DECENTRALIZED AUTONOMOUS ORGANIZATIONS (DAOs) IN THE SWISS LEGAL ORDER

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I.   Introduction

The internet was the technology that revolutionized the last part of the 20th century. It has generated a whole new digital economy that has reshaped the way we look for information, the way we interact with each other, the way we share our stories, the way we buy our goods, the way we do business, and many other aspects of our lives. This virtual environment is known as the Web 2.0: a digital space accessible to everyone, a space where physical boundaries are removed. The internet has taken on such a crucial role in our everyday lives that it represented 10% of U.S. gross domestic product (GDP) in 2018.[1]

Today, we are at the forefront of a whole new transformation of the digital space: we are entering the blockchain revolution. While big corporations known as GAFA[2] have arisen in the internet area, concentrating power in the hands of very few actors, blockchain technology promises to redistribute the power of any central institution among the hands of individuals. Thanks to the decentralization of power and the widespread distribution of information that characterize blockchain technology, some individuals have already regained control over their money by using cryptocurrencies such as bitcoin. However, this phenomenon is undermining the control exercised by established central institutions and does not come without its share of legal issues.

The rise of bitcoin has already disrupted the way individuals can transfer capital. Smart contracts are on the verge of revolutionizing the way individuals enter into contractual relations by inscribing the terms of their agreement into a blockchain, which allows automation of the transfer of capital under predefined conditions. Building on the architecture of smart contracts, new forms of entity called Decentralized Autonomous Organizations (DAOs) are now emerging from the blockchain environment.

DAOs are, essentially, entities that manage crypto assets with predefined governance rules, which are encoded in a series of smart contracts deployed on a blockchain. Smart contracts provide the framework that defines how the participants in the DAO can spend the entity's assets and how they are organized within the entity. Although DAOs and their underlying smart contracts are unknown in Swiss law, some DAOs already carry out activities within the Swiss legal order, which raises legal issues.

It must be determined whether the activities of a DAO have legal effects in Switzerland. The answer to this question is greatly influenced by the way DAOs are handled in the Swiss legal order. The first instinct would be to transform them into a known legal concept by characterizing them under Swiss substantive law. In this way DAOs could exist as a form of company known in the Swiss legal order, or they could simply be recognized as a series of contractual relationships. However, the Swiss legal system has existing tools that could possibly allow DAOs to

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[1] C. HOOTON, Measuring the U.S. Internet Sector: 2019, *Internet Association*, 26 September 2019, p. 5, available at https://internetassociation.org/wp-content/uploads/2019/09/IA_Measuring-The-US-Internet-Sector-2019.pdf on 5.3.2020.

[2] GAFA stands for Google, Apple, Facebook and Amazon.

exist in their present form, while recognizing their legal effects within the Swiss legal order. The solution to this issue should be sought in private international law. In this article we will explore this preferred pathway in the hope that our analysis will buttress current reflections on how these new forms of entity, which have characteristics similar to those of companies, can be dealt with in Swiss private law.

II. The Underlying Technology behind DAOs

A. Technical Bases of Blockchain Technology

The bitcoin[3] cryptocurrency was the first application of blockchain technology when it was launched in 2009. The key innovation introduced by Bitcoin was the creation of a distributed ledger that fixed the double spending problem with a protocol that requires the verification of each transaction by means of a consensus mechanism. Up until then, the only way to guarantee the reliability of digital value transfers was to rely on a trusted central institution such as a bank to keep track of all transfers on a central ledger.

Bitcoin was specifically introduced in order to remove the need for central institutions by creating a protocol structure where trust in the system no longer relies on one trusted actor, but instead relies on a computer code that allows unreliable actors to form a reliable consensus as a group. Trust is thus shifted onto the architecture of the system itself.

In its most basic form, blockchain technology can be described as "a chronological database of transactions recorded by a network of computers".[4] The term "blockchain" refers to the transactions being placed in blocks that are linked to one another, forming a chain of blocks. In order for a new block to be added to the chain, it has to be validated by means of a consensus mechanism such as Proof of Work (PoW) or Proof of Stake (PoS).[5]

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[3] Hereafter, "Bitcoin" will refer to the Bitcoin blockchain and "bitcoin" will refer to the bitcoin cryptocurrency. The same logic will be followed with other cryptocurrencies and their underlying blockchains.

