overcome corruptive elements. When fungible assets are used as the dominant incentive

design in the governance of DAOs with identifiable actors, rational and opportunistic internal constituents and external participants will typically attempt to corrupt the governance design of the DAO for their own gain. Similarly, the identity of actors in a DAO governance design creates typically corruptive elements. Merit identifiers other than individual identity remove the most corruptive influences. At the beginning of the 2020s, no then-existing DAO design had effectively conceptualized and applied an anonymous merit identifier with non-fungible decentralized assets.

IV. Governance & Legal Design Experimentation

In the 2020s, legal designs of DAOs are still largely relegated to experimentation. Such experimentation is natural and useful for the evolution of DAO concepts. Trial and failure of legal DAO designs create a natural filtering mechanism for successful DAO designs. Importantly, the experimentation with DAO legal designs, that is, legal designs that allow DAOs to interact with the real world in a legal construct, can go hand in hand with internal DAO governance designs.

Any experimentation with DAO legal solutions has the ultimate objective of accomplishing the highest level of decentralization. Lasting legal solutions for DAOs have to increase and maintain the internal and external decentralization accomplished in the DAO. DAOs cannot exist and persist without ever increasing degrees of decentralization. Therefore, first and foremost, DAO legal designs need to supplement the internal decentralization accomplished by the DAO.

Supplementing internal DAO decentralization is perhaps the most serious challenge for DAO legal designs. Existing legal solutions for DAOs typically require forms of legal representation in the respective jurisdiction. Jurisdictional requirements pertaining to legal representation are always a point of centralization. Tying the legal existence of a DAO to any forms of existing legal and jurisdictional frameworks typically results in the need for a representative in the chosen legal framework and jurisdiction, which in turn centralizes the DAO and can result in the long-term failure of the respective DAO concept. Representation requirements, however, are a natural DAO anchoring mechanism

for a given jurisdiction that allows the respective jurisdiction to exercise jurisdiction and control over the DAO.

Surrendering jurisdiction over DAOs while giving DAOs legal status and limited liability will be the epitome and linchpin for DAO legal solutions. Surrendering control over DAOs while giving them a legal status in the given jurisdiction may be accomplished some day, if and when jurisdictions recognize the importance of DAO constructs for business relationships. However, tying the legal status recognition to forms of limited liability while surrendering jurisdiction over the DAO is perhaps less likely. Giving a DAO legal recognition and limited liability in a given jurisdiction would require the legislature to acknowledge that third parties in that jurisdiction who may interact with the limited liability DAO would only have limited recourse if things go wrong in the legal relationship. Because consumer protection is a core mandate for any legislature, it seems less likely that they will surrender control and jurisdiction over the DAO which includes no legal recourse, inability to sue in national courts etc, while also giving the DAO limited liability in that jurisdiction. Even if adequate alternative dispute resolution systems should emerge for DAO and smart contracting disputes, it remains unclear if these can suffice from a consumer protection perspective in most jurisdictions.

Combining internal DAO governance with a legal concept has several advantages. First, a DAO with a legal wrapper enables the DAO's operations in the real world and beyond. A DAO needs a legal wrapper representing the DAO in the sense that a DAO cannot rent an office or sign a contract that can only happen on paper.¹²⁶ Second, the legal entity that represents the DAO in the real world can benefit from the DAO's on-chain governance.¹²⁷ The on-chain governance of the DAO gives the legal entity a form of decentralized democratic legitimacy while at the same time not requiring internal democratic processes within such legal entity. The legal anchor, e.g. the legal wrapper, creates a form of needed centralization between decentralized technical functionality, legal relevance, and legal definition. Organizing based on functional

¹²⁶ MME Switzerland Token Summit, *supra* note 17, at 25:10-25:46.

¹²⁷ MME Switzerland Token Summit, *supra* note 17, at 25:10-25:46.

technicalities runs participants into legal risks.¹²⁸ For example, a smart contract can have a basic element of an organization and hence could be qualified as a minimum simple partnership, and never be a legal entity as such.¹²⁹ In this context, the legal anchor reduces risks and increases legal certainty for the DAO and third parties that transact with the DAO because the DAO would be represented through the legal wrapper.¹³⁰ Using the legal wrapper concept, the individual DAO members would not be liable and the third party knows exactly with whom she is interacting and where liabilities arise.

Incremental improvements of DAO governance can include multiple measures. Those measures can include releasing smart contracts in stages. In earlier stages the contract is more controlled and easily updated by a set of cryptographic, multi-signature notaries.¹³¹ In later stages, the control over the contract is released at an increasing rate. Certification processes and review processes as well as multiple security audits from respected institutions in combination with formal verification programs for smart contracts are additional possible governance improvement solutions for DAOs.¹³² Design changes can include so called tripwires or arbitration and mediation under adverse conditions or designing the DAO such that it can be stopped when it may appear to become too big to fail. Barriers to DAO entry can help ensure the success of on-chain governance, such as with permissioned blockchains or community guidelines (different tiers for different contracts).¹³³

1. Governance

Most cryptocurrencies would not exist if Bitcoin and Ethereum had effective incentives for future protocol development and

¹²⁸ MME Switzerland Token Summit, *supra* note 17, at 16:15-16:30.

¹²⁹ MME Switzerland Token Summit, *supra* note 17, at 53:01-53:24.

¹³⁰ MME Switzerland Token Summit, *supra* note 17, at 16:30-16:55.

¹³¹ Kyle Torpey, *They Might Be Smart, But These Contracts Need to Be More Secure*, American Banker Vol. 181 Iss. 140 Jul. 22, 2016 (discussing RSK Labs).

¹³² Torpey, *supra* note 40.

¹³³ Torpey, *supra* note 40.

governance built into the core protocol.¹³⁴ Common core denominators of existing problems in governance design include the corruptive effects of existing governance designs with fungible assets as well as the identity of actors in governance designs. These factors, among many others, contributed to the resulting inability to govern institutions effectively.

DAO governance structures are built on software, code and smart contracts that run on public decentralized blockchain platforms, such as Ethereum. DAOs typically do not have a physical address as they merely compute code. Because of these code-based features, DAOs are not organizations with a traditional hierarchy as known from traditional corporate structures where authority and empowerment flow downwards from investors/shareholders through a board of directors to management and eventually staff. Indeed, DAOs typically do not have directors, managers, or employees. Because a series of smart contracts grants DAO token holders voting rights, the blockchain-based smart contracts imitates the role of articles of association or bylaws and the entirety of a precedent system that would otherwise be provided by default in a jurisdiction-based legal structure. Because DAO code is typically open source, the token holders not only vote on investment and/or work proposals, but also on any change made to the code. Accepted proposals would also be backed by a software code, defining the relationship (in terms of rights, obligations, and performance metrics) between the respective DAO and the accepted and funded work proposals.

The technological infrastructure of decentralized systems enables unprecedented decentralized governance incentive designs that can create solutions that could not so far be accomplished in centralized governance structures. Unlike centralized governance incentive design, decentralized incentive alignment in a DAO have the potential to be organized in an incorruptible way with non-fungible digital assets. Efficiently designed DAO governance helps overcome collective action problems associated with lacking incentive alignment in existing agency-based governance designs.

¹³⁴ Naval Ravikant (@Naval), TWITTER (Apr. 13, 2018, 9:55 PM), <https://twitter.com/naval/status/985018594252742656>.

Community audits are a key element in DAO governance. Centralized systems rarely provide for and administer community-driven audits. Community-driven audits go against the agency and monitoring principles embedded in the centralized governance. External monitoring and validation are key in centralized governance systems because the incentive design in centralized structures does not enable incorruptible internal controls. By contrast, community audits are at the core of DAO governance. The decentralized nature of DAOs enhances efficiency of coordination because the users of the system, e.g. DAO members, typically know best how to assess other users / DAO members. The decentralized DAO structure enables unprecedented information symmetry in the governance design because governance information, e.g. DAO group decision making metrics and DAO governance protocol needs, is at the edge of the decentralized system and is exchanged and evaluated directly between DAO members in a continuous and iterative stream of information that provides dynamic feedback effects.

Governance upgrades in DAOs enable a different kind of agency relationship. Because of the smart contract coordination of agency relationships, traditional control mechanisms employed by principals in agency relationships can be scaled back and partially be removed. DAO workers are engaged in a dynamic set of working relationships that continuously and dynamically self-organize around projects and outcomes, not corporate hierarchies with implicit hierarchical biases.

The DAO governance optimization makes traditional uses of fiduciary duties less relevant. The traditional regulatory infrastructure that attempts to overcome the corporate governance problems associated with the separation of ownership (shareholders) and control (management) relies heavily on fiduciary duties. Those directors and officers who violate their fiduciary obligations in centralized organizations by not acting in the best interest of the corporation can be sued. In the DAO structure such duties and litigation-based control mechanisms are less relevant. Because of the value to effort focus of workflows in the DAO structure, supervision of management and imposition of legal duties on management is less needed because there are fewer or no supervisors. Rather, token holders optimize the DAO together according to their best value

propositions in accordance with their unique skillsets, backgrounds, and training.

a) Dynamic Elements

Dynamic elements in DAO governance help avoid otherwise inevitable corruptive influences. In any open and democratic system, naturally opportunistic rational parties will attempt to circumvent and game the sets of applicable complex static rules to increase their share of power and profit within the system. Stable and presumptively optimal static and/or constitutional rules for DAO governance therefore typically enable gaming and arbitrage opportunities. To enable sufficient protection of DAO members while at the same time allowing for DAO enhancements, the static sets of rules of smart contracts in such a system will need to be rather complex. With static complex sets of DAO rules comes inevitable corruptive opportunistic gaming and arbitrage behavior. To avoid these negative effects of static complex DAO rules, effective DAO governance designs should be focused on dynamic elements. Dynamic elements here include DAO members' ability to re-evaluate existing precedent in the system.

