

Decentralized Autonomous Organizations as Legal Persons

Evaluating the Legal Personhood of DAOs in Light of the Bundle Theory

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The proliferation of blockchain and other distributed ledger technologies has led to widespread experimentation with modes of operation that are predicated on decentralization. Among these innovations are so-called Decentralized Autonomous Organizations—essentially blockchain-native organizations whose operations are predicated on a high level of automation and whose functions are managed by a human collectivity leveraging some sort of decentralized governance model. These entities are steeped in novelty, for example with regard to their technological makeup, the context in which they operate, as well as the method of forming an intention based on which to operate. As such, they constitute a very unique, decidedly digital type of entity, whose ontology is quite vague.

This thesis, then, aims to examine DAOs as novel entities that engage in legally relevant behaviour, focusing specifically on the question of whether or not they can be considered legal persons. This question is approached in light of Visa Kurki's Bundle Theory of Legal Personhood, which provides quite a nuanced framework through which to examine the concept. Indeed, his theory brings this thesis to the conclusion that DAOs can, in fact, be considered legal persons, although there is still room for more nuance in the discussion, as there remains ambiguity in a term as wide as 'DAO', as well as in the whole concept of legal personhood as applied to entities that tread the vague line between traditional legal frameworks and a blockchain-based world quite of its own.

Keywords: *Decentralized Autonomous Organization – Blockchain – Distributed Ledger Technology – Legal Personhood – Smart Contract – Group Agency*

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1. Introduction

1.1. Background and significance

Some technological innovations are prone to enable and inspire new ways of organizing activity between humans. The advent of the internet is an obvious example, having led to a fundamental reordering of business, work, and private life. Today, based on the groundwork laid out by Satoshi Nakamoto in the creation of Bitcoin, Distributed Ledger Technology (DLT)¹ holds promise of enabling new ways of organizing economic activity. The fundamental innovation brought about by DLT, as well as the driving ideological force behind it, is to create a so-called trustless environment, where economic activity is organized in such a way as to forgo the need for a trusted third party, i.e. a point of centralization. To some extent, this has already been a success, as many protocols themselves—Bitcoin and Ethereum in particular—can be deemed decentralized.

Whatever one's thoughts on the merits of the technology or the feasibility of the novel modes of operation it enables striking through in the “real world”, the fact is that the DLT sector has grown immensely over the past decade, not only in value but in its breadth of applications. Referencing the total market value of crypto assets in a static document is bound to become dated, but this much can be said: at this point in time the market value is counted in trillions of dollars, and the daily transaction volume in upwards of tens of billions of dollars. Within the DLT sector, the fastest growing field over the past few years has been that of Decentralized Finance or “DeFi”, i.e. financial products such as lending, staking, collateralization etc. that are offered on a public DLT platform. The DeFi market now covers assets worth tens of billions of dollars and is poised to continue growing rapidly over the coming years. These DeFi projects are by definition based on some degree of decentralization, with a general trend towards

¹ Blockchains are a type of distributed ledger technology or DLT. The term DLT is used in this thesis due to its technologically agnostic nature.

increasingly decentralized governance as well as in many cases increasingly automated operations. These novel structures of governance and automated operation are commonly referred to as “Decentralized Autonomous Organizations” or “DAOs”.

Valuations can of course change in an instant; bringing them up is only meant to emphasize the point that the DLT sector is on its way to becoming an economically and thus systemically significant market whose developments can have consequences that reach beyond its own sphere. This “infiltration” of the wider economy is further evidenced by the rapid adoption of crypto assets, particularly Bitcoin, as an element of the investment strategies of large financial institutions. At the same time, the novel entities and modes of operation enabled by DLT are often hard to integrate into the wider legal system – an issue which is at the core of this thesis.

Getting back to the issue, while the underlying protocols themselves may be decentralized, many of the actors that leverage them have yet to earn that classification. Most projects today are run by some sort of legal entity; generally a company or a foundation. With that being said, the same ideological force that inspired the creation and proliferation of Bitcoin and other DLT platforms is at work in many of the projects built upon them. As an example, while most DeFi projects are currently run by some sort of legal entity, many of them aim to make themselves redundant over time, gradually delegating their functions to DAOs.² As mentioned, some of these DeFi projects administer assets amounting to hundreds of millions of dollars in total, with countless more projects in the making. Ultimately, there will exist a wide variety of organizations and governance models that run their respective projects; some of them are easily defined from a legal perspective, but others are far from it. Some are fully

² A prominent example of this is MakerDAO, which is governed by a foundation that expressly aims to make itself redundant over time. See <https://makerdao.com/en/>.

autonomous with seemingly no actionable legal entity, while others may be in the middle of automating and decentralizing their functions. This plurality — already reality to some extent — begs the question: how should these entities be perceived from a legal perspective? Are they to be seen as general partnerships of some sort? Or are they legal persons in and of themselves, independent from their individual members?

1.2. Research questions

This thesis, then, aims to examine whether and in what regards DAOs can be considered legal persons. More specifically, it approaches these questions in light of Visa Kurki's Bundle Theory of Legal Personhood. The significance of the issue lies in DAOs arguably being the first concrete examples of amorphous online entities that don't fit into any existing legal framework as to their ontology. What are they, or rather, how should they be perceived? Kurki's theory provides a solid framework for this discussion; a discussion that will no doubt come to reach artificial entities that aren't rooted in human collectivities as DAOs, for the time being, are. DAOs, and the question of their legal personhood, can thus be seen as stepping stones on the way to more complex discussions that await us as the concept of agency becomes increasingly less the sole domain of humans.

The first step in assessing the legal personhood of DAOs is to examine the question of decentralization and how it affects the character of DAOs. This will be done through examining the notion of *sufficient decentralization* and what criteria a DAO needs to meet in order to be considered sufficiently decentralized. At one end of the spectrum are, essentially, traditional legal entities that leverage automation on a DLT platform for specific functions; at the other end are highly autonomous entities whose governance is distributed between a dynamic community of participants. The concept of legal personhood applies differently

depending on where on the spectrum of decentralization a DAO sits, which is why the question of decentralization warrants its own discussion.

Having established the qualifications for sufficient decentralization, we can move on to discussing the concept of legal personhood with regard to DAOs. This is done through Kurki's Bundle Theory of Legal Personhood and whether and to what extent it's applicable to DAOs.

1.3. Methodologies and sources

This thesis leverages theoretical legal analysis in particular, focusing on the concept of legal personhood and how it relates to DAOs. There is little in the way of doctrinal legal analysis, seeing as there's little to base such an analysis on at this point.

The novelty of the subject matter, i.e. DLT in general but the legal personhood of DAOs in particular, will be reflected in the referenced material, which, rather than relying primarily on textbooks, will consist of a wide array of legal articles, reports, as well as blog posts, most of which for their own part attempt to fill in the gaps that the law has yet to address. The referenced articles are from journals covering the intersection of either law and technology in general, or law and blockchain in particular. Moreover, some articles pertaining to the Hohfeldian analysis of rights will be referenced, where relevant as background for the rationale of the Bundle Theory of Legal Personhood.

Geographically speaking the referenced material is rather international; plenty of the material is American in origin, but various European sources are used where applicable. The American bent of the material owes to the fact that a number of renowned American universities, such as Stanford, MIT and Harvard, are at the vanguard of the discourse on law and blockchain. The main work referenced in

this thesis is, however, written by a Finn and published in the UK. Nevertheless, decidedly Finnish perspectives will not be considered, as the cross-border nature of the subject is best served by cross-border perspectives.

1.4. Structure of the thesis

The main body of the thesis starts with an overview of the technology, which is covered to the extent that it's necessary to form an understanding of the core concepts of DLT with a focus on the aspects that are most relevant to the discussion at hand. Having gone through the fundamentals of DLT, a short overview of smart contracts will be given, as they are an essential building block of DAOs.

The next chapter will focus on DAOs; what they are and how they are governed. An understanding of their nature is of course crucial for the discussion on their legal personhood. Another important aspect to take into consideration is, as mentioned, the decentralization of DAOs, as a distinction needs to be made between DAOs that are largely centralized and those that have achieved a substantial level of decentralization. Both ends of the decentralization spectrum will be subject to examination when discussing the legal personhood of DAOs.

With the technical groundwork laid, the discussion can move on to the core of the thesis, i.e. the concept of legal personhood, particularly as laid out by Kurki with his Bundle Theory of Legal Personhood. For the sake of cohesiveness I found it reasonable to first outline Kurki's theory in isolation, rather than muddying the waters by constantly relating the issue at hand to DAOs. Having first equipped the reader with a holistic picture of his theory and its merits, the discussion can then move on to applying it to DAOs. The discussion on how Kurki's theory relates to DAOs is as such largely contained into a section of its own. This leads to the section on Kurki's theory being heavily referential, as it

draws significantly from his thesis in both structure and content. However, this solution, while perhaps unorthodox, should ultimately serve the whole, as it not only equips the reader with an understanding of Kurki's theory before applying it in practice, but also leaves the subsequent analysis with room to breathe.

Having applied Kurki's theory to DAOs, the final chapter will lay out what conclusions we can draw from it as to the legal personhood of DAOs, as well as what those conclusions entail.

2. Technical Foundations

2.1. *Blockchain*

While ‘Blockchain’ is the generally accepted term for the technology that underpins the subject of this thesis, we should first specify how it relates to the term ‘Distributed Ledger Technology’. Distributed Ledger Technology or ‘DLT’ refers to a digital peer-to-peer network where all the participants (or ‘nodes’) converge on the same view of its state—thus essentially being a decentralized database. This shared view is achieved by means of a consensus mechanism, of which there are a variety of different types, the most famous of which is the original ‘Proof-of-Work’ mechanism popularised by the Bitcoin network, launched by the pseudonymous Satoshi Nakamoto in 2009.³ Its novelty was in fusing three concepts that are foundational to all DLTs today: 1) public-private key cryptography⁴, 2) digital signatures⁵, and 3) peer-to-peer technology⁶. Through the combination of these concepts together with a mechanism for achieving consensus, DLTs allow for exchanging value and coordinating activity online without the need for intermediaries, i.e. centralised entities that track and enforce the state and ordering of events or ‘transactions’.

‘Blockchain’ refers to a specific structure of DLT, deriving its name from its implementation as ‘a series of blocks of transactions, each containing the hash of

³ Satoshi Nakamoto, ‘Bitcoin: A Peer-to-Peer Electronic Cash System’ (28 October 2008) <<http://bitcoin.org/bitcoin.pdf>> accessed 28 February 2022.

⁴ A sort of asymmetric cryptography that uses pairs of keys. Basically, the public key can be derived from the private key but not the other way around. The public key is used to receive transactions (as it can safely be shared with others), while the private key is used to send transactions (i.e. it controls the funds associated with the public key, which is why it should not be shared with others).

⁵ A signature created with a private key which proves that the public key (and the assets associated with it) belong to you.