[4] G. PETERS/ E. PANAYI, Understanding Modern Banking Ledgers through Blockchain Technologies: Future of Transaction Processing and Smart Contracts on the Internet of Money, in P. TASCA/ L. PELIZZON/ N. PERONY (eds), *Banking Beyond Banks and Money – A Guide to Banking Services in the Twenty-First Century*, Switzerland 2016, p. 241.

[5] See generally A. BALIGA, Understanding Blockchain Consensus Models, *Persistent White Paper*, April 2017, available at https://pdfs.semanticscholar.org/da8a/37b10bc1521a4d3de925d7ebc44bb606d740.pdf on 5.3.2020.

A blockchain is a peer-to-peer network where the ledger containing all information is distributed to all participants (the nodes)[6] so that there is "no single point of failure, making the technology available and reliable".[7] The information contained in a blockchain transaction is timestamped and tamperproof, and cannot be deleted.[8] Some of the nodes (called miners) supply computer power to process the transactions and are remunerated with cryptocurrency (*e.g.* bitcoins) in return. Cryptographic technology ensures that information cannot be altered, and nodes are prevented from trying to cheat the system by game-theoretic incentives.[9]

To initiate a transaction, users are not required to run a node, but need only open a wallet. A wallet is identified by a public key and can only be accessed by providing the corresponding private key. In addition, both keys must be computed into the system to initiate a cryptocurrency transfer.[10]

Blockchains can be put into two distinct categories, depending on whether they are permissionless (public) or permissioned (private). The use of a permissionless blockchain does not require access rights, meaning that "anyone can be a user or run a node, anyone can « write » to the shared state through invoking transactions (provided transaction fees are paid for), and anyone can participate in the consensus process for determining the « valid state »".[11] The user does not need to trust a central institution but must simply rely on the computer program that manages the blockchain and guarantees the proper execution of the transaction. While the ledger of transactions made on a permissionless blockchain is usually public and accessible to anyone (not only nodes), users operate anonymously. Bitcoin and Ethereum are examples of permissionless blockchains.

Permissioned blockchains, on the other hand, deviate from the standard model in that they are managed by a central institution, reintroducing the concept of the "trusted third party". This central institution administers the users' access rights and has "means to identify the nodes that can control and update the shared state, and often also [has] ways to control who can issue transactions".[12] This is why permissioned blockchains are referred to as being private. Users must rely on the central institution for the processing of information stored on the blockchain.

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[6] A node is a computer that has a copy of the blockchain and that can verify the validity of a transaction.

[7] J. WALDMAN, Blockchain Fundamentals, *MSDN Magazine*, Vol. 33, 2018, pp. 20-26.

[8] LEGALER, *Blockchain for Lawyers*, 2018, p. 11, available at https://www.legaler. com/wp-content/uploads/2018/12/Blockchain-for-Lawyers-eBook.pdf?utm_medium=email &utm_campaign=eBook%20Delivery&utm_content=eBook%20Delivery+&utm_source=C M&utm_term=Click%20Here%20to%20Download%20eBook on 5.3.2020.

[9] K. WERBACH, Trust, But Verify: Why the Blockchain Needs the Law, *Berkeley Technology Law Journal*, Vol. 33, 2018, p. 493.

[10] K. WERBACH (note 9), p. 503.

[11] C. CACHIN/ M. VUKOLIĆ, Blockchain Consensus Protocols in the Wild, *IBM Research – Zurich*, 7 July 2017, p. 1, available at http://arxiv.org/abs/1707.01873v2 on 5.3.2020.

[12] C. CACHIN/ M. VUKOLIĆ (note 11), p. 1.