DAO design can enable a code-based governance infrastructure that can create dynamic governance protocol upgrades in real-time through dynamic feedback loops. The technological infrastructure underpinning DAOs enables autonomous and evolutionary incomplete smart contract upgrades. With dynamic DAO governance mechanisms, DAO token holders can vote for a change of any outdated or flawed code as the flaws materialize or in anticipation of future contingencies.

Unlike centralized legal structures that rely on ex-ante majoritarian rules that are presumed to be stable and optimal, DAOs can generate majoritarian rules ex-post without the need for ex-ante majoritarian rules that function as default rules.¹³⁵ Presumptively stable ex-ante majoritarian rules are flawed because they are inevitably suboptimal in an ever-changing environment that evolves from the environment that precipitated the promulgation of the ex-ante majoritarian rule. Ex-post code-based majoritarian rules are superior to ex-ante

¹³⁵ *Contra see supra* Part II.

majoritarian rules because they are based on more accurate real-time information from the edge and decentralized feedback effects. Ex-post code-based majoritarian rules are not subject to the same information asymmetries as stable and presumptively optimal ex-ante rules. As such, DAOs enable a code-based governance infrastructure that can create dynamic governance protocol upgrades in real-time through dynamic feedback loops.

b) On-Chain Governance

On-chain governance is a necessity for most public blockchains. Because all existing blockchains need to calibrate soft forks for protocol upgrades, most public blockchain communities have considered on-chain governance proposal in some form. Those proposals included Bitcoin Improvement Proposals,¹³⁶ Ethereum Improvement Proposals,¹³⁷ Ethereum General Assembly,¹³⁸ mailing lists,¹³⁹ and suggestion pages on GitHub trees.¹⁴⁰ Certain protocols have expanded their on-chain governance considerations. These include, but are not limited to: Tendermint,¹⁴¹ PolkaDot,¹⁴²

¹³⁶ Bitcoin Improvement Proposals, WIKIPEDIA (last visited Aug. 19, 2019) https://en.bitcoin.it/wiki/Bitcoin_Improvement_Proposals.

¹³⁷ Adam Reese, *Ethereum Dev Yoichi Hirai Steps Away From Role As EIP Editor, Raises Questions About Process*, ETHNEWS: ECOSYSTEM (Feb. 15, 2018), <https://www.ethnews.com/ethereum-dev-yoichi-hirai-steps-away-from-role-as-eip-editor-raises-questions-ab> (for a good argument from the former EIP editor that the EIP system is dangerous, who has since retired based on his serious concerns).

¹³⁸ Gavofyork, *Yellow Paper Committee*, GITHUB (Apr. 10, 2016), <https://github.com/gavofyork/curly-engine>.

¹³⁹ LISTS.OZLABS.ORG, <https://lists.ozlabs.org/pipermail/bitcoin-dev-moderation/> (last visited Aug. 19, 2019).

¹⁴⁰ E.g., Aragon Network, *supra* note 43.

¹⁴¹ Ethan Buchman, *Tendermint: Byzantine Fault Tolerance in the Age of Blockchains* (June 2016) (unpublished A.A.S. thesis, University of Guelph), https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/9769/Buchman_Ethan_201606_MAsc.pdf?sequence=7&isAllowed=y.

¹⁴² Rachel Rose O'Leary, *Polkadot's Plan for Governing a Blockchain of Blockchains*, COINDESK (Mar. 22, 2018, 1:10 UTC), <https://www.coindesk.com/polkadots-radical-plan-governing-blockchain-blockchains/> ("the internal token of the Polkadot network, allows its holders to

DAOstack,¹⁴³ Tezos,¹⁴⁴ Dash,¹⁴⁵ Bitshares, Lisk, MemoryCoin, Aragon,¹⁴⁶ Cardano,¹⁴⁷ Maker,¹⁴⁸ and NuShares.¹⁴⁹ The blockchain community continues to debate the preferable modus operandi for protocol changes.¹⁵⁰

Despite the ever-widening need for on-chain governance solutions, arguments against on-chain governance remain strong. In an off-chain governance model, miners provide checks and balances on power over protocol changes. On-chain governance arguably removes such checks and balances. An on-chain governance model also arguably would take the participation of governance away from

vote directly on a piece of code, which will then automatically upgrade across the network.”).

¹⁴³ DAOstack, *An Operating System for Collective Intelligence*, (White Paper V1.1, April 22, 2018), <https://daostack.io/wp/DAOstack-White-Paper-en.pdf>.

¹⁴⁴ Tezos, *Tezos-Papers*, GITHUB (Oct. 25, 2016), <https://github.com/tezos/tezos-papers>.

¹⁴⁵ Joel Valenzuela, *Dash Surges to Record High, Claims \$0.5 Mln Monthly Development Budget*, COINTELEGRAPH (Mar. 13, 2017), <https://cointelegraph.com/news/dash-surges-to-record-high-claims-05-mln-monthly-development-budget>. Decentralized Governance by Blockchain includes a system where “masternodes” have voting power and control of a development budget that takes 10% of the mined profit, which they claim amounted to more than \$500,00 US per month in March 2017. However, masternodes can have incentives that are not always aligned with other users so that such on-chain governance may skew the development of the platform in unhealthy ways.

¹⁴⁶ Luis Cuende & Jorge Izquierdo, *Aragon Network: A Decentralized Infrastructure for Value Exchange*, White Paper (April 20, 2017), <https://www.chainwhy.com/upload/default/20180705/49f3850f2702ec6be0f57780b22feab2.pdf>.

¹⁴⁷ CARDANO, <https://www.cardano.org/en/academic-papers/> (last visited Aug. 19, 2019).

¹⁴⁸ MAKERDAO, <https://makerdao.com/> (last visited Aug. 19, 2019).

¹⁴⁹ NUBITS, <https://nubits.com/nushares> (last visited Aug. 19, 2019).

¹⁵⁰ E.g., see this discussion: Buck Perley, *Crypto-Governance and the Dangers of Faction*, MEDIUM (Oct. 27, 2017), <https://medium.com/@BuckPerley/crypto-governance-f1318affbbe0>; Fred Ehrsam, *Blockchain Governance: Programming Our Future*, MEDIUM (Nov. 27, 2017), <https://medium.com/@FEhrsam/blockchain-governance-programming-our-future-c3bfe30f2d74>; Vlad Zamfir, *Against On-chain Governance*, MEDIUM (Dec. 1, 2017), https://medium.com/@Vlad_Zamfir/against-on-chain-governance-a4ceacd040ca; Vitalik Buterin, *Notes on Blockchain Governance*, VITALIK.CA (Dec. 17, 2017), <https://vitalik.ca/general/2017/12/17/voting.html>.

miners and subsequently users. Because on-chain governance enables automatic protocol upgrades and is not dependent on manual interference by miners, miners are no longer required to make a conscious choice to participate in their chosen chain.¹⁵¹ Moreover, an off-chain governance system that finds an equilibrium between several competing factors could be a better alternative for protocol governance than an on-chain governance mechanism.¹⁵²

In the early 2020s, on-chain voting mechanisms were still largely in their infancy. Most on-chain voting mechanisms and governance designs mostly resembled a plutocracy. Suboptimal voting outcomes in existing decentralized protocols were associated with the then popular one-token-one-vote voting mechanisms. A one-token-one-vote design allocates more power to token holders who have a significant share of the total supply of a given token. Majority token holders have more power than the rest of the token holders combined. These structures reintroduce many of the downsides and suboptimal incentive allocations of one-share-one vote designs in legacy systems of the early 21st century.

More mature voting alternatives are slowly emerging. Such alternative DAO voting designs can ameliorate the traditional voting power corruption of one-token-one-vote. Alternative voting methods include quadratic voting,¹⁵³ futarchy,¹⁵⁴ liquid

¹⁵¹ In off-chain governance models node operators have to update their client manually for a protocol upgrade to align with the new chain.

¹⁵² Buterin, *supra* note 150 (arguing factors to be considered for an off-chain governance system include: consensus among development team, initial roadmap, coin holder voting, user voting with some kind of Sybil resistant polling system, and established norms).

¹⁵³ Steven Lalley & Eric Glen Weyl, *Quadratic Voting: How Mechanism Design Can Radicalize Democracy*, (Dec. 24, 2017), <https://ssrn.com/abstract=2003531>; Kristopher Jones, *Blockchain In or As Governance? Evolutions in Experimentation, Social Impacts, and Prefigurative Practice in the Blockchain and DAO Space*, 24 INFORMATION POLITY 469, 474 (2019) (citing D. Allen, C. Berg, A. Lane, and J. Potts, *The Economics of Crypto-Democracy*, LINKDEM@IJCAI 63-73 (2017)).

¹⁵⁴ Robin Hanson, *Futarchy: Vote Values, But Bet Beliefs*, GEO. MASON U., <http://mason.gmu.edu/~rhanson/futarchy.html> (last visited Aug. 19, 2019).

democracy,¹⁵⁵ and reputation-based voting as an instantiation of non-fungible voting.¹⁵⁶ These emerging more mature voting ecosystems enable on-chain protocol governance with an incentive design that more optimally balances risk and rewards of voting.