⁶ A network where information is shared without a centralised administrative system, i.e. between ‘peers’.

the previous block, committing this block as its sole antecedent.’⁷ The network converges on the same ‘opinion’ regarding the ordering and content of these blocks by means of a consensus mechanism. Those will be covered next, however it is worth stating at this point that a chain of blocks is but one of many possible structures that a DLT can assume; other alternatives include lattices or so-called Directed Acyclic Graphs (‘DAGs’). In accordance with established praxis, the term ‘blockchain’ will subsequently be used technology-agnostically to refer to all of these possible solutions. To reiterate, the crucial aspect shared by all of these solutions is the existence of some mechanism through which the whole network ultimately converges on the same view of its state, i.e. a consensus mechanism.

2.1.1. Consensus mechanisms

The consensus mechanism that started it all is called Proof-of-Work (or ‘PoW’). This PoW is done by so-called ‘miners’. These miners 1) bundle together a bunch of transactions in blocks, 2) validate the transactions (i.e. ensure that there are no conflicting transactions), and 3) solve a highly energy-intensive problem known as the PoW. What it entails is hashing the preceding block until a hash is found that starts with a specific number of zeroes. This can only be done through brute-forcing, i.e. making countless guesses until a match is found. As such, having found a match means that one has expended a significant amount of energy on the computation that lead to it, thus constituting a proof-of-work. The first miner to find a match broadcasts the solution to the rest of the network and is rewarded in a set amount of tokens (e.g. Bitcoins) as well as the transaction fees associated with the block in question. The other nodes verify the solution, accept the block thus created, and subsequently start the PoW-process all over again by hashing the new block. Multiple miners finding the solution simultaneously results in a ‘fork’ in the chain, as different nodes verify different

⁷ Bonneau et al. SoK: Research Perspectives and Challenges for Bitcoin and Cryptocurrencies.

blocks. This is solved through the ‘longest-chain-wins’ rule, whereby the nodes converge on the chain on which the most energy has been expended.⁸ The environmental concerns relating to PoW are well-publicised⁹—a part of the reason for why countless alternatives have arisen, among them Proof-of-Stake.

Proof-of-Stake (or ‘PoS’) differs from PoW in that instead of miners, blocks of transactions are validated by ‘validators’. Aspiring validators must put up their own tokens as collateral to disincentivize them from malicious behaviour. The validator for each block is chosen more or less randomly, although factors such as the amount of tokens staked can increase the chances of being chosen. Whoever is chosen to be the validator then receives the transaction fees associated with the block in question. PoS lacks features that would make it inherently time-consuming or energy-intensive, making it more efficient than PoW. There are, however, concerns with regard to whether PoS-based systems might tend towards centralization, but discussing those is beyond the scope of this thesis.¹⁰

A feature shared by the two dominant consensus mechanisms—PoW and PoS—is their leader-based consensus. What this means is that for each set of transactions (i.e. each block), a ‘leader’ is selected determine its content (in PoW this is the first miner to find the solution, in PoS it is whoever has been chosen as the validator for the next block). However, there are also leaderless consensus mechanisms, where all the participants in the network can propose and validate

⁸ See Satoshi Nakamoto, ‘Bitcoin: A Peer-to-Peer Electronic Cash System’ (n 3) and Bonneau et al. SoK: Research Perspectives and Challenges for Bitcoin and Cryptocurrencies.

⁹ See Karl J. O’Dwyer and David Malone, Bitcoin Mining and its Energy Footprint, in ISSC 2014/CIICT (2014), 280-285. See also Renee Cho, ‘Bitcoin’s Impacts on Climate and the Environment’ (20 September 2021) <<https://news.climate.columbia.edu/2021/09/20/bitcoins-impacts-on-climate-and-the-environment/>> accessed 28 February 2022.

¹⁰ For a more thorough overview of PoW and PoS, see ‘Types of Blockchains: PoW, PoS, and Private’ <<https://www.gemini.com/cryptopedia/blockchain-types-pow-pos-private#section-private-and-consortium-blockchains>> accessed 28 February 2022.

transactions as well as participate in resolving conflicts between them.¹¹ This allows for a greater degree of decentralization, while also enabling feeless transactions. This is brought up to emphasize the potential of DLTs in fact becoming a ubiquitous feature of the web, as the high fees of the dominant protocols today constitute a significant deterrent to wider adoption.

These consensus mechanisms are at the core of what makes blockchains conducive to new forms of social and economic activity. They allow for both information and value to be transferred without intermediaries, and for the history of those transactions to persist, immutable and over time, such that the integrity and persistence of the system doesn't hinge on any specific place or any specific entity.

This persistence becomes particularly interesting when combined with another innovation, namely that not only do blockchains allow for a shared view of the state of a ledger with regards to the ordering of transactions, but also with regards to the execution of code. This feature enables the creation of so-called 'smart contracts', which will be covered next.

2.2. Smart contracts

2.2.1. Outline

Smart contracts are often defined very simply as agreements whose execution is automated.^{12 13} On a technical level, though, smart contracts are simply code that

¹¹ See <https://blog.iota.org/mana-parallels-to-human-voting-systems-and-ingenuous-concepts/> accessed 28 February 2022.

¹² Raskin, 'The Law and Legality of Smart Contracts' (2016) 304(1) *Georgetown Law Technology Review* 305.

¹³ Or to use the definition given by the 'inventor' of smart contracts, Nick Szabo: 'A smart contract is a computerized transaction protocol that executes the terms of a contract.' <<https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html>> accessed 2 March 2022.

is stored, verified and executed on a blockchain. The use cases of such code aren't restricted to anything that should necessarily be likened to a contract in the traditional sense. Using the term 'contract' is, however, often justified, as conditional exchanges of value involving a meeting of the minds are one of the predominant functions of smart contract code.

On the other hand, rather than referring simply to the code, the term is often used to refer to a combination of blockchain-executed code and traditional legal language. In these cases a smart contract, or smart *legal* contract, is an ensemble where the terms that allow for automation are executed in code on the blockchain, while e.g. terms that require interpretation are drafted in traditional legal language.¹⁴ Ensembles like this can also be referred to as 'hybrid arrangements' or 'hybrid agreements'.¹⁵

So essentially there are two distinct concepts that assume the name 'smart contract': 1) legal relationships governed exclusively by self-executing code, and 2) legal relationships supplemented by self-executing code. These two concepts align with Raskin's distinction between *strong* and *weak* smart contracts respectively. Basically, weak smart contracts are relatively easily enforced through traditional means, while, as Raskin expresses it: 'once a strong smart contract has been initiated, by definition, it must execute.'¹⁶

This thesis will largely pertain to smart contracts of the strong type. In the Ethereum white paper, Vitalik Buterin names three applications for smart

¹⁴ Josh Stark, 'Making Sense of Blockchain Smart Contracts' (*CoinDesk Insights*, 4 June 2016) <<https://www.coindesk.com/markets/2016/06/04/making-sense-of-blockchain-smart-contracts/>> accessed 2 March 2022.

¹⁵ Primavera DeFilippi and Aaron Wright, *Blockchain and the Law - The Rule of Code* (Harvard University Press 2018) 57.

¹⁶ Raskin, 'The Law and Legality of Smart Contracts' (2016) 304(1) *Georgetown Law Technology Review* 305, 311.

contracts built on Ethereum, all of which can be characterised as strong smart contracts:¹⁷

In general, there are three types of applications on top of Ethereum. The first category is financial applications, providing users with more powerful ways of managing and entering into contracts using their money. This includes sub-currencies, financial derivatives, hedging contracts, savings wallets, wills, and ultimately even some classes of full-scale employment contracts. The second category is semi-financial applications, where money is involved but there is also a heavy non-monetary side to what is being done; a perfect example is self-enforcing bounties for solutions to computational problems. Finally, there are applications such as online voting and decentralized governance that are not financial at all.

Unsurprisingly, these three applications are exactly what constitute the functionalities and activities of DAOs. So let's take a closer look at how smart contracts actually function. We'll assume Ethereum as the platform, as it is the first and most prominent blockchain to offer smart contract functionality.

2.2.2. Technical aspects of smart contracts

To start with, smart contracts are, in fact, dumb. They do what they're programmed to do—no more, no less—and inevitably there will be instances where what a smart contract is intended to do, and what it actually does, fail to match. In other words, they're prone to human error same as any code. However, when properly implemented, they can be very powerful, acting by themselves based on intricate arrays of conditional clauses and/or different data inputs. The 'acting by themselves' part is important—self-enforcement is foundational to smart contracts, guaranteeing performance provided that conditions are met. This

¹⁷ Vitalik Buterin, 'Ethereum Whitepaper' <https://blockchainlab.com/pdf/Ethereum_white_paper_a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf> accessed 2 March 2022.

is the ‘smart’ aspect of smart contracts; they act autonomously, fulfilling contractual obligations without the need for intervention, neither by the parties nor any intermediaries. The ‘autonomous’ label requires a qualification, as smart contracts don’t express any intentionality of their own—only that of their creators.

To get to the technical aspects, smart contracts consist of 1) its functions, and 2) its state.¹⁸ The functions are represented as code, and the state as data, both residing on a specific address or ‘account’ on the Ethereum blockchain. An account can also have funds associated with it which it can use to send transactions over the network. These functionalities together constitute a smart contract. Once such an account (i.e. smart contract) is deployed on the network, no user can control it; the contract simply executes its functionality when a user interacts with it by submitting a transaction that executes one of its functions. The Ethereum ledger holds the state of every smart contract deployed on it, and every state change, triggered by a transaction included in a block, is processed by the entire network. As the state changes are triggered by transactions, and transactions on a blockchain are (practically speaking) irreversible, this means that any interactions with and actions by a smart contract are irreversible.^{19 20}

A powerful feature of smart contracts is that they can call other contracts or deploy contracts of their own, vastly increasing their potential functionality. This capability to leverage other contracts and potentially use them as building blocks in larger systems is called *composability*²¹. Composability, together with the

¹⁸ For a great example of what a smart contract might look like, see Riikka Koulu, ‘Blockchains and ODR’ (2016) 13(1) SCRIPTed - A Journal of Law, Technology & Society 40.

¹⁹ This is what makes the self-enforcement aspect of smart contracts, mentioned above, rather definite.

²⁰ For a more detailed technical explanation of smart contracts, see <<https://ethereum.org/en/developers/docs/smart-contracts/>> accessed 2 March 2022.

²¹ For an overview of smart contract composability, see Linda Xie, ‘Composability is Innovation’ (15 June 2021) <<https://future.a16z.com/how-composability-unlocks-crypto-and-everything-else/>> accessed 3 March 2022.

transparent, open source nature of smart contracts has a number of benefits: 1) it allows for a great deal of innovation; 2) it lowers the threshold to smart contract development as one can leverage existing components; and 3) being able to use established building blocks reduces the risk of human error, as one doesn't need to reinvent the wheel. Composability is also the basis for building, among other things, DAOs.

2.2.3. Legal aspects of smart contracts

Earlier we made a distinction between two concepts that the term 'smart contract' may refer to: 1) legal relationships governed exclusively by self-executing code (or "strong smart contracts"), and 2) legal relationships supplemented by self-executing code (or "weak smart contracts"). The relationships constituted by weak smart contracts, being rooted in traditional contracts, can quite readily be characterised as 'legal relationships'. As for strong smart contracts, some elaboration is necessary.