Anonymity is not fully guaranteed, as the central institution relies on identity to "define rules about what data [users] can commit to the ledger and what data they can consume from the ledger".[13] These characteristics can make permissioned blockchains very advantageous for institutions and corporations.[14]

Although a blockchain can be described as a "distributed, immutable, transparent, secure and auditable ledger",[15] there is a way to maliciously alter its consensus mechanism and potentially corrupt its security and proper functioning: the "50% + 1 attack". This attack happens when the majority of the miners of a blockchain join forces in order to create a new consensus of the chain and alter the operations on the chain.[16] In such a scenario, attackers can prevent transactions from occurring between some or all users of the blockchain.[17] Attackers can also reverse transactions that occurred under their control, allowing them to double-spend coins.[18] While the range of action of the attackers would be limited to these two kinds of attack, and the blockchain as a whole could not be taken down, an attack would certainly destabilize the entire blockchain for some days.[19] This could lower trust in the system.

However, gaining more than 50% of the mining power of a blockchain is virtually impossible in a globally distributed system because of the immense computing power required to perpetrate such an attack and the costs that would be incurred. This is especially the case with widely adopted blockchains such as Bitcoin and Ethereum.

B. Blockchain as a Multipurpose Technology

While the blockchain's very architecture provides a new kind of secure ledger, this technology was originally envisaged by its "creator" Satoshi Nakamoto as the

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[13] D. MASSESSI, Public Vs Private Blockchain In A Nutshell, *Medium*, 12 December 2018, available at https://medium.com/coinmonks/public-vs-private-blockchain-in-a-nutshell-c9fe284fa39f on 5.3.2020.

[14] V. BUTERIN, On Public and Private Blockchains, *Ethereum Blog*, 6 August 2015, available at https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/ on 5.3.2020.

[15] THE WORLD ACADEMY OF RESEARCH IN SCIENCE AND ENGINEERING, An Overview on Integrating Machine Learning with Blockchain, *International Journal of Information Systems and Computer Sciences*, Vol. 8, No 2, March-April 2019, pp. 40 *et seq*.

[16] Permissioned blockchains are not affected by this risk factor as the central institution has power over the nodes and consequently over the miners of the blockchain.

[17] Y. PRITZKER, Is Bitcoin mining centralization a threat?, *Medium*, 16 October 2018, available at https://medium.com/bitcoin-not-blockchain/is-bitcoin-mining-centralized-and-what-does-that-mean-for-my-coi-1fc1bc379601 on 5.3.2020.

[18] Y. PRITZKER (note 17).

[19] The phenomenon of distrust was observed with the Ethereum blockchain when the market value of ethers plummeted after The DAO attack. See *infra* Chapter III. B.

basis for a new type of payment method.[20] By resolving for the first time the double spending problem coupled with digital scarcity[21], blockchain technology has enabled the creation of a cheap, secure and decentralized cryptocurrency open to any person around the world equipped with an electronic device connected to the internet.[22] Bitcoin has revolutionized the transfer of funds, in particular for international transactions. The transaction costs for transferring bitcoins from one account to another are hence virtually reduced to nothing, especially as compared with those of an international bank transfer.[23]

With the success of bitcoin, many other cryptocurrencies called "altcoins" (alternative coins) have emerged over the years. Altcoins generally try to differentiate themselves from bitcoin by offering other features or by having different purposes. Others have simply emerged from Initial Coin Offerings (ICOs) and are used to tokenize rights to access a digital network or a service, but they are not designed as an alternative currency.[24]

The Ethereum blockchain and its cryptocurrency, named ether, were launched in July 2015 by the Swiss-based Ethereum Foundation. Today ether is the second-largest capitalized cryptocurrency after bitcoin. It is not purely designed as an alternative to fiat currencies per se, unlike bitcoin. The Ethereum protocol offers additional features and can be used to execute cryptocurrency transfers conditioned by a set of rules that are inscribed on the protocol.[25] This allows parties

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[20] S. NAKAMOTO, *Bitcoin: A Peer-to-Peer Electronic Cash System*, 2018, available at https://bitcoin.org/bitcoin.pdf on 5.3.2020. The name Satoshi Nakamoto is a pseudonym used by a person or a group of people.