On-chain governance models can further be optimized with reputation-based staking as voting mechanisms.¹⁵⁷ Reputation-based voting revolves around voting by way of staking a non-fungible asset, aka staking non-fungible reputation tokens in a given DAO, towards a certain outcome. The corruptive elements of fungible assets/tokens are removed because third parties are less likely able to take over a non-fungible asset, such as reputation, that is organically grown and maintained through actual expertise in a given DAO subject matter. Even if third parties should be able to take over or purchase non-fungible reputation, they are less likely able to maintain the reputation score and the associated revenue stream of fungible assets over time.

2. *Legal Designs*

The legal setup for a DAO is determined by several core considerations that pertain to the type of DAO interaction that is to be governed. The purpose of the DAO often drives DAO governance. For instance, different governance designs may apply to DAOs that focus on investment purposes versus DAOs that focus on membership rights, voting mechanisms, or DAOs that are allocating certain assets to a certain purpose. The degree of DAO governance and its implementation on-chain, governed by smart contracts, or off-chain is perhaps one of the first considerations. DAO governance functions, such as voting rights and dividend distributions, can be implemented on-chain and synchronized off-

¹⁵⁵ *Delegative Democracy*, WIKIPEDIA, https://en.wikipedia.org/wiki/Delegative_democracy (last visited Aug. 19, 2019).

¹⁵⁶ Craig Calcaterra, Wulf A. Kaal, and Andrei, Vlad, *Blockchain Infrastructure for Measuring Domain Specific Reputation in Autonomous Decentralized and Anonymous Systems* (February 18, 2018). U of St. Thomas (Minnesota) Legal Studies Research Paper No. 18-11, Available at SSRN: <https://ssrn.com/abstract=3125822> or <http://dx.doi.org/10.2139/ssrn.3125822>

¹⁵⁷ *Id.*

chain. A minimum written proof of existence, such as Articles of Association, can be the only off-chain link, but may be required to connect on-chain governance with the off-chain necessities. Another core consideration pertains to DAO project-specific governance or governance of the whole network. Communication methods for DAO members are often determined based on whether the governance is permissionless and community-based, or via a permissioned-community with one coordinator.

a) OpenLaw - LAO

Limited liability DAOs have become a trend in DAO legal design. Limited liability DAOs incorporate as LLCs in order to optimize their smart contract and DeFi applications, while maintaining traditional controls over business risks and membership.¹⁵⁸ The first limited liability DAO experiment organized in New York was OpenEsquire, a hybrid organization combining the liability-limiting public legal fictions (LLC-DAO) with the private ordering benefits of Ethereum.¹⁵⁹ Open, ESQ LLC provides pragmatic Solidity solutions for legal engineering of DAOs.¹⁶⁰

In 2018, Vermont added a Blockchain-based Limited Liability Companies provision to the Corporations Title of their state statutes.¹⁶¹ In June 2019, dOrg, the second limited liability DAO, was launched under this law, organized in Vermont.¹⁶² dOrg first

¹⁵⁸ Van Valkenburgh, *supra* note 108.

¹⁵⁹ Van Valkenburgh, *supra* note 108.

¹⁶⁰ OpenEsq, GITHUB, <https://github.com/open-esq> (last visited July 10, 2020). For a tutorial of how to create a DAO using the OpenLaw LLC-DAO Operating Agreement written by two US-licensed attorneys, see, Ross Campbell, E-Commerce with Legal and Blockchain Security, Medium Good Audience (Jan. 26, 2019) (using OpenLaw, <https://lib.openlaw.io/web/default/template/New%20York%20LLC%20Articles%20of%20Organization>).

¹⁶¹ 11 V.S.A. § 4173; *see e.g.* Stan Higgins, *Vermont Governor Signs Bill Clearing Way for Blockchain Companies*, COINDESK (May 31, 2018), <https://www.coindesk.com/vermontdao-state-governor-signs-bill-clearing-way-blockchain-companies>.

¹⁶² Van Valkenburgh, *supra* note 108 (citing https://twitter.com/dOrg_tech)

deployed the DAO to the blockchain then formed a blockchain-based limited liability company (BBLLC).¹⁶³

OpenLaw publishes legal templates to help DAOs limit their liability by creating a “corporate veil” for the DAO. An LLC Operating Agreement is available for consumers on the OpenLaw website.¹⁶⁴ OpenLaw implements a Ricardian contract system¹⁶⁵ to bridge traditional legal regimes with the Ethereum world by permitting users to create binding legal agreements and tie them to the execution of a smart contract.¹⁶⁶ Moreover, OpenLaw offers a legal wrapper library to generate digital tokens to reflect group membership and network utility.¹⁶⁷ OpenLaw offers interactive forms to easily deploy limited liability DAOs based on OpenEsquire and dOrg legal forms.¹⁶⁸ OpenLaw is contemplating collaborative service offerings, research publications, and best-practice summaries to aid more effective use of the Library.¹⁶⁹ OpenLaw also offers templates for DAO business transactions including consulting, NDAs, memos of understandings, and code deference.¹⁷⁰ OpenLaw also offers Token Forge forms enabling users to contribute to research.¹⁷¹

OpenLaw created an OpenLaw DAO¹⁷² which was a DAO set up as a traditional legal entity using binding legal agreements to effectuate asset transfer and other functions. OpenLaw’s new vertical DAO contains an easy to use set of features to rapidly build and deploy limited liability DAOs. For example, OpenLaw published a video, walking users through the creation of a DAO

¹⁶³ *dOrg Launches First Limited Liability DAO*, GRAVEL & SHEA (Jun. 2019), <https://www.gravelshea.com/2019/06/dorg-launches-first-limited-liability-dao/>.

¹⁶⁴ See, e.g., *Limited Liability Company Operating Agreement Open, Esq LLC*, <https://lib.openlaw.io/web/default/template/LLC-DAO%20Operating%20Agreement>.

¹⁶⁵ Ian Grigg, *The Ricardian Contract*, IANG.ORG (2004), https://iang.org/papers/ricardian_contract.html

¹⁶⁶ Van Valkenburgh, *supra* note 108.

¹⁶⁷ Van Valkenburgh, *supra* note 108.

¹⁶⁸ Van Valkenburgh, *supra* note 108.

¹⁶⁹ Van Valkenburgh, *supra* note 108.

¹⁷⁰ Van Valkenburgh, *supra* note 108.

¹⁷¹ Van Valkenburgh, *supra* note 108.

¹⁷² DAO, OPENLAW (2019) <https://dao.openlaw.io/> (last accessed Jun. 22, 2020).

organized as a Limited Cooperative Association in Colorado.¹⁷³ In June 2019, OpenLaw created an OpenLaw DAO¹⁷⁴ which was a DAO set up as a traditional legal entity using binding legal agreements to effectuate asset transfer and other functions.

In September 2019, OpenLaw announced the launch of the LAO. The LAO will be set up as a limited liability entity organized in Delaware,¹⁷⁵ conforming with U.S. SEC regulations.¹⁷⁶ The LAO is innovative because it will be engaged in for-profit endeavors in ways that limit the legal risk of members and aims to comply with US Law, modifying established organizational documents to accommodate smart contract-based corporate governance mechanisms, while working within the current confines of the law.¹⁷⁷ Smart contracts will handle mechanics related to voting, funding, and allocation of collected funds.¹⁷⁸ The OpenLaw protocol will generate entity formation documents and member subscription agreements.¹⁷⁹

The LAO is anchored by ten founding members, and other interested parties can purchase interests potentially through a public sale.¹⁸⁰ OpenLaw serves as an administrator of the LAO but will exercise no control unless directed by members.¹⁸¹

The LAO provides a legal structure to enable members to give grants, invest in blockchain-based projects in exchange for tokenized stock or utility tokens.¹⁸² Projects or Ethereum-based projects can also receive funding within days of submission.¹⁸³ That

¹⁷³ Van Valkenburgh, *supra* note 108.

¹⁷⁴ Van Valkenburgh, *supra* note 108.

¹⁷⁵ The LAO, *supra* note 33.

¹⁷⁶ Christine Kim, *New Interest in DAOs Prompts Old Question: Are They Legal?*, COINDESK.COM (Sep. 29, 2019), <https://www.coindesk.com/new-interest-in-daos-prompts-old-question-are-they-legal>.

¹⁷⁷ The LAO, *Unpacking the LAO*, MEDIUM (Sep. 23, 2019).

<https://medium.com/openlawofficial/unpacking-the-lao-e463f7357b4b>.

¹⁷⁸ The LAO, *supra*, note 33.

¹⁷⁹ The LAO, *supra*, note 33.

¹⁸⁰ The LAO, *supra*, note 33.

¹⁸¹ The LAO, *supra*, note 33.

¹⁸² The LAO, *supra*, note 33.

¹⁸³ The LAO, *supra*, note 33.

structure is called a “legal wrapper,” which is created by structuring the DAO as a LLC to make the entity responsible for contracts, taxes, and violations of the law, but not the individuals acting on behalf of that entity.¹⁸⁴

The goal of the LAO will be to limit participant liability, provide clarity on what law applies, and provide tax benefits (flow-through/single taxation).¹⁸⁵ Members purchase interests, proceeds of which pool and are allocated by members to startups and other projects in need of financing, using a voting mechanism similar to MolochDAO’s.¹⁸⁶ Rage-quitting features are also in place.¹⁸⁷ The LAO designed a “Minimum Viable Venture Moloch” borrowing from “the original Moloch design that emphasizes simple Solidity scripts for voting and other member transactions, largely relying on off-chain coordination to scale membership and deliver funding to promising Ethereum ventures[,]” “further imbu[ing] LAO actions with legal effect through OpenLaw smart agreements and establish[ing] a proxy entity.”¹⁸⁸

A benefit beyond those offered by Moloch, LAO membership is further incentivized because members continue to generate profits from the portfolio holdings of the LAO. LAO members can continuously claim their fair share of profits provided by tokens received from projects receiving investments from the LAO.¹⁸⁹ A LAO can also receive funding much quicker than a traditional LLC and can meet virtually.¹⁹⁰

The LAO will at first only be available to a limited number of accredited investors, which requires participants to disclose their identities, pay taxes, and often hire legal counsel, as they would in joining a traditional business organization.¹⁹¹ An accredited

¹⁸⁴ Kim, *supra* note 176.