It is not self-evident that interacting with a piece of code could be deemed to constitute a valid contract, however, all the necessary elements exist to make such a judgement. Smart contracts: 1) involve two or more parties, 2) contain definite terms, 3) involve consideration, and 4) involve an expression of intent to be bound by the contract. To be clear, the expression of intent takes the form of a transaction to the contract.²² While not all smart contracts formalise a meeting of the minds, those that do qualify as legally binding²³, and those that don't can still be classified as constituting legally relevant behaviour.^{24 25}

²² Riikka Koulu, 'Blockchains and ODR' (n 18) 65.

²³ DeFilippi & Wright, *Blockchain and the Law - The Rule of Code* (Harvard University Press 2018) 58.

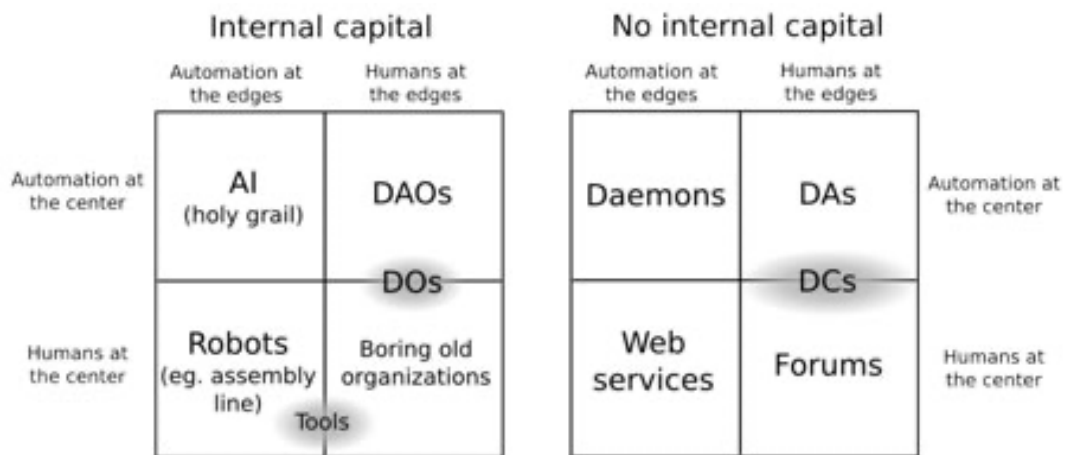
²⁴ Florian Glatz, 'What Are Smart Contracts? In Search of a Consensus' (12 December 2014) <<https://heckerhut.medium.com/whats-a-smart-contract-in-search-of-a-consensus-c268c830a8ad#.hlgo86909>> accessed 4 March 2022.

²⁵ The issue is muddled by the ambiguity of the term smart contract.

3. Decentralized Autonomous Organizations

3.1. Foundations

The composability of smart contracts as well as their capacity to have funds associated with them allow for complex structures of automated operation. These structures are tied to a greater or lesser degree of human involvement depending on their design and purpose. These structures can be called Decentralized Autonomous Organizations or “DAOs”. Essentially they are organizations, governed by humans, that operate and manage their internal capital with a high degree of automation. Vitalik Buterin has distinguished them from other types of entities as follows, noting that DAOs have automation at the center and humans at the edges:²⁶



Another potential distinction can be made between algorithmic and participatory DAOs, however in this case the former could readily be called AIs as per the table above, as speaking of ‘organizations’ generally implies some sort of human

²⁶ Vitalik Buterin, 'DAOs, DACs, DAs and More: An Incomplete Terminology Guide' (*Ethereum Foundation Blog*, 6 May 2014) <<https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide/>> accessed 7 March 2022.

collectivity. Having covered the basic features of DAOs, we can take a closer look at what the elements of the name imply.

Decentralized

The term ‘decentralization’ in DAOs pertains to a number of different aspects. The underlying platform, i.e. the blockchain that a DAO exists on, is presumably decentralized, as are the nodes, i.e. the hardware, that the blockchain resides on. The governance is generally decentralized in that decision making is collective rather than controlled by one entity. Furthermore the pertinent data and the actual operation of a DAO can be decentralized in the sense of involving smart contracts deployed by other entities.²⁷ These three axes can be classified as architectural, political and logical decentralization respectively.²⁸

Autonomous

As for autonomy in the context of DAOs, the MIT Computational Law Report has given a thorough explanation of the concept:²⁹

In contrast, the use of the term [autonomy] in the context of the original DAO refers to the automated nature of intermediation between the participating parties and behaviour of the entity as a whole, similar to how a body attains autonomy through the aggregation of its constituent parts. As with the case of decentralization, the complexity of the logic specifying the nature of autonomy and the degree of internal representation of purpose or goal may range from simple branching logic to complex, artificially intelligent agents.

So as with decentralization, there are degrees of autonomy that depend on the specific implementation. The plurality that these two elements imply reveals

27 Ganado et al. ‘Mapping the Future of Legal Personality’ (2020) MIT Computational Law Report 3.

28 Vitalik Buterin, ‘The Meaning of Decentralization’ (6 February 2017) <<https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274>> accessed 23 April 2022.

29 Ganado et al. (n 27).

the rather wide scope of the term ‘DAO’, which we will be returning to in a moment.

Organization

As mentioned, the term ‘organization’ could be taken to imply that the autonomous entity at the core of a DAO is rooted in some sort of human collectivity. This can be seen in the technology being characterised as an ‘enabler of organizational behavior’³⁰, or ‘facilitating coordination and trust’³¹. At the same time, the term ‘organization’ can be understood as referring to the components (i.e. various smart contracts) as themselves constituting entities or parties that form the organization in question.³² DAOs in both senses of the term will feature in this thesis due to a classification made in the following chapter.

3.2. Governance

To restate what DAOs are, they’re essentially blockchain-native organisations, collectively owned and managed by their members, with 1) some or all of their functions automated through smart contracts, and 2) built-in treasuries. Their governance is carried out through proposals that are voted on by the members—a system that is at least supposed to be more democratised and less hierarchical than what can be seen in the governance of traditional companies. Some elements that speak for the more egalitarian nature of DAO governance are that 1) voting is required by members for any changes to be implemented; 2) votes are tallied and the outcomes implemented automatically; 3) services offered are automated and executed in a decentralized manner; and 4) all of this happens completely transparently.³³

³⁰ *ibid.*

³¹ Aaron Wright & Primavera De Filippi, ‘Decentralized Blockchain Technology and the Rise of Lex Cryptographia’ (2015) 16

³² Ganado et al. (n 27) 4.

³³ See ‘Decentralized Autonomous Organizations (DAOs)’ <<https://ethereum.org/en/dao/>> accessed 23 April 2022.

DAO governance is practically implemented through the use of tokens that grant specific rights to its holder. As an example, we can imagine the following scenario: a DAO is launched, and it mints X governance tokens, each granting one vote on new proposals. The governance tokens are then sold to interested parties in exchange for i.e. a certain amount of ETH. As a result, participation in the governance of the DAO is gradually distributed, while the DAO receives funds for its treasury, allowing it to finance its future projects. Of course, this is only one potential way to collect funds and form a membership that participates in its governance; there are far more nuanced implementations that tackle specific drawbacks of this method (such as it being prone to form a plutocracy) as well as specific use cases. Airdrops, for instance, are one way to counteract the tendency towards a plutocracy where those that are willing to dish out the most money are those with de facto control of the DAOs governance. Airdrops involve giving away tokens (in this case governance tokens) for free. This can be done by, for instance, whitelisting³⁴ prospective members, or simply by sending tokens to all entities with a certain wallet.³⁵ Governance tokens can also be distributed by providing them in exchange of services rendered for the DAO. Simply put, community members can create and ratify proposals whereby contributor X should receive payment Y for their contribution over a certain period of time. Naturally, all of these methods can be used simultaneously, providing avenues for funding, incentivising participation in the governance of the DAO or in the ecosystem at large etc. To give a concrete example of how this all might be implemented, we can take a look at MakerDAO.

³⁴ Whitelisting means specifically granting some privilege, service etc. to an identified entity and is a common feature in airdrops as well as ICOs (Initial Coin Offerings).

³⁵ Alexandra Sims, 'Blockchain and Decentralized Autonomous Organizations (DAOs): The Evolution of Companies?' (2020) 28 New Zealand Universities Law Review 423.

3.3. MakerDAO

As per their homepage, MakerDAO is “a decentralized governance community that enables the generation of Dai, the world’s leading decentralized stablecoin.”³⁶ The generation of Dai is managed through a governance mechanism that is run by holders of MKR – the protocol’s governance token.

Basically, by depositing a certain amount of crypto assets as collateral to the protocol, you receive a portion (e.g. 2/3) of the value of the collateral as Dai tokens, which are pegged to the US dollar. This is done through a smart contract called a *Collateralised Debt Position* (or ‘CDPs’). Specific assets used as collateral have specific risk parameters, decided by the MKR token holders. The token holders benefit through ‘stability fees’ that are charged for open CDPs, but at the same time risk having their holdings diluted in the case of catastrophic events that require additional liquidity through the issuance of new MKR. These features provide a strong incentive to govern the system well.

As for the governance mechanism, a distinction is made between two functions: *proactive governance*, e.g. the process of accepting a new token as collateral and deploying the risk parameters associated with it; and *reactive governance*, e.g. increasing or decreasing exposure to a form of collateral due to increases or decreases in liquidity. Similarly, the voting process takes two distinct forms: *governance polls*, used to provide a resolution on a matter or a collection of matters; and *executive votes*, used to change the state of the system.³⁷

In other words, MakerDAO is essentially a lending platform that uses overcollateralization to automatically provide loans. Interestingly, it is the protocol itself, rather than the human collectivity behind it, that is providing the

³⁶ <<https://makerdao.world/en/learn/MakerDAO/>> accessed 8 April 2022.

³⁷ *ibid.*

loans. The token holders exist to set the parameters for the operations that happen on the protocol, and reap the benefits of doing so. The lending activity could continue without the governance, and the governance of the system could hypothetically be automated, yet regardless of the degree of human involvement, the entity as a whole is referred to as a DAO. The next chapter will seek to create a distinction between different types of DAOs, taking their level of decentralization and automation into account.

4. Implications of the Level of Decentralization

4.1. Assessing the level of decentralization

As we have seen, the decentralization of distributed systems covers many different aspects, all of which have to be taken into account when assessing a system's decentralization as a whole. In other words, decentralization is not a binary concept, but a spectrum, hence the discussion around *sufficient decentralization* of blockchains and other distributed systems built on them.³⁸

DAOs, too, come in different levels of decentralization. In order to accurately consider the legal personhood of DAOs, we will need to create some sort of taxonomy that allows us to take into account different degrees of decentralization. To this end, the spectrum of decentralization will be reduced to a binary – while a crude distinction, it ought to be sufficient, as it allows us to distinguish between a subset of DAOs that are more akin to traditional organisations, and a subset that is more peculiar to the world of blockchain. But first we need to take a look at the different aspects of decentralization and at which point they collectively constitute *sufficient* decentralization.