[21] Up until then, in a distributed system where no central institution was in charge of the reliability of the information, digital entries could easily be duplicated and transferred more than once, making digital currencies impossible to imagine because it was impossible to trust that the digital asset received had not already been transferred to someone else.

[22] It was precisely for this function that the first blockchain was created with the launch of Bitcoin. The foundations of blockchain technology and the "philosophy" of Bitcoin are outlined by S. NAKAMOTO (note 20).

[23] As of 5 March 2020, fees to have a transaction mined within the next hour correspond to $0.41. Information available at https://bitcoinfees.info on 5.3.2020.

[24] An ICO is similar to an Initial Public Offering (IPO) with the difference that, instead of a company's shares, investors are granted cryptographic tokens (*i.e.* units of a cryptocurrency) to which rights are generally attached. The Swiss Financial Market Supervisory Authority (FINMA) has classified tokens issued through an ICO in three categories: payment, utility and asset tokens. See FINMA, *Guidelines for enquiries regarding the regulatory framework for initial coin offerings (ICOs)*, 16 February 2018, available at https://www.finma.ch/en/~/media/finma/dokumente/dokumentencenter/myfinma/1bewilligung/fintech/wegleitung-ico.pdf?la=en on 5.3.2020. A quick overview of the classification is also available at https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/ on 5.3.2020.

[25] The Bitcoin protocol has a set of functions that allow simple conditions to be added to transactions. However, these are limited, and each new function needs to be added to the protocol through a soft fork. See LUMI BLOCKCHAIN WALLET, Bitcoin Smart Contracts, *Medium*, 22 February 2019, available at https://medium.com/lumiwallet/bitcoin-smart-contracts-b3ae6a4b3041 on 5.3.2020.

to enter into a conditioned transfer of cryptocurrency where performance of the transfer is automated in accordance with programmed conditions.

These transactions are commonly referred to as "smart contracts".[26] This term was originally used by computer scientist and legal scholar Nick Szabo, who in 1994 defined a smart contract as "a computerized transaction protocol that executes the terms of a contract".[27] The great advantage of smart contracts is that the transfer of cryptocurrencies is automatically triggered if/when the conditions are fulfilled. This ensures, in theory at least, the perfect execution of the contract in accordance with the predefined conditions encoded on the blockchain. It is also possible to incorporate external input from a third party, sometimes referred to as an oracle, in order to trigger a programmed outcome. One example of a smart contract incorporating input from an oracle would be the postal service confirming the delivery of a package, which in turn would trigger the execution of the smart contract binding the buyer and the seller by transferring the amount of cryptocurrency agreed on for the delivered goods. In this way the buyer pays only if the package is delivered, and the seller knows that upon delivery the cryptocurrency transfer will be triggered automatically.

This example shows that the parties to a smart contract place their trust in the code, and state enforcement mechanisms become virtually unnecessary. This has the advantage of greatly lowering transaction costs. It has been acknowledged that onerous and costly services such as trust accounting and tracking custody of assets could become massively simplified, possibly increasing affordability for clients and expanding business into new markets.[28]

III. The Concept of DAOs

A. Genesis of DAOs

The idea of a decentralized and autonomous entity running on a blockchain originates from blockchain entrepreneur Daniel Larimer's blogpost on the hidden costs of Bitcoin, which was published on 7 September 2013.[29] Daniel Larimer was making the point that a cryptocurrency could be seen as a Decentralized Autonomous Corporation (DAC), where the source code represents bylaws and token holders are shareholders. In his comparison, Daniel Larimer went on to say that the DAC's purpose is to maximize value for its token holders by performing activities

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[26] LUMI BLOCKCHAIN WALLET (note 25).

[27] N. SZABO, *Smart Contracts*, 1994, available at http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html on 5.3.2020.

[28] LEGALER (note 8), p. 14.