¹⁸⁵ The LAO, *supra*, note 33.

¹⁸⁶ The LAO, *supra*, note 33.

¹⁸⁷ The LAO, *supra*, note 33.

¹⁸⁸ OpenLawTeam, *The LAO*, GITHUB (Dec. 11, 2019), <https://github.com/openlawteam/TheLAO>

¹⁸⁹ The LAO, *supra*, note 33.

¹⁹⁰ Kim, *supra* note 176.

¹⁹¹ Kim, *supra* note 176.

investor is a set definition by the SEC.¹⁹² The LAO is exploring on-chain verification of accredited status for the LAO using third-party oracle services to streamline the onboarding process, such as ChainLink.¹⁹³

b) DAA

Using an existing Swiss legal construct, the DAA takes the Swiss civil law Association and adds a decentralized smart contract layer to replace the centralized governance process.¹⁹⁴ The DAA approach is a third generation DAO approach in the sense that an existing legal construct, such as the Swiss Association, is combined with a DAO.

A Swiss Association consists of a community of members where each member has one vote that is not capital-driven but a voting-driven, membership-driven legal entity.¹⁹⁵ It is a legal entity, itself liable for its own actions, with a corporate veil that protects individual members from liability.¹⁹⁶ One membership layer and legal entity layer limiting risks for members.¹⁹⁷ A Swiss Association is formed by a group of individuals expressing their intention to incorporate such legal entity.¹⁹⁸ No legal act in front of a notary or formal registration is needed to establish a Swiss Association.¹⁹⁹ To start a Swiss Association, individuals come together as a group,

¹⁹² 17 C.F.R. § 230.501(a) (2017).

¹⁹³ The LAO, *supra*, note 33.

¹⁹⁴ See also Validitylabs, *Daa*, GITHUB (2020), <https://github.com/validitylabs/daa/tree/web>.

¹⁹⁵ MME Switzerland Token Summit, *supra* note 17, at 9:30-9:55 (Thomas Linder swiss assn. slide).

¹⁹⁶ MME Switzerland Token Summit, *supra* note 17, at 9:55-10:10 (Thomas Linder Swiss assn. slide).

¹⁹⁷ MME Switzerland Token Summit, *supra* note 17, at 10:10-10:35 (Thomas Linder).

¹⁹⁸ MME Switzerland Token Summit, *supra* note 17, at 14:30-14:45 (Thomas Linder).

¹⁹⁹ MME Switzerland Token Summit, *supra* note 17, at 14:20-14:45 (Thomas Linder).

draft the statutes of association, define purpose and how the purpose will be financed, identify membership fee.²⁰⁰

At the General Assembly, members can propose and vote for one Swiss delegate who anchors the DAA to the real-world by filing tax returns, litigating trademark issues, etc.²⁰¹ All other interactions and transactions between members and legal entity are smart-contract based, completed by a smart-contract system in order for all governance transactions to be decentralized.²⁰²

The DAA integrates interactions between the members and the legal entity into smart contracts.²⁰³ An individual member can provide funding through membership fees, donations via smart contract;²⁰⁴ propose and vote on projects to be supported, change of articles of association, agenda items for General Assembly.²⁰⁵ The DAA has over a dozen smart contracts interact with one another.²⁰⁶ Smart contracts manage membership and use of funds;²⁰⁷ a “mothership” runs treasury, proposal management, and membership functions.²⁰⁸ The DAA smart contract does not have a token, is membership registry only, looks like a traditional association model with one-member one vote.²⁰⁹

Although the DAA is created based on the Swiss Association legal anchor, using a legal concept similar to the Swiss Association from other jurisdictions to create a, for example, US DAA, would be

²⁰⁰ MME Switzerland Token Summit, *supra* note 17, at 13:27-14:45 (Thomas Linder).

²⁰¹ MME Switzerland Token Summit, *supra* note 17, at 11:40-12:20 (Thomas Linder).

²⁰² MME Switzerland Token Summit, *supra* note 17, at 12:20-12:53 (Thomas Linder).

²⁰³ MME Switzerland Token Summit, *supra* note 17, at 10:35-10:55 (Thomas Linder).

²⁰⁴ MME Switzerland Token Summit, *supra* note 17, at 10:55-11:25 (Thomas Linder).

²⁰⁵ MME Switzerland Token Summit, *supra* note 17, at 11:25-11:45 (Thomas Linder).

²⁰⁶ MME Switzerland Token Summit, *supra* note 17, at 29:00-29:10.

²⁰⁷ MME Switzerland Token Summit, *supra* note 17, at 28:15-28:40.

²⁰⁸ MME Switzerland Token Summit, *supra* note 17, at 29:10-29:30.

²⁰⁹ MME Switzerland Token Summit, *supra* note 17, at 44:11-44:44.

possible.²¹⁰ Members of the DAA can be all over the world, but because the Association is a legal entity, it must have a “seed” in Switzerland, run in Switzerland.²¹¹ Individuals wishing to launch a DAA have low legal costs²¹² but high technical costs.²¹³

A fully legally-compliant organization living entirely on the blockchain is possible, but complicated.²¹⁴ In a technical setting, everything must be defined, because resolving a code issue is not as simply resolved as in a legal dispute.²¹⁵ For example, coders had to consider whether the General Assembly could be scheduled on-chain 200 years in the future.²¹⁶ Another example is that when the delegate, analogous to a president, of the DAO steps down with no new delegate in place, the wallet must be blocked so the DAA cannot actively engage in business activities, e.g. disburse funds.²¹⁷ Therefore, only the most basic common denominator enabling the operation of a fully functional Swiss Association, runs entirely on-chain.²¹⁸

c) HOPR

Another take on the DAA is the HOPR Association. HOPR is the first Swiss Association-based model to implement the on-chain interactions smart contracts, taking “baby steps” towards a full on-chain DAO.²¹⁹ HOPR is an operative association governed by a token.²²⁰ HOPR is building a privacy infrastructure that can be used for blockchains, MedTech applications, among others.²²¹

HOPR implements a new set of smart contracts behind a new construct, Decentralized Community Enabling Governance,

²¹⁰ MME Switzerland Token Summit, *supra* note 17, at 35:30-36:22.

²¹¹ MME Switzerland Token Summit, *supra* note 17, at 36:22-37:05.

²¹² MME Switzerland Token Summit, *supra* note 17, at 51:00-51:23.

²¹³ MME Switzerland Token Summit, *supra* note 17, at 50:34-51:00.

²¹⁴ MME Switzerland Token Summit, *supra* note 17, at 30:21-40.

²¹⁵ MME Switzerland Token Summit, *supra* note 17, at 27:40-28:15.

²¹⁶ MME Switzerland Token Summit, *supra* note 17, at 27:10-27:40.

²¹⁷ MME Switzerland Token Summit, *supra* note 17, at 29:40-30:21.

²¹⁸ MME Switzerland Token Summit, *supra* note 17, at 26:00-26:30.

²¹⁹ MME Switzerland Token Summit, *supra* note 17, at 34:30-35:23.

²²⁰ MME Switzerland Token Summit, *supra* note 17, at 33:10-33:50.

²²¹ MME Switzerland Token Summit, *supra* note 17, at 30:39-30:54.

developed by ValidityLabs.²²² This framework is called DecenGov.²²³ DecenGov utilizes multiple iterations to eventually achieve full on-chain interaction.²²⁴ The first iteration is a “vanilla” Swiss Association, with all off-chain interactions, that is governed on-chain by a token.²²⁵ The second iteration is quadratic voting.²²⁶ The third iteration is to move back on chain, step-by-step.²²⁷

The HOPR model has a utility token, which gives those who engage with that token a stake in having a voting right.²²⁸ This kind of token is not a security but rather a true governance token. Therefore, legal and compliance hurdles, such as the original DAO had to engage with, are less likely.²²⁹ The token address is comparable to a membership certificate, which, as such, is not transferrable.²³⁰ This feature is missing from traditional ICO entities where the decentralized network disconnected from the legal entity that is opaque and ripe for disruption.²³¹ This was the case with Ethereum and has generated criticism where a grant proposal mechanism has not been open or participatory.²³² The HOPR structure combines the governance at the legal entity level, allowing the entity itself to be governed in an open, participatory fashion.²³³ Another approach is to combine a foundation that has assets with an association of nodes, members, and introduce governance on that level and influence decisions on the foundation level.²³⁴

d) MolochDAO

²²² MME Switzerland Token Summit, *supra* note 17, at 20:05-20:21, 31:25-32:00, 34:30-35:23.

²²³ MME Switzerland Token Summit, *supra* note 17, at 31:25-32:00.

²²⁴ MME Switzerland Token Summit, *supra* note 17, at 31:25-33:50.

²²⁵ MME Switzerland Token Summit, *supra* note 17, at 31:25-32:00.