As mentioned, sufficient decentralization comes up frequently, particularly in discussions around the regulation of blockchains and other distributed systems. The different aspects of decentralization can roughly be divided into architectural, political and logical decentralization. However, particularly for the purposes of a legal analysis of decentralization, looking at the problem through the various forms of power that can be effected over a blockchain system is

³⁸ See William Hinman, 'Digital Asset Transactions: When Howey Met Gary (Plastic)' (U.S. Securities and Exchange Commission, 14 June 2018) <<https://www.sec.gov/news/speech/speech-hinman-061418>>, Gabriel Shapiro, 'Defining Decentralization for Law' (16 April 2020) <<https://lex-node.medium.com/defining-decentralization-for-law-58ca54e18b2a>>, Everett Muzzy & Mally Anderson, 'Measuring Blockchain Decentralization' (Consensus Research) <<https://consensus.net/research/measuring-blockchain-decentralization/>> accessed 11 April 2022.

arguably more helpful. In other words the focus is on political decentralization. The different forms of power can be divided into the following: 1) *validation power*, which refers to the ability of persons participating in or relying on the network to read and validate its data; 2) *consensus power*, which refers to the ability of persons to write data to the blockchain; 3) *protocol/client power*, which refers to the ability of persons to define or influence the blockchain system's protocol; 4) *economic power*, which refers to the ability of persons to affect token price through the funding of research and development or token trading activity; and 5) *user power*, which refers to the ability of persons who do not have a significant amount of consensus power, protocol/client power or economic power to influence or resist those who do have a significant amount of such power.³⁹

Validation and Consensus Power

With regard to DAOs, both the decentralization of the DAO itself as well as that of the underlying protocol are of interest. The first two forms of power, validation power and consensus power, are strictly pertinent to the underlying protocol, but nonetheless consequential to the decentralization of DAOs – an organisation built on a system where one party controls the power to read, write and validate data is antithetical to DAOs as a concept. Therefore, the sufficient decentralization of a DAO assumes a sufficient decentralization of the validation and consensus power of the underlying protocol. The validation power of permissionless blockchains is generally decentralized. As Gabriel Shapiro states:⁴⁰

³⁹ Gabriel Shapiro, 'Defining Decentralization for Law' (16 April 2020) <<https://lex-node.medium.com/defining-decentralization-for-law-58ca54e18b2a>> accessed 14 April 2022.

⁴⁰ Ibid.

Aside from certain read-permissioned enterprise blockchain systems, the validation power of most blockchain systems is decentralized because the blockchain data is freely accessible to anyone through the peer-to-peer network and uses a cryptographic scheme that enables any person with the right software and understanding to independently verify the validity of state changes by running the data through cryptographic checks.

As for consensus power, what is deemed a sufficient level of decentralization depends on the consensus mechanism of the blockchain in question. In a situation where a majority of the consensus power is concentrated in the hands of a few large actors, both game theoretical considerations (i.e. a direct economical incentive to preserve the integrity of the system) and a relative lack of other forms of power over the system may neutralise that specific concentration of power. Nonetheless, the degree of decentralization of consensus power speaks for the decentralization of the system as a whole.

Protocol and Client Power

DAO governance is premised on the notion that updates to the DAO's code are approved collectively through some sort of voting mechanism, but there is the possibility of a centralised entity retaining control – particularly of the de facto ability to change the code. For a truly decentralized implementation, both the update proposals as well as their execution should be handled through a voting mechanism. Of course, responsibility for certain functions of the DAO can be delegated to committees that propose and execute updates pertinent to their area of responsibility. Even with the effective use of a voting mechanism, control of the DAO's code may be retained through the following form of power.

Economic Power

DAOs generally involve some sort of governance token. Particularly in the beginning stages of a project, the token is often controlled by a centralised entity, such as a foundation. Such entities often intend to make themselves redundant over time, but as long as economic power is largely concentrated in the hands of one entity, so is the ability to make and accept proposals, as well as the ability to fund initiatives. How and to what extent the governance tokens are distributed is thus a crucial factor to consider in assessing the decentralization of the DAO as a whole.

User Power

User power, being the collective power of persons that don't have a significant amount of the other forms of power, is in Shapiro's view ensured by a broad and diverse base of users. Naturally, the wider the user base, the more distributed the ownership of the DAO's tokens, the less any one entity can exercise economic power, and concomitantly protocol power, over the project.

4.2. Sufficient decentralization and its implications

As we can see, the various forms of power are intertwined in various ways, with the governance token being a very direct representation of power over the DAO in question. Expressed shortly, an ideally decentralized DAO would meet the following criteria: 1) the validation and consensus power of the underlying protocol would in itself be significantly decentralized; 2) there would be no centralized entity retaining control over the issuance of tokens or of implementing changes to the code; and 3) the governance tokens of the DAO would be perfectly distributed between a wide base of equally active members that collectively exercise the control mentioned in the previous point –

alternatively the governance would be automated such that no human collectivity is involved in running the DAO.

Sufficient decentralization would be met when the aforementioned powers are balanced in a way where no single entity or group can be said to control any significant component (consensus component, economic component, protocol/client component or user component), or, as Shapiro states:⁴¹

if clause “(1)” is not satisfied — i.e., if a person or group *does* control one or more material components of the Open Network System (but less than all of the material components)— control over the other material components is widely distributed among un-affiliated persons in a manner that substantially limits the controlling person’s or group’s power to interfere with or alter the Open Network System to directly or indirectly achieve a material benefit for the controlling person or group in a manner that would adversely affect third parties’ rights, powers, privileges, property interests or uses relating to the Open Network System.

In short, declaring sufficient decentralization means declaring that there is no person that can be said to control the system. With this in mind, though, there is reason to consider something called the Bahamas test, as expressed by M. Todd Henderson and Max Raskin:⁴²

But what does it mean to be “sufficiently decentralized”? Our Bahamas test essentially asks: if the sellers fled to the Bahamas or otherwise ceased to show up to work—like Satoshi Nakamoto—would the project still be capable of existing? If the answer is “yes,” then the risk of fraud is sufficiently reduced such that the instrument is not a security. More technically, the Bahamas test asks if there is either an explicit or implicit contract to build or manage software such that if there was a breach of the contract, the project would fail. If there is no such contract, then the instrument is not a security.

⁴¹ Ibid.

⁴² M. Todd Henderson & Max Raskin, ‘A Regulatory Classification of Digital Assets: Toward an Operational Howey Test for Cryptocurrencies, ICOs, and Other Digital Assets’ (2019) Columbia Business Law Review 444.

If there is such an entity the system can't reasonably be called "sufficiently decentralized". However, there are plenty of DAOs whose functions are to a large degree decentralized while still ultimately being beholden to such an entity – be it a company, foundation etc. For the purposes of this thesis, such DAOs will be referred to as *nominally decentralized DAOs*, while DAOs that meet the criteria for sufficient decentralization will be referred to as *substantially decentralized DAOs*. The former are still rooted in more traditional modes of operation, while the latter are characterised by their structure, logic and operations being peculiar to the blockchain ecosystem that they inhabit. It is worth noting that both nominally and substantially decentralized DAOs generally entail the involvement of a human collectivity in their governance, however substantially decentralized ones may reach the point of completely foregoing human involvement, while nominally decentralized ones are by definition still controlled by one or more persons. In the case of substantially decentralized DAOs, then, the human involvement is to a greater or lesser degree incidental to the automated operation of the organisation.

This distinction between nominally and substantially decentralized DAOs is important, as the notion of legal personhood as laid out in the Bundle Theory applies slightly differently to each. The next chapter will explore the concept of legal personhood, particularly as explicated by Visa Kurki in *A Theory of Legal Personhood*.

4. Legal Personhood

Based on the previous chapter, we can conclude that, even with a high degree of decentralization and automation, DAOs generally imply some measure of human involvement. Even so, the human element can be very dynamic and vague, as there's no need for a governing body *per se*, only an arbitrary group of people or other entities that hold a portion of the DAO's governance tokens at any given time.⁴³ So is a DAO just a dynamic collective of individuals, or does it exist in its own right? In line with the previous chapter, a number of things can be asserted about DAOs: they generally have a stated purpose, they can (and by definition do⁴⁴) own assets, they can enter into contracts and they can share profits etc. They are, in other words, capable of holding various legal positions and performing acts in their own right. To be clear, these legal positions and actions generally can't be attributed to any specific members of the organizations, i.e. the DAOs arguably hold them separately from their members. So what does this imply with regard to their legal status? This chapter will explore that question, and more specifically whether and to what extent DAOs can be considered legal persons.

It's worth mentioning that there are regulatory efforts to create novel forms of legal platforms to which DAOs could attach, thus creating something tangible that is under the purview and control of the regulator in question.⁴⁵ This is of

⁴³ As we have covered, even this extent of human involvement isn't required, but will be assumed for the purposes of this thesis.

⁴⁴ Vitalik Buterin, 'DAOs, DACs, DAs and More: An Incomplete Terminology Guide' (6 May 2014) <<https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide/>> accessed 16 November 2021.

See 'Wyoming Passes DAO Supplement Recognizing Decentralized Autonomous Organizations (DAOs) as LLCs' (13 September 2021) <[https://content.next.westlaw.com/practical-law/document/Ib2ed750711a311ecbea4f0dc9fb69570/Wyoming-Passes-DAO-Supplement-Recognizing-Decentralized-Autonomous-Organizations-DAOs-as-LLCs?viewType=FullText&ppcid=a1a4b409052049e9b4a7e5cde6e6620e&originationContext=knowHow&transitionType=KnowHowItem&contextData=\(sc.DocLink\)&firstPage=true](https://content.next.westlaw.com/practical-law/document/Ib2ed750711a311ecbea4f0dc9fb69570/Wyoming-Passes-DAO-Supplement-Recognizing-Decentralized-Autonomous-Organizations-DAOs-as-LLCs?viewType=FullText&ppcid=a1a4b409052049e9b4a7e5cde6e6620e&originationContext=knowHow&transitionType=KnowHowItem&contextData=(sc.DocLink)&firstPage=true)> accessed 5 July 2022.

course useful for entities that crave the legal certainty that state recognition can provide, but it does, however, fail to address something: countless DAOs already exist, and countless more will be created—all of them performing economically and legally significant acts yet practically none of them being registered or otherwise granted statutory recognition. In fact, the Bitcoin network itself matches the definition of a DAO, operating as a decentralized economic entity without being recognized as such by any jurisdiction.⁴⁶

A state can naturally dictate a set of conditions which, having been met, confer an entity with a sanctioned form of legal personhood; DAOs, however, can and do exist without any such status and outside of any specific jurisdiction which could confer it.⁴⁷ Consequently, the interesting question is whether and to what extent DAOs *in themselves* can be considered legal persons.

The prevalent conception of legal personhood posits that a legal person is any being whom the law regards as capable of rights and duties.⁴⁸ Conversely, if one isn't a legal person, one can't hold rights. In other words, an entity being endowed with legal rights (or the capacity to hold them) is taken to entail its legal personhood. This dichotomous definition has for a long time been taken as a given, but it has recently come under scrutiny. In his doctoral dissertation “A Theory of Legal Personhood”, Visa Kurki brings to the fore the shortcomings of what he calls the “Orthodox theory” of legal personhood, offering a more nuanced framework through which to assess the concept. This chapter will introduce what he refers to as the “Bundle theory of legal personhood”. Seeing legal personhood as a cluster property consisting of active and passive incidents, Kurki manages to create a framework with significant explanatory power that

⁴⁶ Ganado et al. (n 27) 33. See also n 44.