[29] See D. LARIMER, Overpaying For Security – The Hidden Costs of Bitcoin, *The Let's Talk Bitcoin! Network*, 7 September 2013, accessible at https://letstalkbitcoin.com/is-bitcoin-overpaying-for-false-security on 5.3.2020.

on the free market, while paying for services it needs for its operation with its own shares (*i.e.* tokens from the DAC).[30]

The metaphor of cryptocurrencies as DACs was further developed by Daniel Larimer's father, Stan Larimer, in a blogpost published on 14 September 2013.[31] The focus of the post was on determining whether Bitcoin would be better described in terms of a "DAC" metaphor rather than a "currency" metaphor. In his blogpost, Stan Larimer developed a more elaborate definition of a DAC by outlining some key characteristics. He defined a DAC as an entity run by an "incorruptible set of business rules"[32] that can be executed independently of human involvement. Those business rules must be open-source software distributed across all nodes (*i.e.* shareholders' computers) and be publicly auditable. He added that one can become a shareholder (*i.e.* a token holder) either by buying some tokens or by receiving tokens when providing services for the company (*i.e.* the DAC). The tokens grant their holder rights to a share of the DAC's profits and/or voting rights on how the DAC is run.

This first definition of a DAC undoubtedly influenced the broader understanding of DAOs. In his depictions of developments regarding DACs, Stan Larimer said that blockchain technology "[i]s not just the sine quo non [sic] of digital currency, it's a way to implement incorruptible business relationships of almost any kind".[33] He saw the potential of blockchain technology as a new way to implement governance within a digital entity, and ultimately to serve as a vehicle for conducting business. However, in his view DACs were necessarily independent of any jurisdiction and were not to be regulated, or rather could not be regulated.[34]

Shortly after, blockchain entrepreneur Vitalik Buterin revisited the concept of the DAC and took the argument further in a series of three blogposts. In his first post, he directed his attention towards the technical challenges facing the development of a completely distributed "virtual corporation" on the Bitcoin blockchain.[35] This was before the Ethereum blockchain was created, and the identification of the Bitcoin blockchain's shortcomings in this post certainly influenced

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[30] Operational costs could be, for example, the amount of gas required to execute a smart contract. Gas represents the computational effort required for a miner to carry out an operation on the Ethereum blockchain and serves as a unit to determine the number of ethers the miner will be paid. See A. RAJEEVAN, Tokens, Gas and Gas limit in Ethereum, *Medium*, 11 February 2019, available at https://medium.com/@arunrajeevan/tokens-gas-and-gas-limit-in-ethereum-f07790f56d8f on 5.3.2020.

[31] S. LARIMER, Bitcoin and the Three Laws of Robotics, *The Let's Talk Bitcoin! Network*, 14 September 2013, available at https://letstalkbitcoin.com/bitcoin-and-the-three-laws-of-robotics on 5.3.2020.

[32] S. LARIMER (note 31).

[33] S. LARIMER (note 31).

[34] S. LARIMER (note 31).

[35] V. BUTERIN, Bootstrapping A Decentralized Autonomous Corporation: Part I, *Bitcoin Magazine*, 20 September 2013, available at https://bitcoinmagazine.com/articles/bootstrapping-a-decentralized-autonomous-corporation-part-i-1379644274 on 5.3.2020.

Buterin in the development of Ethereum.[36] In his second blogpost, Buterin tried to figure out a way for DACs to interact with the "real world".[37] His third blogpost was focused on determining cases where DACs might be a better alternative to privately run corporations or to services offered by the government, taking as the main example an entity offering online identity.[38] These posts laid the foundations that led Buterin to the concept of a DAO.