²²⁶ MME Switzerland Token Summit, *supra* note 17, at 32:00-32:10. (32:10-33:10 description of quadratic voting, reference also to Buterik blog on same)

²²⁷ MME Switzerland Token Summit, *supra* note 17, at 33:10-33:50.

²²⁸ MME Switzerland Token Summit, *supra* note 17, at 44:40-45:07.

²²⁹ MME Switzerland Token Summit, *supra* note 17, at 47:00-47:17.

²³⁰ MME Switzerland Token Summit, *supra* note 17, at 47:17-47:49.

²³¹ MME Switzerland Token Summit, *supra* note 17, at 45:10-45:45.

²³² MME Switzerland Token Summit, *supra* note 17, at 45:50-46:22.

²³³ MME Switzerland Token Summit, *supra* note 17, at 45:45-46:22.

²³⁴ MME Switzerland Token Summit, *supra* note 17, at 46:22-47:00.

Moloch DAO is perhaps the most prominent DAO in the early 2020s. MolochDAO was formed to fund and develop public infrastructure related to Ethereum 2.0.²³⁵ This objective can be accomplished by incentivizing coordination between Eth 2.0 projects and major ecosystem stakeholders.²³⁶ The code is open source, enabling members to create their own guilds, and the goal of MolochDAO is to create a hypercompetitive market for Moloch DAOs.²³⁷ MolochDAO (the original Moloch) has been described as a grant-giving initiative for ETH 2.0, scalability and adoption.²³⁸ MolochDAO is simple, entirely on-chain without a legal wrapper.²³⁹ The term “moloch” is a reference to an article about collective action problems.²⁴⁰ MolochDAO defines public infrastructure, or the blockchain commons, as “technology where the total benefit generated by the technology to the community is greater than the individualized benefit to any particular entity.”²⁴¹

The initial MolochDAO v1 guild was created on February 14, 2019 when Ameen Soleimani utilized his one vote and manually added a set of initial founders to the guild by issuing shares for a fixed entry tribute.²⁴² This process is called “summoning” and the first individual and their member address in the constructor is called a “summoner.”²⁴³ MolochDAO has three contracts: Moloch.sol, GuildBank.sol, and Pool.sol.²⁴⁴

Moloch is intended to be forked, upgraded and iterated on rapidly, with new on-chain and off-chain mechanisms, driven by guild

²³⁵ Matt Slipper & Dan Tsui, *The State of Ethereum 2.0; Ethereum 2.0* (2019), <https://docs.google.com/document/d/1PS0k9MaKPdPwEw3Uh9rq7USjq7LcSpT6ICQUXRij4YE/edit>, <https://consensys.net/knowledge-base/ethereum-2/>; Download the Ethereum 2.0 Staking Ecosystem Report, <https://consensys.net/insights/eth-2-staking-ecosystem-report>.

²³⁶ MolochDAO, *infra* note 244, at 1-2.

²³⁷ MolochDAO, *infra* note 244, at 6.

²³⁸ Ven Gist, *Moloch Primer for Humans*, MEDIUM (Oct. 2, 2019) <https://medium.com/odyssy/moloch-primer-for-humans-9e6a4f258f78>.

²³⁹ MME Switzerland Token Summit, *supra* note 17, at 33:53-34:15.

²⁴⁰ MolochDAO, *supra* note 244, at 1-2.

²⁴¹ MolochDAO, *supra* note 244, at 2.

²⁴² MolochDAO, *supra* note 244, at 10; Gist, *supra* note 238.

²⁴³ MolochDAO, *supra* note 244, at 10; Gist, *supra* note 238.

²⁴⁴ MolochDAO, *MolochDAO 101 - Welcome to Moloch* (Aug. 2019), <https://molochdao.discourse.group/t/molochdao-101-welcome-to-moloch/24>

size.²⁴⁵ Beginning in June 2019 with MetaCartel DAO, 119 DAOs have cloned MolochDAO.²⁴⁶ Participants can clone MolochDAO using the rage-quit mechanism.²⁴⁷ That is, if participants do not agree with the result of a vote, they can exit with their funds by “rage-quitting” the guild within a grace period of seven days after voting on a proposal completes but before members’ ownership is affected by the proposal.²⁴⁸ When guild size is small, members retain voting power and can keep the organization’s philosophy aligned on a specific goal.²⁴⁹ On the other hand, as guild pool value increases, the cost to each individual member per proposal decreases.²⁵⁰

The core mechanism of MolochDAO restructures incentives by pooling user funds and locking them up in a Guild Bank contract. This process gives contributors voting rights over how those funds should be spent, proportional to their contribution relative to the total pool.²⁵¹ To ensure votes cannot be bought and sold on the open market, shares are inalienable.²⁵² Members can liquidate their votes.²⁵³

In order to maximize security, the absolute minimum set of functionality is on-chain.²⁵⁴ MolochDAO also implements iterative development methodology.²⁵⁵ When participants deem an upgrade necessary, they can deploy a new DAO smart contract and exit Moloch, coordinating off-chain, rather than upgrading on-chain.²⁵⁶ A dilution bound stops a large set of colluding actors from forcing a minority of guild members to experience massive dilution in a

²⁴⁵ MolochDAO, *supra* note 244, at 6.

²⁴⁶ DAOHAUS, <https://daohaus.club/>; *see also* Cooper Turley, *Moloch—2019 Year in Review*, MEDIUM (Jan. 1, 2020), <https://medium.com/@molochdao/moloch-2019-year-in-review-eb6f53dc035>.

²⁴⁷ MolochDAO, *supra* note 244, at 5-6.

²⁴⁸ MolochDAO, *supra* note 244, at 5, 9.

²⁴⁹ MolochDAO, *supra* note 244, at 6.

²⁵⁰ MolochDAO, *supra* note 244, at 6.

²⁵¹ MolochDAO, *supra* note 244, at 3.

²⁵² MolochDAO, *supra* note 244, at 7.

²⁵³ MolochDAO, *supra* note 244, at 3.

²⁵⁴ MolochDAO, *supra* note 244, at 6.

²⁵⁵ MolochDAO, *supra* note 244, at 7.

²⁵⁶ MolochDAO, *supra* note 244, at 7.

single hit by all rage-quitting at the same time—the maximum dilution a member can suffer is specified in the contract with a default of three.²⁵⁷

In order to join the guild, individuals submit a membership proposal, which requests a certain number of Shares in return for a tribute in wETH, which is a way to wrap Ether as an ERC-20 token.²⁵⁸ However, only existing members can submit a membership proposal, and only up to five proposals may be submitted per day.²⁵⁹ Existing members vote on new entrants in a similar fashion to funding proposals, as well as whether to grant the requested number of Shares.²⁶⁰ No quorum requirement exists — votes are won by simple majority.²⁶¹ The voting period of each proposal is seven days, and there is a maximum of thirty five proposals being voted on at any given time, each staggered by 4.8 hours.²⁶² A seven-day grace period exists for membership proposal votes.²⁶³ If the membership proposal is accepted, the tribute tokens are deposited into the Guild Bank and new shares are minted and issued.²⁶⁴ Membership proposals require a 10 ETH deposit, 9.9 ETH is returned regardless of outcome, and 0.1 ETH is reserved.²⁶⁵

MolochDAO v2 contract standard was released in August 2019²⁶⁶ and was designed through a collaborative effort between MetaCartel, The LAO, and Moloch.²⁶⁷ The MetaCartel Venture DAO²⁶⁸ is expected to be the first deployment of Moloch v2.²⁶⁹

²⁵⁷ MolochDAO, *supra* note 244, at 9-10.

²⁵⁸ MolochDAO, *supra* note 244, at 7; Gist, *supra* note 238.

²⁵⁹ MolochDAO, *supra* note 244, at 8.

²⁶⁰ MolochDAO, *supra* note 244, at 4, 7.

²⁶¹ MolochDAO, *supra* note 244, at 9.

²⁶² MolochDAO, *supra* note 244, at 8-9.

²⁶³ MolochDAO, *supra* note 244, at 9.

²⁶⁴ MolochDAO, *supra* note 244, at 7.

²⁶⁵ MolochDAO, *supra* note 244, at 8.

²⁶⁶ Moloch (@MolochDAO), TWITTER (Aug 28, 2019), <https://twitter.com/MolochDAO/status/1166693888008081410?s=20>.

²⁶⁷ Moloch v2, <https://github.com/MolochVentures/moloch>; The LAO, *supra* note 54.

²⁶⁸ Metacartel Ventures (@VENTURE_DAO), TWITTER (Sept. 2019), https://twitter.com/venture_dao; Metacartel, MCV, GITHUB (2020), <https://github.com/metacartel/MCV/blob/master/MCV-Whitepaper.md>.

²⁶⁹ Moloch v2, *supra* note 267.

v2—LAO will use a multi-signature-controlled admin role to complete authorized transactions on Moloch DAO and manage off-chain operational tasks.²⁷⁰ Molochv2 will also add a more capital-driven membership onboarding process.²⁷¹

e) MakerDAO

Maker DAO is clearly the leading DAO project by market capitalization and overall use in the early 2020s. MakerDAO uses token mechanisms to create new organizational structures that allow its members to achieve a common goal.²⁷² The Maker system creates a decentralized, open scientific risk management community, which was initially²⁷³ guided by the Maker Foundation, but eventually led by risk teams formally elected by MKR (the Maker DAO governance token) vote, and contributions of independent volunteer risk researchers.²⁷⁴

The Maker Protocol allows users to generate Dai by leveraging collateral assets approved by “Maker Governance,” the community-organized and operated process of managing the protocol.²⁷⁵ Token holders have the right to vote on critical changes to the network chain, which ultimately determines the success of the network.²⁷⁶ These votes on MakerDAO include some of the highest stake votes in the digital asset industry.²⁷⁷

²⁷⁰ The LAO, *supra* note 267.