⁴⁷ The notorious *The DAO* project incorporated a company called DAO.Link in Switzerland in order to facilitate contracting with the project, yet, being a limited liability company, a successful action against it would only extend to whatever assets it holds. See Allen & Overy, ‘Decentralized Autonomous Organizations’ (2016).

⁴⁸ Black’s Law Dictionary.

can help to conceptualize the legal status of DAOs. Furthermore, a short overview of *group agency* as formulated by Pettit and List will be provided to the extent that it helps examine the ontology of DAOs.

This chapter will significantly draw from and follow the structure of Kurki's dissertation, first outlining the background and main elements of his theory, then relating those elements to DAOs. The discussion that follows, as well as the thesis in general, can as such be seen as an attempt at applying Kurki's theory to a class of entities that didn't come under the direct purview of his analysis.

DAOs suit rather well as the subjects in light of which to examine the Bundle theory, as their nature is yet to be properly established in the first place, on top of which the term itself fits within it a variety of organisational solutions as well as levels of decentralization. We've compressed that variety into a dichotomy, distinguishing between *nominally* and *substantially decentralized* DAOs, for the purposes of this analysis. To recap, substantially decentralized DAOs are characterised by their high level of decentralization and automation, by virtue of which they cannot easily be placed within the traditional legal framework. As such, their operations are largely restricted to the DLT-platform they exist on as well as the smart contracts and other DAOs with which they may interact. Nominally decentralized DAOs, on the other hand, are characterised by their similarities to, if not dependence on, traditional corporations. They may operate through an incorporated entity, thus allowing them to function both as traditional economic actors and as actors in the context of the DLT-platform they exist on. Nominally decentralized DAOs are less of a curiosity, due to their rootedness in the traditional economy, but they are included in this analysis in order to provide a full analysis of DAOs in light of the Bundle theory.

4.1. The Orthodox Theory of Legal Personhood

According to Black's Law Dictionary, '[s]o far as legal theory is concerned, a person is any being whom the law regards as capable of rights and duties.' This view, i.e. legal personhood meaning the holding of rights and/or the bearing of duties, became prevalent in early modern times, although its foundations, as is often the case with Western legal theory, reach back to the Roman Empire.⁴⁹

Kurki holds that this so-called Orthodox view stands in conflict with certain widely held *extensional beliefs*⁵⁰, i.e. major convictions regarding the extension of legal personhood, when interpreted in light of the contemporary Hohfeldian theories of rights. These theories 'either ascribe rights to entities that are not usually classified as legal persons, such as foetuses and nonhuman animals, or deny rights to entities that are ordinarily classified as legal persons, such as human children.'⁵¹ The Orthodox view represents an all-or-nothing distinction between persons and non-persons—a duality that may not accurately explain the prevailing legal circumstances.

4.2. The Hohfeldian Theory of Rights

Wesley Newcomb Hohfeld (1879-1918) was an American legal theorist who developed what is now known as the Hohfeldian Theory of Rights. He brought

⁴⁹ Kurki 55.

⁵⁰ Kurki lists the following extensional beliefs that are widely held by jurists in the Western world (p 55):

- (i) human beings who meet the four criteria of passive natural personhood (human beings, who have been born, who are currently alive, and who are sentient) are legal persons;
- (ii) animals and foetuses are not legal persons, and slaves were not legal persons;
- (iii) there are some relevant legal differences between the legal personhood of adults of sound mind and that of infants and severely mentally disabled individuals;
- (iv) there are artificial persons, such as corporations.

⁵¹ Ibid.

forth the ambiguity of the legal concept of a “right”, asserting that it conflates what should rather be seen as four distinct notions, i.e. rights as “claims”, “privileges”, “powers” or “immunities”.⁵² These are also known as the four “Hohfeldian incidents”, each with their corresponding jural opposites, i.e. legal positions that negate each other, and correlatives, i.e. legal positions that entail each other.⁵³

Claim-rights for instance necessitate a corresponding duty held towards or directed at the holder of the claim-right, so *A* has a claim that *B* ϕ *if and only if* *B* has a duty to *A* to ϕ . *B*’s duty is as such the jural correlative of *A*’s claim-right. The jural opposite of *A*’s claim-right is *A*’s no-right that *B* ϕ .⁵⁴ Conversely, having a duty to ϕ entails that at least one party has a claim-right to ϕ . To give another example of a Hohfeldian right and its opposite and correlative, *A*’s privilege to ϕ entails a no-claim held by another entity that *A* not ϕ . *A* as such has a privilege to ϕ *if and only if* *A* has no duty not to ϕ .⁵⁵

Jural opposites	Claim-right	Privilege	Power	Immunity
	No-right	Duty	Disability	Liability
Jural correlatives	Claim-right	Privilege	Power	Immunity
	Duty	No-right	Liability	Disability

The Hohfeldian theory of rights has served as a framework for subsequent theories seeking to determine the necessary and sufficient conditions of right-

⁵² David M. Adams, ‘Hohfeld on Rights and Privileges’ (1985) 71(1) Archives for Philosophy of Law and Social Philosophy 84, 85.

⁵³ ‘The Form of Rights: The Hohfeldian Analytical System’ (*Stanford Encyclopedia of Philosophy*, first published 19 December 2005; substantive revision 24 February 2020) <<https://plato.stanford.edu/entries/rights/#FormRighHohfAnalSyst>> accessed 7 December 2021.

⁵⁴ Claim-rights can stem from voluntary actions like signing a contract, or independently from voluntary actions such as in the case of bodily rights or property rights.

⁵⁵ Instead of privileges some writers prefer to speak of “liberties”.

holding; these can largely be classified as either interest theories or will theories.⁵⁶ In short, will theorists assert that the function of a right is to give its holder control over another's duty, while interest theorists hold that the function of a right is to further the right-holder's interests.⁵⁷ As well as being integral to Kurki's thesis, a short account of these theories will be helpful in giving context to the later discussion on DAOs as right-holders.

4.2.1. Interest Theory of Rights

Kurki refers extensively to Matthew Kramer's conception of the interest theory, according to which "...X holds a right towards Y if Y has a duty towards X, and having a duty *towards* someone (or something) means that such a duty typically is in the interest of the entity in question."⁵⁸ The question of what entities duties can be held towards is usually predicated on whether or not the well-being of the entity in question is "of ultimate value". The possession of ultimate value, in turn, is often predicated on sentience. Kurki proceeds from the premise that "... only sentient beings are of ultimate value and that they can consequently hold claim-rights."⁵⁹

By most definitions, animals and foetuses would as such be of ultimate value, meaning that they're capable of holding interest theory rights, and yet they are generally not held to be legal persons. So too were slaves capable of holding interest theory rights, yet they weren't considered to be legal persons. In other words, the premise of the Orthodox view, that an entity holding rights or bearing duties constitutes its legal personhood, conflicts with the interest theory, which

⁵⁶ Kurki 60.

⁵⁷ 'The Function of Rights: The Will Theory and the Interest Theory' (*Stanford Encyclopedia of Philosophy*, first published 19 December 2005; substantive revision 24 February 2020) <<https://plato.stanford.edu/entries/rights/#FuncRighWillTheoInteTheo>> accessed 7 December 2021.

⁵⁸ Kurki 62.

⁵⁹ Kurki 64.

attributes legal rights to entities that are generally not considered to be legal persons.

Kurki sums this up by stating that “defining legal personhood as the holding of interest-theory rights cannot explain the extensional beliefs regarding who or what is a legal person because interest-theory rights are held by beings who are very commonly classified as nonpersons.”⁶⁰

4.2.2. Will Theory of Rights

Will theorists assert that the function of a right is to give its holder the power to waive or enforce another’s duty.⁶¹ As such, right-holding according to the will theory presupposes the capability to exert influence over someone else’s legal position through the expression of one’s will. Will theorists thus tend to exclude infants, animals and severely mentally handicapped individuals as right-holders—this of course conflicts with some central extensional beliefs, namely that infants and mentally disabled individuals are legal persons.⁶²

Based on this short examination of the prevailing theories regarding right-holding, it is clear that the notion that right-holding and legal personhood are mutually entailing conflicts with our extensional beliefs regarding legal personhood.⁶³ This leads Kurki to instead examine the notion of legal personhood as the capacity for participation in legal relations.

⁶⁰ Kurki 66

⁶¹ n 57.

⁶² Kurki 67.

⁶³ *Ibid.* 15.

4.2.3. Capacity for Legal Relations

Steven Wise defines legal personhood as ‘the capacity to possess at least one legal right’.⁶⁴ In assessing the capacity to possess legal rights, he employs Hohfeld’s scheme, later going on to say that ‘[b]ecause [Hohfeldian relations] can exist only between two legal persons and one thing, and all nonhuman animals are things, no jural relationships can presently exist between a human being and a nonhuman animal’.⁶⁵ Kurki calls this notion the *Capacity-for-Legal-Relations*, noting that it’s often used to clarify the capacity to be a subject of rights and duties and vice versa, meaning that the two concepts tend to be treated as synonymous. As such, this concept similarly carries with it the aforementioned issues in conflicting with our extensional beliefs regarding legal personhood.

⁶⁴ Steven M. Wise, ‘Legal Personhood and the Nonhuman Rights Project’ (2010) 17 *Animal Law Review* 1.

⁶⁵ Steven M. Wise, ‘Hardly a Revolution— The Eligibility of Nonhuman Animals for Dignity- Rights in a Liberal Democracy’ (1998) 22 *Vermont Law Review* 793, 801.

4.3. *The Bundle Theory of Legal Personhood*

In order to contemplate the legal personhood of DAOs, Visa Kurki's Bundle Theory and its distinction between active and passive incidents of legal personhood will be outlined below. The Bundle Theory conceptualizes legal personhood as a *cluster property* consisting of distinct incidents, akin to the *bundle-of-rights* conceptualization of property rights.⁶⁶ Constructing legal personhood as a cluster property allows for a more multifaceted analysis of entities that, in their specific regards, may be perceived as such. Kurki's theory is therefore well suited to confront the conceptual questions that are borne out of the new forms of entities enabled by nascent technologies such as AI and DLT.

Other conceptualizations of legal personhood as a cluster property differ from Kurki's in being based on the Orthodox view, and as such providing necessary and sufficient criteria for an entity's legal personhood, namely that one is a legal person if and only if one holds legal rights and/or bears legal duties.⁶⁷ Kurki's conception of legal personhood is a cluster property 'in the ordinary sense, as it consists of interconnected but disseverable incidents. There is no exact border between legal personhood and nonpersonhood. The incidents can, however, be grouped in various ways.'⁶⁸

⁶⁶ A.M. Honoré disaggregated property into eleven distinct incidents, arguably none of which are necessary or sufficient. See A.M. Honoré, *Ownership*, in *OXFORD ESSAYS IN JURISPRUDENCE, FIRST SERIES* 107–47 (A.G. Guest ed., 1961). See also Baron, 'Rescuing the Bundle-of-Rights Metaphor in Property Law' (2014) 82(1) *University of Cincinnati Law Review*, Art. 2.

⁶⁷ An exception to this is MacCormick's theory, which does not explicitly subscribe to the Orthodox View. He also uses the distinction between active and passive legal personhood. See Neil MacCormick, 'Persons as Institutional Facts' in Ota Weinberger and Werner Krawietz (eds), *Reine Rechtslehre im Spiegel ihrer Fortsetzer und Kritiker* (Springer 1988) 371.