The term "Decentralized Autonomous Organization" seems to have appeared for the first time in the Ethereum White Paper, where Buterin said that "[t]he logical extension of [smart contracts] is decentralized autonomous organizations (DAOs) – long-term smart contracts that contain the assets and encode the bylaws of an entire organization".[39] With this new term in use and other confusing concepts associated with blockchain technology circulating on the internet, Buterin decided soon afterwards to create a guide to some of the terminology he had encountered in the blockchain environment. He defined a DAO as "an entity that lives on the internet and exists autonomously, but also heavily relies on hiring individuals to perform certain tasks that the [automation] itself cannot do".[40] He differentiated DACs from DAOs by saying that DACs were "basically a subclass of DAOs" and that DACs introduced the concept of shares, and were therefore for-profit entities, while DAOs were defined as non-profit entities, even though money could be made by participating in their ecosystem.[41] Building on this, Daniel Larimer claimed later on that the word "corporation" in DAC had simply been

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[36] Vitalik Buterin later co-developed the Ethereum blockchain with Gavin Wood. In November 2013 he published the Ethereum White Paper, which was followed in April 2014 by the Ethereum Yellow Paper's first version dedicated to technical aspects of the Ethereum blockchain. See V. BUTERIN, Ethereum White Paper – A Next Generation Smart Contract & Decentralized Application Platform, *Blockchain research network*, November 2013, available at https://www.blockchainresearchnetwork.org/wp-content/plugins/zotpress/lib/request/request.dl.php?api_user_id=2216205&dlkey=LIWF7NVA&content_type=application/pdf on 5.3.2020; WOOD GAVIN, Ethereum: A Secure Decentralised Generalised Transaction Ledger, Byzantium version, *GitHub*, 11 August 2019, accessible at https://ethereum.github.io/yellowpaper/paper.pdf on 5.3.2020.

[37] V. BUTERIN, Bootstrapping A Decentralized Autonomous Corporation, Part 2: Interacting With the World, *Bitcoin Magazine*, 22 September 2013, available at https://bitcoinmagazine.com/articles/bootstrapping-an-autonomous-decentralized-corporation-part-2-interacting-with-the-world-1379808279 on 5.3.2020.

[38] V. BUTERIN, Bootstrapping a Decentralized Autonomous Corporation, Part 3: Identity Corp, *Bitcoin Magazine*, 25 September 2013, available at https://bitcoinmagazine.com/articles/bootstrapping-a-decentralized-autonomous-corporation-part-3-identity-corp-1380073003 on 5.3.2020.

[39] See V. BUTERIN (note 36), p. 1.

[40] V. BUTERIN, DAOs, DACs, DAs and More: An Incomplete Terminology Guide, *Ethereum Blog*, 6 May 2014, available at https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide/ on 5.3.2020.

[41] V. BUTERIN (note 40).

abandoned in favour of "organization" in order to avoid unnecessary legal entanglements.[42] For this reason, he also adopted the term "DAO" instead of "DAC".

According to Daniel Larimer, the first entity that had the characteristics of what he regarded as a DAO was created in 2013 when he was working on developing the first decentralized cryptocurrency exchange market place, called BitShares.[43] For him, BitShares had to be considered a DAO because "[m]oney was raised, tokens were allocated, and token holders were given the ability to vote on how to spend community money and set blockchain parameters".[44] However, the launch of "The DAO" in 2016 was the real turning point in popularizing the concept of a DAO.

B. Sample of Entities that Identify as DAOs

The first widely known application of a DAO was launched as The DAO in April 2016. For many, The DAO defined the understanding of what a Decentralized Autonomous Organization is. The DAO was a form of venture capital fund structured as a network of smart contracts deployed on the Ethereum blockchain, where participants could submit projects to be funded.[45] Investors were granted voting rights proportionally to their investment to enable them to participate in the project selection process and to carry out the operations of The DAO.[46] Programming all governance and operational rules on the blockchain was intended to allow The DAO to operate indefinitely and autonomously. The venture was a great success and acquired more than $150 million within a few weeks from not only blockchain enthusiasts, but many other investors, creating "the largest crowdfunding project ever".[47] At the time, it demonstrated "the potential for business associations to exist on the blockchain".[48] As such, the blockchain community had high hopes that this project would pave the way for a blockchain revolution.

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[42] D. LARIMER, Is The DAO going to be a DOA?, *Steemit*, 2016, available at https://steemit.com/crypto-news/@dan/is-the-dao-going-to-be-doa on 5.3.2020.

[43] D. LARIMER (note 42).

[44] D. LARIMER (note 42).