²⁷¹ The LAO, *supra* note 267.

²⁷² Nick Tomaino, *Lessons from MakerDAO*, MEDIUM (Feb. 19, 2018), <https://thecontrol.co/lessons-from-makerdao-a42081116e9a>.

²⁷³ See MakerDAO, *supra* note 50 (discussion of The First Risk Construct).

²⁷⁴ MakerDAO, *supra* note 50; See also *MakerDAO Governance Risk Framework (Part 2)*, MAKERDAO (July 30, 2018), <https://blog.makerdao.com/makerdao-governance-risk-framework-part-2/>, at “Maker token holder (MTH) and Maker internal risk team (MRT) duties”.

²⁷⁵ MakerDAO, *Maker Whitepaper*, *supra* note 49.

²⁷⁶ Tomaino, *supra* note 272.

²⁷⁷ Ben DiFrancesco, *FakerDAO: An Exploration of MakerDAO’s Governance Incentives*, SCOPELIFT: HIGH CALIBER CRYPTO (Mar. 9, 2020), <https://www.scopelift.co/blog/fakerdao>.

Eventually, Maker token holders will manage the risk function of the system through the two-part voting mechanism.²⁷⁸ Proactive governance includes debate, resolution, and automated implementation.²⁷⁹ Reactive governance contains procedural intervention.²⁸⁰ Risk teams will contribute “risk constructs”—assessments and risk parameters for the system.²⁸¹ The governance debate will be about choosing risk teams based on their proposed risk constructs, and risk teams will be elected through a vote.²⁸²

The self-sustaining MakerDAO has technical, human, and procedural elements to enable the community to maintain a fully decentralized Maker Protocol and be completely responsible for every aspect of the MakerDAO.²⁸³ Some community members will form a decentralized workforce, Elected Paid Contributors (EPC), elected by Maker governance.²⁸⁴ A subset of the EPCs will manage critical processes.²⁸⁵ Community members can define key issues and suggest system modifications through Maker Improvement Proposals (MIPs).²⁸⁶ All token holders will have an active stake in the ecosystem, can pool their voting power through Vote Delegates.²⁸⁷

The Dai stablecoin is collateralized, which asks users to put trust in token value on-chain rather than off-chain.²⁸⁸ Dai is supplied to the blockchain through a lending system, Maker’s smart contract Collateralized Debt Position, which provides loans and attempts to mitigate risk.²⁸⁹ In case the system debt exceeds the surplus, the

²⁷⁸ MakerDAO, *Governance Risk Framework Part 1*, *supra* note 50.

²⁷⁹ MakerDAO, *Governance Risk Framework Part 1*, *supra* note 50.

²⁸⁰ MakerDAO, *Governance Risk Framework Part 1*, *supra* note 50.

²⁸¹ MakerDAO, *Governance Risk Framework Part 1*, *supra* note 50.

²⁸² MakerDAO, *Governance Risk Framework Part 1*, *supra* note 50.

²⁸³ MakerDAO, *What Will Maker Governance Look Like After Complete Decentralization?*, MAKERDAO: BLOG (Apr. 3, 2020) <https://blog.makerdao.com/what-will-maker-governance-look-like-after-complete-decentralization/>.

²⁸⁴ MakerDAO, *supra* note 283.

²⁸⁵ MakerDAO, *supra* note 283.

²⁸⁶ MakerDAO, *supra* note 283.

²⁸⁷ MakerDAO, *supra* note 283.

²⁸⁸ MakerDAO, *supra* note 50.

²⁸⁹ MakerDAO, *supra* note 50.

tokens are the recapitalization resource of the protocol.²⁹⁰ Dai is a collateral-backed cryptocurrency soft-pegged to the US Dollar and resistant to hyperinflation due to low volatility.²⁹¹ Maker released a new multi collateral Dai (MCD), which brought with it some new features but did not change Maker governance.²⁹²

Anyone, not only token holders, can submit proposals for a vote by deploying a proposal contract.²⁹³ A proposal contract—a smart contract with one or more valid governance actions programmed into it—can be deployed by any Ethereum address, and once executed, immediately applies its changes to the internal governance variables of the protocol.²⁹⁴ Once a proposal contract is deployed, token holders cast approval votes for the proposal they want to elect as the Active Proposal.²⁹⁵ The Ethereum address with the highest number of approval votes is elected as the Active Proposal, which is then empowered to gain administrative access to the internal governance variables of the protocol and then modify them.²⁹⁶ The contract can only be executed once and cannot be reused after execution.²⁹⁷

The MakerDAO governance system²⁹⁸ is scientific and evolved.²⁹⁹ It requires first governance polling/proposal polling/governance

²⁹⁰ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 14.

²⁹¹ MakerDAO, *Maker Whitepaper*, *supra* note 49.

²⁹² See MakerDAO, *Currency Re-imagined for the World: Multi-Collateral Dai is Live!*, MAKERDAO: BLOG (Nov. 18, 2019), <https://blog.makerdao.com/multi-collateral-dai-is-live/>.

²⁹³ MakerDAO, *Maker Whitepaper*, *supra* note 49 at 13.

²⁹⁴ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 13.

²⁹⁵ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 13-14.

²⁹⁶ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 14.

²⁹⁷ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 13.

²⁹⁸ See MakerDAO, *Awesome-Makerdao*, GITHUB (2020),

<https://github.com/makerdao/awesome-makerdao/blob/master/README.md#governance-and-risk>; MakerDAO, *MakerDAO Governance Risk Framework (Part 3)*, (Dec. 11, 2018), <https://blog.makerdao.com/makerdao-governance-risk-framework-part-3>, (for more information on MakerDAO governance.)

²⁹⁹ MakerDAO, *supra* note 50; see also MAKER FOUNDATION, *Scientific Governance and Risk*, YOUTUBE (Jun. 25, 2020), <https://www.youtube.com/playlist?list=PLLzkWCj8ywWNq5-90-Id6VPSsrk4OWVAn>.

vote and only thereafter executive voting.³⁰⁰ The governance system is designed to be flexible and upgradeable.³⁰¹ The governance token of the protocol, MKR, allows token holders to vote on changes to the protocol.³⁰² Voting power is proportional to the outstanding supply of tokens.³⁰³ First, proposal polling establishes a rough consensus of community sentiment before any executive votes are cast.³⁰⁴ Next, executive voting is held, for example on a vote to ratify risk parameters for a newly accepted collateral type.³⁰⁵ A governance security module is in place that gives token holders the opportunity to protect the system against a malicious governance proposal by creating a delay of up to 24 hours before the protocol modification takes effect, and permitting members to trigger a shutdown, if necessary.³⁰⁶

In late March 2020, Maker formally transferred token control to the community.³⁰⁷ The first governance cycle³⁰⁸ took place in May

³⁰⁰ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 2, 5, 13; *see also* MakerDAO, *supra* note 50.

³⁰¹ For a full list of token holder responsibilities and modifications token holders can vote on, *see* MakerDAO, *Maker Whitepaper*, *supra* note 49, at 14.

³⁰² MakerDAO, *Maker Whitepaper*, *supra* note 49, at 13. *See also* MakerDAO, *What is MKR?*, MEDIUM (Sep. 10, 2015), <https://medium.com/@MakerDAO/what-is-mkr-e6915d5ca1b3>.

³⁰³ Maker Foundation, *Maker Protocol 101 Slide Deck*, (Dec. 9, 2019), https://drive.google.com/file/d/1bEOInk2xUXgwy0I_UlB_8tPPZ8mH1gy9/view?slide=36. *For more on Maker governance, see* <https://docs.makerdao.com/smart-contract-modules/governance-module>.

³⁰⁴ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 13.

³⁰⁵ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 13.

³⁰⁶ MakerDAO, *Maker Whitepaper*, *supra* note 49, at 13.

³⁰⁷ MakerDAO, *The Transfer of MKR Token Control to Governance: The Final Step*, MAKERDAO: BLOG (Mar. 25, 2020) <https://blog.makerdao.com/the-transfer-of-mkr-token-control-to-governance-the-final-step/>; *see also* Charles St.Louis, *Announcement: Kickstarting the Self-Sustaining MakerDAO Initiative*, MAKERDAO: BLOG (Apr. 1, 2020) <https://forum.makerdao.com/t/announcement-kickstarting-the-self-sustaining-makerdao-initiative/1864> (“Announcement (Apr. 1, 2020)”).

³⁰⁸ *See* MAKERDAO, *MIP3: Governance Cycle*, GITHUB (May 2, 2020), <https://github.com/makerdao/mips/blob/master/MIP3/mip3.md#mip3c2-governance-cycle-breakdown>.

2020³⁰⁹ on Maker's first thirteen MIPs³¹⁰ introduced in April 2020 on preferred mechanisms for improving governance and protocol.³¹¹ After several years of proposal and governance iterations, this framework is to lead to fully autonomous community governance of the Maker Protocol, followed by dissolution of the Maker Foundation.³¹² The second governance cycle began June 1, 2020.³¹³

f) DevDAO

The DevDAO's approach combines technological, governance, and legal solutions in an effort to accomplish a higher degree of decentralization in the architecture.