⁶⁸ Kurki 94.

4.3.1. Passive Legal Personhood

Kurki categorises the passive incidents of legal personhood as substantive passive incidents and remedy incidents. Below is a table of these incidents, each of which will subsequently be summarised.

The passive incidents of legal personhood

Substantive passive incidents	Remedy incidents
Fundamental protections: protection of life, liberty, and bodily integrity	Standing
Capacity to be the beneficiary of special rights	Victim status in criminal law
Capacity to own property	Capacity to undergo legal harms
Insusceptibility to being owned	

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The incidents listed in the table above will later be reflected against DAOs in order to determine in what regards they may be considered passive legal persons. To that end, an outline of each incident will follow.

Fundamental protections

Fundamental protections include claim-rights pertaining to the protection of life, liberty and bodily integrity. These claim-rights occupy a hierarchically high status, which Kurki takes to mean that ‘considerations underlying the claim-right normally prevail against competing considerations and interests, including property interests’.⁷⁰

⁶⁹ Kurki 95.

⁷⁰ Ibid. 99.

Capacity to be the beneficiary of special rights

Special rights, according to H. L. A. Hart, are rights which ‘arise out of special transactions between individuals or out of some special relationship in which they stand to each other’ and where ‘the persons who have the right and those who have the corresponding obligation are limited to the parties to the special transaction or relationship.’⁷¹ The capacity to be a party to special rights is, according to Kurki’s characterization, one element of what MacCormick calls *passive transactional capacity*⁷², the other being the capacity to own property.

Capacity to own property

The capacity to own property is significant in that various incidents of legal personhood presuppose it, for instance when one is the beneficiary of special rights that involve the payment of a sum.⁷³ As mentioned above, ownership can also be divided into distinct incidents, and these incidents can further be divided into active and passive instances. The active incidents presuppose certain mental faculties (the right to manage, transfer and use property), while the passive incidents only presuppose the capacity to enjoy the benefits of property (the right to possession, income, security etc.).⁷⁴

⁷¹ H. L. A. Hart, ‘Are There Any Natural Rights?’ (1955) 64 *The Philosophical Review* 175.

⁷² Neil MacCormick, ‘Persons as Institutional Facts’ in Ota Weinberger and Werner Krawietz (eds), *Reine Rechtslehre im Spiegel ihrer Fortsetzer und Kritiker* (Springer 1988) 371.

⁷³ Kurki 103.

⁷⁴ *Ibid.* 104.

Insusceptibility to being owned

Whereas one typical incident of legal personhood is that one is not an object of ownership⁷⁵, there is no inherent contradiction between being a legal person and being the object of ownership; corporations for instance are entities that both *are* property and *own* property.⁷⁶

Standing

First among the remedy incidents of passive legal personhood is standing, which is defined by the US Legal Dictionary as ‘the ability of a party to bring a lawsuit in court based upon their stake in the outcome. A party seeking to demonstrate standing must be able to show the court sufficient connection to and harm from the law or action challenged.’⁷⁷

Kurki makes a distinction between the *invested* aspect of standing and the *competence-related* aspect of standing. The former concerns whether an entitlement of X is legally recognized as enforceable in court, while the latter concerns X’s legal competence to pursue the case in court.

Capacity to undergo legal harms / Victim status in criminal law

Tort law tends to consider legal persons the only recognisable victims towards whom harm can be done.⁷⁸ The same can be said for criminal law, as, for

⁷⁵ Natural persons are not susceptible to being owned, while animals and slaves, considered legal nonpersons, are.

⁷⁶ Kurki 103.

⁷⁷ US Legal Dictionary.

⁷⁸ Ibid. 110.

instance, animals are generally not considered to actually be victims of animal welfare crimes.

4.3.2. Active Legal Personhood

Active legal personhood according to Kurki's conception is divided into two incidents: the capacity to perform legal acts and legal responsibility. Kurki refers to these incidents as *legal competences* and *onerous legal personhood* respectively. Being endowed with these incidents distinguishes adults of sound mind from e.g. toddlers and mentally severely disabled individuals, where the former are active legal persons, while the latter, lacking the active incidents, are passive legal persons. However, the distinction isn't black-and-white, as there are levels of agency with regard to the active incidents.⁷⁹

The active incidents of legal personhood

Legal competences	Onerous legal personhood
Capacity to administer the other incidents without a representative, e.g. the capacity to enter into contracts	Criminal-law responsibility Tort-law responsibility Other types of legal responsibility

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Legal competences

As exemplified by the notion that legal personhood is the holding of will-theory rights, legal personhood is closely connected to the notion of *will*. The ability to express one's will in order to perform legal acts can be called competence, or as Kurki expresses it:

The term 'act-in-the-law' (also 'legal act', 'legal transaction') is used, especially among Continental jurists, to refer to intentional acts that constitute the creation, upholding, or termination of entitlements, particularly in the field of private law.

⁷⁹ Ibid. 113.

⁸⁰ Ibid. 96.

‘Competence’ or ‘capacity’ refers to one’s ability to perform acts-in-the-law. Because of the ambiguity of ‘capacity’, I will use ‘competence’ here.⁸¹

He goes on to say that acts-in-the-law are ‘acts which effect changes in legal relations in virtue of the fact that they have been performed with the intention to effect the change in question’, also noting that those action must pertain to oneself (as opposed to being carried out as a representative of someone else) in order to count as an incident of legal personhood.⁸²

Onerous legal personhood

Onerous legal personhood refers to one’s capability to bear responsibility for one’s actions—particularly criminal and civil responsibility. Onerous legal personhood tends to imply other incidents of legal personhood, as for instance in the case of tort liability, where the ability to pay damages implies being able to own property.⁸³

Having gone through the incidents of legal personhood, we can now move on to determining whether and when collectivities such as DAOs can be endowed with these incidents in their own right, i.e. as agents of their own.

4.4. The Legal Personhood of Collectivities

4.4.1. Group Agency

As active legal personhood presupposes the ability to express one’s will, a concept with great significance when discussing the legal personhood of

⁸¹ Ibid. 114.

⁸² Ibid. 116.

⁸³ Ibid. 117.

collectivities is that of *group agency*. In their aptly titled book *Group Agency*⁸⁴, Christian List and Philip Pettit have developed an account of the concept that Kurki refers to when assessing the agency of collectivities. As such, a short account of the concept will be given in order to deepen the analysis that follows.

First of all, List and Pettit describe an agent as ‘a system that has representational and motivational states such that in favourable conditions, within feasible limits, it acts for the satisfaction of its motivations according to its representations’.⁸⁵ To clarify, representational states depict how things are in the environment, while motivational states specify how the agent requires things to be in the environment. An agent, then, is an entity that has these states and is able to process them and act on them.

A notion subscribed to by Pettit and List⁸⁶, as well as e.g. Raimo Tuomela⁸⁷ and Margaret Gilbert⁸⁸, is that the collective intentions of a group cannot be reduced to the intentions of its individual constituents (i.e. *ontological irreducibility*). On top of this, Kurki suggests a *pragmatic irreducibility*, meaning that ‘treating a group agent as a separate actor is often the most useful way of explaining a phenomenon, as the intentional stance can be adopted in order to understand and predict the group’s behaviour.’⁸⁹ Group agents are thus capable of possessing the intentionality required to exercise Hohfeldian powers. This in turn means that they can potentially be endowed with the active incidents of legal personhood.

⁸⁴ Christian List & Philip Pettit, *Group Agency: The Possibility, Design, and Status of Corporate Agents* (Oxford University Press 2011).

⁸⁵ Ibid. 5.

⁸⁶ Ibid. 70.

⁸⁷ Raimo Tuomela, *Social Ontology: Collective Intentionality and Group Agents* (Oxford University Press 2013) 95.

⁸⁸ Margaret Gilbert, *Sociality and Responsibility: New Essays in Plural Subject Theory* (Rowman & Littlefield Publishers 2000).

⁸⁹ Kurki 161.

The same line of thinking (i.e. the irreducibility of group intentions to individual intentions) can be employed with regard to groups as holders of claim-rights as per the interest theory. Kramer sums it up as follows:

Because a group is an overarching structure, it can never be reduced to the individual interactions that are its components—notwithstanding that it can be thoroughly explicated by reference to those components. Its interests do not amount to a sum or welter of individual interests, since its interests are those which characterize its members qua collectivity rather than those which characterize its members qua individuals.⁹⁰

In other words, a group naturally consists of individuals, but interests can pertain to the group-level intention of those individuals. Kurki uses an unincorporated pop-up restaurant as an example, stating that ‘[a]s the group ‘owns’ the products of its joint project, and the final beneficiary of the project may not be settled at the time a duty is borne towards the group, it would be highly unsatisfactory to claim that the group is unable to hold claim-rights of its own.’⁹¹ Arguably, then, group agents can also hold Hohfeldian claim-rights, which means that they can be endowed with the passive incidents of legal personhood.

Both nominally and substantially decentralized DAOs, being to a higher or lesser degree governed by human collectivities, qualify for this conception of group agency.

Having established that group agents have the potential to fully participate in Hohfeldian relations and that they can be endowed with both the active and passive incidents of legal personhood, we can now move on to the core of the thesis, which is to discuss the legal personhood of DAOs in particular. The first

⁹⁰ Matthew H. Kramer, ‘Rights Without Trimmings’ in Matthew H. Kramer, N. E. Simmonds and Hillel Steiner (eds), *A Debate over Rights: Philosophical Enquiries* (Oxford University Press 1998) 56.

⁹¹ Kurki 165.

order of business to that end is to examine which incidents of legal personhood
DAOs can be endowed with.

5. DAOs in Light of the Bundle Theory of Legal Personhood

The aim of this chapter is to apply Kurki's theory to DAOs by first determining which active and passive incidents of legal personhood they can be endowed with, and then moving on to an analysis of what can be gleaned from the set of incidents that pertain to them. We can readily assume that DAOs may be considered legal persons *in certain respects*, but in what respects that is the case, as well as what the sum of those parts might imply, will be analyzed in this chapter.

5.1. DAOs and Passive Legal Personhood

Having established that group agents such as DAOs can hold claim-rights and thus be endowed with passive incidents of legal personhood, we can now determine which passive incidents DAOs in particular can be endowed with. As per Kurki's categorisation, the passive incidents can be divided into substantive incidents and remedy incidents. The former concern non-procedural claim-rights and liabilities held by an entity, while the latter has to do with the legal remedies available to it. Substantive passive incidents include fundamental protections, the capacity to be the beneficiary of special rights, the capacity to own property, and insusceptibility to being owned. Remedy incidents include standing, victim status in criminal law, and the capacity to undergo legal harms.⁹²

⁹² Kurki 95.

Fundamental protections

Fundamental protections concern dignity rights that safeguard the life, bodily integrity and bodily liberty of their holder.⁹³ The first incident of legal personhood subject to this analysis, it is perhaps also the simplest to assess. Were DAOs to (at least outwardly) possess a measure of sentience in their own right, a debate could be had regarding whether or not fundamental protections are pertinent to them, and even in that case, such protections could only be extended to them by analogy, as the notions of *life*, *bodily integrity*, and *bodily liberty* would take on meanings far from the conventional if applied to them. At this point in time, however, there is little debate to be had regarding whether or not Artificial Intelligences, let alone DAOs of any kind, should or could be extended these protections. In other words, we can conclude that fundamental protections are not pertinent to DAOs.

Capacity to be a party to special rights

Moving on to the second passive incident, the question becomes less straightforward. Kurki maintains that special rights must 1) follow from exercises of legal competences and 2) be limited to the parties who perform the transaction and/or to the parties in whose name the transaction is performed.⁹⁴ Legal competence, as discussed earlier, refers to one's ability to perform 'acts which effect changes in legal relations in virtue of the fact that they have been performed with the intention to effect the change in question.'⁹⁵ When it comes to DAOs, such acts are typically performed in the form of smart contracts, in which case the intentionality of the act is expressed through the design and

⁹³ Steven M. Wise, 'Hardly a Revolution— The Eligibility of Nonhuman Animals for Dignity- Rights in a Liberal Democracy' (1998) 22 Vermont Law Review 793, 823.

⁹⁴ Kurki 102.

⁹⁵ See n 83.

deployment of the smart contract that executes it; only when specific conditions have been met will changes in the legal relations between the DAO and its counterparty take place. Expressing it in terms of group agency, the individual (*i-mode*) intentionality of the members of the DAO is expressed through smart contracts as the group (*we-mode*) intentionality of the DAO. Smart contracts are however not the only means through which DAOs can exercise legal competences; depending on the organisational make-up of the DAO, it may also be party to more traditional agreements and as such a party to the special rights that they imply, however this is a point that we'll get back to later.

To give a concrete example of a DAO being a party to special rights, we can picture a scenario where a prospective member seeks to acquire a portion of a DAO's governance tokens. Upon completing the transaction, the new member of the DAO acquires whatever rights are specified to be associated with the token—generally at least voting rights. The new member thus acquires a claim-right in the form of a right to vote and the DAO a corresponding duty to take that vote into account. A DAO being the beneficiary of a special right doesn't, however, presuppose an exercise of legal competence on its part.

Capacity to own property

As mentioned, the capacity to own property is significant in that various incidents of legal personhood presuppose it. One of these is the capacity to be a party to special rights. To return to the example above, the acquisition of a DAO's governance tokens typically involves a consideration paid by the prospective member in the form of tokens such as ETH. The DAO being the beneficiary in such a transaction presupposes some sort of capacity to own property. In the case of DAOs, that capacity is basically manifested as a wallet address to which funds can be sent and a corresponding private key by means of which those same funds can be administered.

We talked about how ownership, too, can be divided into active and passive incidents. A DAO's possession of a public-private key pair enables ownership in both capacities; it enables passive incidents such as the right to possession, the right to the income, the right to the capital and the right to security etc. on one hand, and active incidents such as the right to use, transmissibility, and the right to manage on the other.

A DAO's capacity to own property may at first glance seem largely restricted to features of the context it exists in (i.e. the protocol it runs on), but there is no reason a DAO couldn't possess tokens that represent ownership of real-world, tangible assets. To what extent such representations of ownership are actually recognized in the real world is a question of its own, but the notion is at least conceptually plausible. In other words, a substantially decentralized DAO is by design capable of owning property pertaining to the protocol it runs on, but it may also be capable of owning property pertaining to the real world. Nominally decentralized DAOs may even own property in a more conventional sense, so to speak, akin to corporations, but we'll return to this in the concluding chapter.

Insusceptibility to being owned

DAOs are by definition susceptible to being owned. However, insusceptibility to being owned, while being an incident of legal personhood, is not a necessary feature of it. Corporations, for instance, can function both as legal persons owning property, and as property themselves; in other words they can be both subjects and objects of ownership. In fact, Kurki points out that counting corporations as legal persons in their own right is predicated on the joint intentionality that its shareholders express through their stakes in the company.⁹⁶ Similarly with DAOs, it is precisely through the collective exercising of stakes

⁹⁶ Kurki 105.

(i.e. governance tokens) in the organisation that its joint intentionality is expressed.

Standing

Standing, shortly expressed, is the ‘ability of a party to bring a lawsuit in court based upon their stake in the outcome.’⁹⁷ Kurki distinguishes between the invested and competence-related aspects of standing, where the former concerns whether an entitlement is recognized as enforceable in court, whereas the latter concerns the legal competence of the pursuant.⁹⁸ With regard to standing, there’s a rather marked difference between substantially and nominally decentralized DAOs.

The invested aspect of standing with regard to DAOs is complicated by the fact that, even if an entitlement that’s borne out of smart contracts were to be formally recognized as enforceable⁹⁹, it may prove cumbersome, if not impossible, to enforce it in practice.¹⁰⁰ Invested standing with regard to entitlements based on smart contracts, has, to the extent that it could even be established, little practical relevancy at this point in time.

As for the competence-related aspect of standing, such competence is predicated on being a legally recognized entity, which, in the case of collectivities, generally entails some form of incorporation. A substantially decentralized DAO, as we have pointed at in the chapter on DAOs, lacks some of the preconditions for

⁹⁷ US Legal Dictionary.

⁹⁸ Kurki 108.

See Arizona’s Blockchain Bill, Act of Mar. 29 2017, 2017 Ariz. Less Laws ch. 97, <<https://apps.azleg.gov/BillStatus/GetDocumentPdf/452616>> accessed 24 April 2022.

¹⁰⁰ For an exposition of the shortcomings of traditional jurisdictional means with regard to smart contracts, see Wulf A. Kaal & Craig Calcaterra, ‘Crypto Transaction Dispute Resolution’ (2017) 73(1) *The Business Lawyer* 109.

incorporation, which is to say that it doesn't possess the competence to pursue a case in court.

Nominally decentralized DAOs, on the other hand, may 1) enter into traditional agreements, making entitlements easier to both establish and enforce, and 2) may through incorporation gain the competence to pursue a case in court. A nominally decentralized DAO's rootedness in the traditional modes of economic activity thus brings it closer to a full articulation of legal personhood. This point will resurface later on, as it constitutes a significant difference between nominally and substantially decentralized DAOs.

Capacity to undergo legal harms / Victim status in criminal law

Kurki notes that 'typically only harm done to a legal person is classified by tort law as harm to a recognisable victim.'¹⁰¹ Seeing as the capacity to undergo legal harms is one of the incidents that constitutes legal personhood under Kurki's theory, this risks getting us into a circular argument. However, Kurki backs his statement by referring to John Austin, who stated that 'A slave (as the subject of property) may be damaged; but (as having no rights) is not himself susceptible to injury.'¹⁰² Austin's statement is predicated on the Orthodox theory of Legal Personhood, where 'having no rights' equals 'nonpersonhood', and 'nonpersonhood' thus implies incapability to be legally harmed.

We have, however, already established that groups can arguably hold claim-rights that are irreducible to those of its members, as well as that they can be parties to special rights. Holding those rights implies, in Hohfeldian terms, the holding of duties on someone else's part. Those duties, in turn, can be breached.

¹⁰¹ Kurki 110

¹⁰² John Austin, *Lectures on Jurisprudence: Or, the Philosophy of Positive Law, vol. I* (John Murray, Albemarle Street 1885) 349f.

As such, groups, including DAOs, are at least conceptually capable of undergoing legal harms, *even if* they aren't already recognized as legal persons. Consequently, both nominally and substantially decentralized DAOs may be considered capable of undergoing legal harms.

As we can see, both nominally and substantially decentralized DAOs may be endowed with many of the passive incidents of legal personhood—nominally decentralized ones more extensively so due to features that allow for more traditional modes of operation. We'll return to these differences after an examination of the applicability of the active incidents of legal personhood with regard to DAOs.

5.2. DAOs and Active Legal Personhood

Legal competences

Kurki points out that legal personhood is closely associated with the notion of *will* or *choice*. We've established that group agents can possess an intentionality of their own, i.e. one irreducible to its members, and that this allows for the conceptual possibility of their being endowed with the active incidents of legal personhood. Kurki, however, remarks that while any volitional acts that can cause a change in legal relations are exercises of Hohfeldian power, not all such acts are acts-in-the-law, i.e. exercises of one's legal competences. This is because one doesn't need to intend to cause a legal change for one's volitional conduct to lead to such changes.¹⁰³ As such, a narrower notion of competence needs to be

¹⁰³ For examples, see Kurki 114.

employed with regard to the active incidents of legal personhood.¹⁰⁴ We talked about the notion of legal competence with regard to DAOs as parties to special rights, however, a more thorough elaboration of the concept is in order.

Kurki employs the following definitions of *legal competence* and *act-in-the-law* as foundational to the *legal competence* incident of active legal personhood:¹⁰⁵

Legal competence:

1. X holds the competence C to effect the legal consequence r if and only if X can perform an act-in-the-law to bring about r.
2. If X holds C, any act by X that effects r is an exercise of C.

Act-in-the-law:

Act A, performed by X, constitutes an act-in-the-law if and only if

1. X performs A with the intention to bring about the legal consequence r, and
2. the fact that X has performed A in order to bring about r is an element of a set of actually occurrent conditions minimally sufficient for r.

So let's apply these definitions to a smart contract as deployed by a DAO "X". Since X holds the competence C to effect the legal consequence r if and only if X can perform an act-in-the-law to bring about r, we need to first determine whether an act A, performed by X, constitutes an act-in-the-law.

¹⁰⁴ H. L. A. Hart refers to this narrower notion of competence in distinguishing power-conferring and duty-imposing rules: 'Legal rules defining the ways in which valid contracts or wills or marriages are made do not require persons to act in certain ways whether they wish to or not. Such laws do not impose duties or obligations. Instead, they provide individuals with facilities for realizing their wishes, by conferring legal powers upon them to create, by certain specified procedures and subject to certain conditions, structures of rights and duties within the coercive framework of the law.' H. L. A. Hart, *The Concept of Law* (Clarendon Press 1964) 27– 28.

¹⁰⁵ Visa Kurki, 'Legal Competence and Legal Power' in Mark McBride (ed.), *New Essays on the Nature of Rights* (Hart Publishing 2017).

First of all, in the context of smart contracts, an act can be said to refer to a smart contract being executed according to certain parameters. The execution is subject to specific conditions codified in the smart contract, representing the DAO X's intention to bring about a specific legal consequence. The fact that X has performed act A in order to bring about legal consequence r is an element of a set of actually occurrent conditions minimally sufficient for r; the other element of the set is the performance of the counterpart (e.g. payment of a specific sum).¹⁰⁶ Consequently, X can in fact perform an act-in-the-law to bring about r, meaning that it holds the competence C to effect legal consequence r. Seeing as X holds C, any act (i.e. execution of the smart contract) that effects r is an exercise of C. In other words, the case can be made that even substantially decentralized DAOs operating purely through smart contracts are capable of exercising legal competences.