The DevDAO internal governance design and its external legal design supplement each other on many levels and create synergies. For many attempts to create legal solutions, if the internal voting mechanism of a DAO is more centralized and afflicted with existing legacy voting issues, a higher degree of decentralization in the external legal design will typically be cancelled out in the long run. If the degrees of internal and external governance decentralization cancel each other out, the respective DAO is less likely to succeed in its decentralization attempt, which in turn makes it more likely for the DAO to fail. By contrast, the DevDAO's synergy between internal DAO governance and external legal DAO designs can accomplish higher levels of decentralization. Because the internal governance of the DevDAO is decentralized and effective through

³⁰⁹ MakerDAO, *Maker Governance Review: May 2020*, MAKERDAO: BLOG (Jun. 3, 2020), <https://blog.makerdao.com/maker-governance-review-may-2020/>.

³¹⁰ Charles St. Louis, *The Release of the 13 Initial Maker Improvement Proposals (MIPs)*, MAKERDAO FORUM, (Apr. 6, 2020), <https://forum.makerdao.com/t/the-release-of-the-13-initial-maker-improvement-proposals-mips/1915>; see also MakerDAO, *The First 13 Maker Improvement Proposals (MIPs) To Further Decentralization of MakerDAO*, MAKERDAO: BLOG (Apr. 6, 2020), <https://blog.makerdao.com/the-first-13-maker-improvement-proposals-to-further-decentralization-of-makerdao/>.

³¹¹ St. Louis, *supra* note 307.

³¹² St. Louis, *supra* note 307.

³¹³ MakerDAO, *supra* note 309.

reputation staking, it is more likely to create internal governance solutions that translates well into real-world legal solutions.

The DevDAO governance design helps to facilitate a more equal distribution of power. Language, religion, race, physical presence, group identifiers, culture, etc., influence centralized power distribution. Similarly, commonly used identifiers in centralized governance such as social media profiles and credit scores, among others, are essential for access to the central system and to resources. Such relatively superficial identifiers play less of a role in the DevDAO voting designs. The more equal distribution of power in the DevDAO governance design allows the inclusion of constituents who otherwise have no agency in centralized systems.

- Legal Structure

Key for the legal solution offered by the DevDAO is its duality of internal and external governance design that helps optimize the decentralized nature of the DevDAO. The internal and external governance coordination is facilitated by the duality of entities and their respective governance. For the internal governance, the DevDAO uses a system of reputation token staking that facilitates unprecedented incentivization of the DevDAO community and governance improvements in orders of magnitude. For the external legal relationships and governance, the DevDAO is represented in real-world legal contexts by the Emerging Technology Association (ETA) under Swiss law.

The objective of the ETA is to establish a decentralized and democratic association with flat hierarchies. The ETA accomplishes this objective by supporting open source and transparent research and development of emerging technologies and frameworks for community building and governance by way of receiving grants from unaffiliated entities and issuing grants to a broad array of experts, developers, and scientists around the globe.

Key for the success of the duality of internal and external governance of the DevDAO is the broad deference the ETA gives to the voting outcomes that originate in the DevDAO. This deference is accomplished through delegation of voting power and

outcomes from the DevDAO to a member of the ETA, called the Delegate Association Member (DAM). Under the ETA articles, the DAM merely executes the upvotes on a given issue coming out of the DevDAO. The majority of the voting rights can also convene an extraordinary Association Assembly at any time. To create maximum deference to the votes within the DevDAO, under the ETA articles, the ETA Board has only those competencies that actually require the action of an individual, natural person. Such duties include representation of the DevDAO and the ETA and the duty to keep records, among others. In other words, the ETA Board merely executes the decisions of the DevDAO. In the ETA assembly, the DAM always has more votes, representing the upvotes on a given decision coming out of the DevDAO, than the ETA board because only five initial board members have voting rights. Through the votes executed in the DevDAO and represented in the ETA assembly, the DevDAO determines the support of developers and scientists and the funding allocation for projects the DevDAO sponsors.

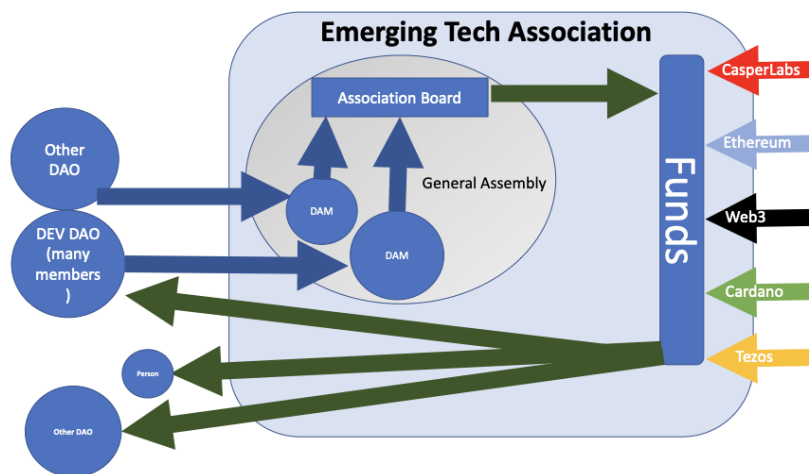


Figure 1: Legal Structure of DevDAO and Emerging Technology Association (Swiss Law)

Figure 1 illustrates that the ETA is subject to the governance and voting outcomes of all the DAOs that operate within the ETA's legal framework. The DevDAO is the first and primary DAO in the ETA infrastructure. Like the DevDAO, all DAOs in the ETA

exercise their voting power through the ETA's DAM under the ETA Articles. The DevDAO established the minimum viable protocol requirements ("MVPR") which apply to any and all DAOs that operate under the Association's legal framework. The MVPR establish a system of reputation staking for the internal governance of the DevDAO. After adopting the MVPR (adopting entirely or hard forking the MVPR code), each DAO in the ETA structure votes independently through a DAM in the ETA who represents the total upvotes from each DAO in the ETA general assembly.

This combination of factors in the DevDAO enables higher levels of decentralization. Because the internal governance of the DevDAO is decentralized and effective through reputation staking, it can create internal governance solutions that translate well into real-world legal solutions that are instantiated via the ETA and vice versa. Because the internal reputation staking voting mechanism of the DevDAO is more decentralized it creates decentralization synergies with the external legal design in the ETA. Unlike other DAO legal proposals, the degrees of internal and external governance decentralization in the DevDAO and the ETA do not cancel each other out but rather synergize and enhance each other. While the ETA is still a form of centralization of the DevDAO, the DevDAO has the potential to remove the ETA structure incrementally. The DevDAO may, for instance, replace the DAM in the ETA, a core point of centralization, with a smart contract. The automation of the DAM is a key objective of the DevDAO to continually enhance its decentralization.

- **Benefits of DevDAO's Reputation-Based Internal Governance**

The use of reputation staking and voting metrics in the DevDAO's internal governance design has key advantages over other decentralized voting mechanisms. The DevDAO's use of reputation voting has two key advantages over other decentralized one-token-one-vote voting mechanisms: 1) it is non-fungible which avoids corruptive elements, and 2) it optimally aligns incentives for DevDAO members individually and at the same time aligns their incentives for the totality of the DevDAO as an institution. Because reputation is non-fungible, and ideally anonymous, it is much harder for DevDAO members and external participants to try to

game the system to improve their own utility exclusively while hurting the common good of the DAO.

The DevDAO' non-fungible and fungible token governance design enables the incentivization of DevDAO members with indirect economic gain. In the DevDAO's bifurcated design with two disparate types of tokens, e.g. reputation tokens and reputation salary tokens, 1. the non-fungible reputation tokens give DevDAO members voting rights, and 2. fungible reputation salary tokens allow DevDAO members to earn a fungible salary in proportion to their non-fungible reputation tokens. DevDAO members increase their non-fungible tokens by making valuable contributions to the DAO and participating consistently in DevDAO voting pools. DevDAO members get paid with a fungible stable token denominated in US Dollars that is pegged to a pool of fungible tokens. The salary payments in fungible stable tokens are in proportion to DevDAO members' respective non-fungible reputation token scores. The indirect economic effects remove corruptive elements and make the governance design more attack resistant and stable in the long run.

Reputation as a valuation metric allows DevDAO members to improve their own utility while at the same time improving the DevDAO in the long term. Because reputation is used as a metric for indirect economic benefits, e.g. a salary in fungible tokens that is paid in proportion of the non-fungible reputation token score, DevDAO reputation token holders are incentivized to increase their own reputation/utility by engaging in valuable conduct for the DAO. The more the aggregated individual reputation of all DevDAO members increases the more the overall DevDAO value increases and the more the DevDAO creates value enhancing outcomes for its members.

Reputation-staking as a basis for the DevDAO governance improves incentive alignment. Reputation-staking as a basis for DevDAO governance enables the correlation between individual and institutional value enhancement. DevDAO members rationally stake their own reputation tokens based on the outcomes they believe will increase their overall reputation/utility. If they did not, they would irrationally sacrifice a future income stream in fungible tokens. Through reputation-staking, the DevDAO members are

incentivized to provide long-term positive contributions because the DevDAO member reputation is transparent and reviewable by the DevDAO and the public in a slow and stable review process that reaches far into the future. Valuable individual behavior/work that leads to individualized reputation staking and individual reputation enhancement also enhances the DevDAO as an institution because the individual and institutional value enhancement are correlated.

The correlation between individual DevDAO value enhancement and DevDAO institutional value enhancement can be illustrated as follows. Take for example, a DevDAO member who stakes that a given smart contract template is optimal for XYZ outcome/application. Once the template is affirmed by the DevDAO members as optimal at that point in time, it becomes a valuable precedent for the DevDAO members and external DAOs. Hence, the staking of an individual and the ex-ante work that leads to staking increases sustainable value for all DevDAO members. The DevDAO members and other DAOs will rationally increasingly use the precedent until a better precedent emerges. That precedent thus increases the individual DAO member's reputation and the DAO overall.