To summarise the above, acts-in-the-law are 'acts which effect changes in legal relations in virtue of the fact that they have been performed with the intention to effect the change in question.'¹⁰⁷ Legal competence to effect a specific legal consequence is held if and only if one can perform an act-in-the-law to bring about said legal consequence. While substantially decentralized DAOs can exercise legal competences *at least* through smart contracts, there is also the possibility, for instance, to 'employ' someone. In essence, the community members can create and ratify proposals whereby contributor X should receive payment Y for their contribution over a certain period of time.¹⁰⁸ In this case, the intention to bring about a certain legal consequence is expressed *in casu*, which

¹⁰⁶ Seeing as a smart contract is triggered by a transaction that satisfies its conditions, the transaction and its triggering of the smart contract (i.e. act A by X) constitute the elements of a set of conditions minimally sufficient for legal consequence r.

¹⁰⁷ See n 83.

¹⁰⁸ See Andre Cronje, 'Decentralized Payroll Management for DAOs' (*Yearn Finance*, 31 March 2021) <<https://medium.com/iearn/decentralized-payroll-management-for-daos-b2252160c543>> and 'Governance and Operations' (*Yearn Finance*) <<https://docs.yearn.finance/contributing/governance/governance-and-operations>> accessed 17 November 2021.

regard to the specific situation at hand, in other words signifying a more traditional and direct expression of intent than in the case of self-executing smart contracts.

As we can see, DAOs of all types can exercise legal competences in a protocol-internal context, constituting legal relationships of a rather novel kind. Furthermore, there is no reason why the same wouldn't be possible in a protocol-external context, i.e. with regard to traditional agreements, through the use of the aforementioned proposals. However, the willingness of someone to enter into such an agreement with a DAO may often hinge on the other incident of active legal personhood, which will be covered next.

Onerous legal personhood

Onerous legal personhood refers to an entity's capability to bear responsibility for its actions. It implies the ability to demand a certain conduct of the entity in question, as well as sanctions upon breaching said conduct, such as restitution in the form of a payment, which in turn implies the capacity to own property. We've established that DAOs of all kinds are capable of owning property. As for demanding a certain conduct, at a conceptual level, both nominally and substantially decentralized DAOs can be subjected to such demands—after all, both of them hold the (group) intentionality necessary to respond to demands placed upon them; the difference between the two can once again largely be found in the practicalities.

First of all there's the question of directing responsibility. Substantially decentralized DAOs are quite ephemeral in nature, as they aren't necessarily rooted in a specific place or to any specific person. How then do you effectively place demands if there is no identifiable addressee? In some instances the ephemerality could conceivably be overcome, but the fact remains that lacking a

sanctioned legal platform makes the task at the very least more arduous. Kurki likens this sanctioned form of existence, achieved through incorporation, to a “visibility cloak” (...) that makes corporations and their entitlements and obligations easier to track by other actors.’¹⁰⁹ Subject to a regulatory framework that enables it, nominally decentralized DAOs can take advantage of this visibility cloak, meaning that they can be fully endowed with onerous legal personhood.

Another point to mention is that the responsibilities of substantially decentralized DAOs would, by nature of their sphere of operation, largely pertain to smart contracts. Consequently, adopting a strict ‘code is law’ interpretation, as many crypto maximalists are wont to do, would practically preclude the kind of responsibility we’re talking about. This is because the agreed upon conduct is whatever has been codified in the smart contract in question; the lines of code, as they are, are taken to express the parties’ intent. As such, there can be no breach of said conduct. In a situation where the outcome of the smart contract doesn’t correspond to the expectations of one of the parties, those misplaced expectations are secondary to the apparent intent expressed through code. This rather unsatisfactory hardline interpretation is however not adhered to by everyone¹¹⁰, and DLT-native dispute resolution mechanisms that could help tackle some of these ambiguities are being developed.¹¹¹ What is clear, however, is that the notion of responsibility in the context of smart contracts is not without its issues at this point in time.

¹⁰⁹ Kurki 167.

¹¹⁰ As evidenced by the very first DAO project, *TheDAO*, which resulted in a hard fork of the Ethereum network. For more, see Samuel Falkon, ‘The Story of the DAO — Its History and Consequences’ (2017) <<https://medium.com/swlh/the-story-of-the-dao-its-history-and-consequences-71e6a8a551ee>> accessed May 10 2022.

¹¹¹ See Wulf A. Kaal & Craig Calcaterra, ‘Crypto Transaction Dispute Resolution’ (2017) 73(1) *The Business Lawyer* 109.

In conclusion, whereas nominally decentralized DAOs can be endowed with onerous legal personhood, making that assertion with regard to substantially decentralized ones is somewhat dubious due to the practical infeasibility of effectively directing and enforcing legal demands placed upon them.

This concludes our examination of the incidents of legal personhood as they relate to DAOs. What follows is a summary in the form of a table as well as a short overview of the differences between nominally and substantially decentralized DAOs as to the applicability of certain incidents.

5.3. Incidents of Legal Personhood applicable to DAOs

Passive incidents of legal personhood	<i>Nominally decentralized DAOs</i>	<i>Substantially decentralized DAOs</i>
<i>Fundamental protections</i>	-	-
<i>Capacity to be a party to special rights</i>	X	X
<i>Capacity to own property</i>	X	X
<i>Insusceptibility to being owned</i>	-	-
<i>Standing</i>	X	-
<i>Capacity to undergo legal harms/victim status in criminal law</i>	X	X
Active incidents of legal personhood		
<i>Legal competence</i>	X	X
<i>Onerous legal personhood</i>	X	-/X

What we can glean from this table is that both nominally and substantially decentralized DAOs can possess the incidents of legal personhood necessary for rudimental economic activity, i.e. the capacity to be a party to special rights, the capacity to own property, and legal competence. What both of them lack, on the

other hand, are the incidents that are afforded to sentient beings alone, i.e. fundamental protections and the insusceptibility to being owned.

What sets nominally and substantially decentralized DAOs apart is the latter's lack of standing and onerous legal personhood; the incidents through which, respectively, an entity can secure and enforce its interests towards others, and through which others can secure and enforce their interests towards that same entity. In other words, while substantially decentralized DAOs can possess the incidents that are necessary for basic economic activities, they lack the formal safeguards that are brought about by a 'sanctioned' form of existence. We will return to this point towards the conclusion of the next chapter.

Getting back to the question at hand, we can see that many of the incidents of legal personhood are in fact applicable to DAOs. In the next chapter we will determine what this actually implies with regard to DAOs as legal persons.

6. Conclusion

6.1. The Legal Personhood of DAOs

Let's sum up what has been established so far. Kurki's bundle theory of legal personhood distinguishes between active and passive incidents of legal personhood. These incidents together form a cluster property that constitutes an entity's legal personhood. Active legal personhood is predicated on an entity being able to perform acts-in-the-law and the capability to be held legally responsible, while passive legal personhood is predicated on holding claim-rights.¹¹² We've concluded that DAOs are conceptually capable of both, thus being able to be endowed with both active and passive incidents of legal personhood. We've also established which incidents are applicable to DAOs, with a difference being noted between substantially and nominally decentralized DAOs.

Important to note is that—as the preceding chapter shows—DAOs can in fact hold various legal positions *regardless of whether or not they are considered legal persons*. In other words, declaring DAOs to be legal persons does not endow them with the capacity to hold rights and bear duties—they already have those capacities. This is in direct opposition to the Orthodox view of legal personhood, according to which only legal persons can hold rights and bear duties. The strength of Kurki's theory is apparent here, as it allows one to acknowledge the legal positions held by an entity without needing to declare it a legal person—it allows one to see an entity as a legal person *in certain respects*, foregoing a dichotomous judgement that is prone to fail to acknowledge some entities as legal actors or right-holders when they are in fact just that.

¹¹² Kurki 140.

In a sense, asking whether DAOs are legal persons is missing the point, seeing as, taking the view that legal personhood is a cluster concept, there is no legal person/nonperson dichotomy. Rather, a more fitting question would be *in what respects* DAOs are legal persons—a question which the preceding chapter has sought to tackle. However, humans have an innate desire to label things, making such an open-ended answer rather unsatisfactory. So can the case be made that DAOs are legal persons *tout court*¹¹³, as Kurki puts it? The question hinges on the term *cluster concept*. Legal personhood according to Kurki’s theory is a cluster concept, meaning that it consists of interconnected but dis severable incidents.¹¹⁴ Those incidents form a more or less functional whole.¹¹⁵ DAOs can be endowed with a variety of those incidents that, taken as a whole, enable them to operate as unique, intentional entities in various legally significant ways. That ontology as a functional whole speaks for referring to them as such, in other words as ‘legal persons’ rather than merely ‘entities endowed with certain incidents of legal personhood’. In other words we can conclude that DAOs can in fact be considered legal persons. It is, however, important to stress the point that even if one rejects this conclusion, DAOs still hold certain legal positions and act as legal persons in those specific respects.

As for the difference between substantially and nominally decentralized DAOs, we’ve noted that nominally decentralized DAOs can take advantage of a sanctioned form of existence by way of incorporation. Kurki states that ‘Rather than endowing collectivities with the capacity to hold rights and bear duties, corporate personhood (in its central form) makes group agents more “visible” and less ephemeral by regulating their establishment, dissolution, and other such

¹¹³ Meaning ‘with no addition or qualification’.

¹¹⁴ Kurki 94.

¹¹⁵ Infants are legal persons, but really only in the passive sense, as they lack the agency required for active legal personhood. Corporations are legal persons, but incidents like fundamental protections aren’t pertinent to them.

matters.¹¹⁶ Essentially, with nominally decentralized DAOs, there is the potential to establish a clear avenue for recourse by way of incorporation, endowing the organisation with standing and onerous legal personhood in the eyes of the legal system, making them more fully-fledged operators within that system.¹¹⁷ Substantially decentralized DAOs, on the other hand, are characterised by their more insular mode of operation, which creates a rift between them and the legal system.

Still, assuming that the blockchain ecosystem continues to grow and develop, so will this new sphere of legal relations with its new types of entities. These entities can, we've concluded, be called legal persons. Calling them so is, if nothing else, acknowledging the existence and development of consequential legal relations that aren't dependent on state power to enforce them. Whether the increasingly hypercapitalist nature of the blockchain ecosystem and the wider Web3 movement that it belongs to can be seen as desirable conduits for transforming our imaginaries is a question of its own, but among all the noise you can find a signal that represents a step away from conventional patterns of thought.

6.2. Finally

DAOs are uniquely placed in many ways—spatially, economically, legally, and temporally. Spatially they can exist beyond the notion of borders. Economically they operate in a sphere that's in many ways separate from traditional markets (even if value within that sphere is still ultimately defined through fiat currencies). Legally they are capable of largely eluding the rule of law, instead relying on dispute resolution mechanisms devised by them and/or for the

¹¹⁶ Kurki 173.

¹¹⁷ Ganado et al. 'Mapping the Future of Legal Personality' (2020) MIT Computational Law Report 4.

platforms they exist on, if indeed taking potential disputes into account at all. Temporally they have appeared at a time when automation is getting sophisticated enough to merit discussions about the legal implications of artificially intelligent entities, but largely before those discussions have had a chance to evolve beyond hypotheticals. Kurki makes a compelling case for the need to introduce more nuance into the concept of legal personhood, and DAOs are a part of the technological trend that necessitates such nuance, as that trend brings with it entities that are functionally (as opposed to phenomenologically) increasingly intentional while at the same time being decreasingly reliant on humans to direct their conduct. Kurki's theory has indeed, in this thesis, proven itself to provide a very workable and coherent framework through which to analyze the question of legal personhood.