The reputation-based governance design in the DevDAO changes the dynamic of a zero-sum game to a positive-sum game. Prior DAO governance designs were mostly zero-sum games as they used mostly fungible rewards and incentive designs. Accordingly, in prior DAO designs, DAO members pursued as large of a portion of the rewards as possible for themselves. By contrast, the reputation-based DevDAO governance design creates a positive-sum game because DevDAO members have incentives to create lasting non-fungible value for the DevDAO by developing a long-term non-fungible record of productive cooperation that in effect improves the DevDAO. Moreover, individual DevDAO member reputation can change dynamically if the DevDAO member actions depreciate in value. The DevDAO member reputation is inflationary in the DevDAO design. As such, non-use, e.g. non-staking of reputation tokens or non-voting, would lead to value depreciation, which incentivizes action and thus value enhancement. Liveness faults become less likely. Its ability to address liveness faults in its incentive design is a key distinguishing feature of the DevDAO.

The DevDAO's decentralized on-chain precedent system enables dynamic and evolutionary reputation-based governance. Most prior attempts at DAO governance design had no dynamic and evolutionary elements. By contrast, the DevDAO's decentralized on-chain precedent system enables feedback effects between DevDAO members, the public record of work/posts on the blockchain, and the public users. The DevDAO's decentralized precedent system makes the continuous upgrading of real-time data possible. As a post/template on the blockchain gets increasingly referenced by the DevDAO members and other users, it increases the respective DevDAO member's non-fungible reputation weight and associated fungible token salary. Conversely, if a DevDAO member's post/template on the blockchain dissipates over time, a new post/template emerges naturally. If the new post/template gets more often referenced by the DevDAO members and other users, it becomes over time the new prevailing precedent. The old precedent dissipates over time with non-use. This precedent replacement mechanism in the DevDAO design is dynamic and evolutionary. It has the promise to create eternal solutions for DAO governance and dynamic evolutionary protocol upgrades.

To create the proper incentive design in its reputation staking engine, the DevDAO incorporates several game theoretical insights:

- The DevDAO disincentivize betrayal and defection by charging an admission fee to become a DevDAO member. Given the sunk cost of joining the DevDAO, it is more expensive for prospective members to cheat because it would be expensive to rejoin even if members could be anonymous. The DevDAO also blacklists member accounts to incentivize cooperation. KYC protocols further expand those incentives to cooperate.
- To ensure continuous cooperation of DevDAO members, the promise of future profits in the DevDAO reputation token outweigh their present value. The DevDAO reputation token has a more stable and predictable value as the ETA onboards additional grants and the DevDAO network grows globally. Reputation tokens in the DevDAO system are correlated with expected future salary tokens in the ETA.

- In the DevDAO design the loss of opportunity from slashing DevDAO member reputation grows as the size of the network increases. In other words, the larger the DevDAO network the more competition for reputation tokens to receive fungible token salaries. Further, given the incomplete information due to increasing anonymity, the value of the information from reputation tokens increases. When potential business partners have less knowledge of DevDAO members' identity, the knowledge from the number of reputation tokens a DevDAO member holds becomes more important. Moreover, the lack of personal knowledge encourages the DevDAO members to devote more effort to fairly policing reputation tokens. Meritocracy is encouraged.

The DevDAO reputation staking design also enhances policing and compliance. The value of DevDAO member reputation is directly related to how well punishment can be distributed in response to cheating. The more transparent the system, the more accurate and efficient policing can be. Members of a traditional business police cheaters by withholding their business. But to make the threat credible, members need to police the other members and punish them if they did business with cheaters. To make the threats credible in a traditional business setting one would need to monitor those who, in turn, did not monitor those who, in turn, did not monitor. This is an expensive proposition. By contrast, in the DevDAO, algorithms can be written which exclude DevDAO members who cheat from having access to their market. Punishment for cheating becomes automated and therefore credible. Free riding in policing can at least partially be eliminated by automation. Algorithms can be written proactively to only supply contracts to those who have sufficient reputation. If a DevDAO member's reputation is slashed, such member will not be chosen by the algorithm.

The DevDAO's reputation-based governance design enables a much more equal distribution of power. Language, religion, race, physical presence, group identifiers, culture, etc., influence centralized power distribution. Similarly, commonly used identifiers in centralized governance such as social media profiles and credit scores, among others, are essential for access to the

central system and to resources. Such relatively superficial identifiers play less of a role in the DevDAO voting designs. The more equal distribution of power in the DevDAO governance design allows the inclusion of constituents who otherwise have no agency in centralized systems.

- Attack Resistance

The DevDAO design addresses sock-puppet accounts and Sybil attacks. It is reasonable to assume that DevDAO members can join from any jurisdiction and cannot be tracked or punished for any bad behavior by appealing to outside authorities. In that case, the only punishment available is to take away DevDAO members' potential future reputation token salaries in the DevDAO. DevDAO Members are all anonymous and DevDAO members might try to game the system by creating multiple accounts, e.g. sock-puppet accounts. The only way to discourage such malicious actors from joining is to charge money during the member onboarding process.

Moreover, sock-puppet attacks are also avoided via the DevDAO's periodic reputation-weighted salary that distributes all fees the DevDAO earns through the ETA to all members. Individuals who bring successful ideas to the DevDAO or perform tasks that bring fees to the ETA will be rewarded with reputation tokens, not the salary tokens. DevDAO members who own more reputation tokens share in a larger percentage of the salary pool. This solves the sock-puppet attack because if a DevDAO member creates 10 accounts with 1 reputation token each, it is the same as 1 account with 10 reputation tokens.

The DevDAO design addresses DoS attacks. Denial of Service (DoS) attacks happen when anonymous adversaries flood a given network with automated requests for superfluous tasks. Such incoming superfluous tasks prevent the network from engaging in productive work. To restrict a significant number of bad actors from entering the DevDAO system and ensure resistance to basic DoS attacks, the DevDAO charges a nominal fee during the onboarding process. This fee merely needs to be high enough so that the effort to police the bad actors is profitable, but not so high that it prevents people of good will from joining the DevDAO. The precise number

for the onboarding fee depends on the market environment. Automation should make this feasible.

- Level of Decentralization

The level of decentralization in a DAO design is an indicator for longevity of the respective DAO. The level of decentralization and the associated attack resistance and incorruptibility of DAO governance designs are among the core factors that influence DAO design adoption, its precedence, and longevity. In other words, the more decentralized a given DAO design, the more likely that design will in the long run be adopted by other DAOs. However, not all future DAO designs will comply with the ideal typical DAO parameters. Ideal typical DAO design parameters will naturally filter out at the edges. In other words, because the optimal DAO design parameters change constantly, if and when formerly ideal typical designs fail, new and optimized designs will replace them.

The level of decentralization in the DevDAO design reached unprecedented levels through its applicable design parameters:

- merit identifiers, e.g. DevDAO members merit, knowledge, and influence is measured through their respective DevDAO non-fungible reputation token ownership;
- non-fungibility of DevDAO reputation tokens; e.g. merit of a DevDAO member is expressed by a non-fungible reputation token that cannot be bought or sold;
- full transparency, e.g. all DevDAO decisions are fully transparent and accessible by the public and the DevDAO members themselves;
- indirect economic incentives, e.g. DevDAO members are getting paid with stable fungible tokens in proportion to their non-fungible reputation tokens;
- decisions in the DevDAO are made with a voting design that revolves around staking of non-fungible reputation tokens; and
- DevDAO's fungible salary tokens are designed as stable and \$USD denominated cryptocurrencies that maintain their value at around \$1US. The incoming token grants from a diverse set of grantors are part of the pool of digital assets that constitute the basket of digital assets against

which the DevDAO's stable and \$USD denominated cryptocurrency is pegged.

- anonymity of DevDAO members, e.g. after an initial setup and development period with less anonymity, DevDAO merit identifiers revolve around reputation scores and members of the DevDAO community can predominantly be identified by their respective reputation score in the DevDAO structure.

V. Conclusion

The decentralized autonomous corporation was first introduced briefly in a 2013 blog post. The 2014 Ethereum launch revolutionarily connected issuers to users through smart contracts upon which DAOs function today. The 2016 DAO demonstrated the possibility of using decentralized organizations to pool a large amount of assets between a large number of people. Since then, developers and thinkers have attempted to solve not only the technical flaws of the original DAO had, but also the need to synchronize the legal aspect of a DAO with its technical aspects.

This article introduced the reader to the benefits of operating a DAO, its legal limitations, and actual projects undertaking efforts to operate a DAO on-chain with a corresponding off-chain legally-recognized entity. DAOs solve the principal-agent problem that traditional organizations face by reducing misconduct and error, realigning participant incentives, and ultimately shifting economic and power dynamics.

Without a legal wrapper, DAOs face potential regulatory enforcement actions and civil liability, not only at the organization level but against individual participants. Issues of public policy, market, economic, and technical limitations also can arise. In order to create legal certainty, DAOs are evolving using a legal wrapper of the U.S. limited liability corporation concept and the Swiss civil law Association. The current third generation of DAOs take a legal

entity that exists off-chain and adds a DAO concept, on-chain governance, to that existing construct. Future DAO generations will further improve the duality of internal governance and external legal design. Perhaps it will be possible to free DAO concepts of legal constraints in the more distant future.