[45] M. ATMANI, DAO, la première société de financement participatif dématérialisée grâce à la blockchain, *Le Temps*, 19 May 2016, avalable at https://www.letemps.ch/economie/dao-premiere-societe-financement-participatif-dematerialisee-grace-blockchain on 5.3.2020.

[46] C. JENTZSCH, *Decentralized Autonomous Organization to Automate Governance*, 2016, available at https://archive.org/stream/DecentralizedAutonomousOrganizations/WhitePaper_djvu.txt on 5.3.2020.

[47] DELOITTE, The DAO – Chronology of a daring heist and its resolution, *Deloitte Blockchain Institute*, September 2016, available at https://www2.deloitte.com/content/dam/Deloitte/de/Documents/Innovation/Deloitte_Blockchain_Institute_Whitepaper_The_DAO.pdf on 5.3.2020.

[48] U.R. RODRIGUEZ, Law and the Blockchain, *Iowa Law Review*, Vol. 104, 2019, p. 697.

However, one investor found a flaw in The DAO's code a few months after its launch and exploited it in order to take control of a large portion of the funds, bringing the project to a halt.[49] As a consequence, the Ethereum community revised the blockchain's code to restore misappropriated funds. This process caused the Ethereum blockchain to split (hard fork)[50] because a minority of the nodes did not want to follow the decision of the majority of the nodes to restore the funds. While the revolution did not happen, blockchain entrepreneurs were able to learn from the project's flaws and new DAO projects such as Aragon and Gnosis have been developed since then.

Aragon, which was born in November 2016, is a platform that provides entrepreneurs and investors with an ecosystem of tools in order to create and manage DAOs.[51] In November 2018 it introduced the Aragon Network, which is a DAO that serves as an online court. The Aragon Network can be used by the platform's users and the platform itself in order to "resolve subjective disputes with binary outcomes".[52] Aragon is currently stewarded by a Swiss-based association, meaning that the association owns all the proceeds from the token sales, the intellectual property, and the websites and social media, and that it employs the foundational team.[53] Aragon is thereby connected to a legal person and a legal order. However, Aragon is seeking independence from its underlying association and wishes to cut all ties to any legal order in the near future by transferring all assets to the Aragon Network. This will fulfil the platform's vision of being self-sovereign.[54] However, it is unclear what the legal status of Aragon and the Aragon Network and its participants will be once the transfer of assets is completed.

Gnosis Ltd, which is a company incorporated in Gibraltar, has set as its main goal the creation of a blockchain-based prediction market platform.[55] In the pursuit of this goal, on 29 May 2019 Gnosis launched the dxDAO, which is a DAO

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[49] P. BOUCHER, How blockchain technology could change our lives, *European Parliamentary Research Service (EPRS)*, February 2017, p. 21, available at http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/581948/EPRS_IDA(2017)5819 48_EN.pdf on 5.3.2020.

[50] A hard fork happens when the community of a blockchain does not agree on a change to the protocol, and that each version of the blockchain will continue to exist. After The DAO hack, two alternative chains were maintained, Ethereum and Ethereum Classic.

[51] L. CUENDE, *The Aragon Manifesto*, 8 May 2018, available at https://blog.aragon.org/the-aragon-manifesto-4a21212eac03/ on 5.3.2020.

[52] ARAGON NETWORK, Aragon whitepaper: An opt-in digital jurisdiction for DAOs and sovereign individuals, *GitHub*, 1 September 2018, available at https://github.com/aragon/whitepaper/tree/master on 5.3.2020.

[53] L. CUENDE, *Decentralizing Aragon's development II: Minimum Viable Foundation*, 2 May 2018, available at https://blog.aragon.org/decentralizing-aragons-development-ii-minimum-viable-foundation-8ec1f9a13ebc/ on 5.3.2020.

[54] L. CUENDE (note 51).

[55] GNOSIS, *Gnosis Whitepaper*, 22 December 2017, pp. 5-7, available at https://gnosis.io/pdf/gnosis-whitepaper.pdf on 5.3.2020.

aimed at introducing community governance within other DAOs.[56] This project originated from the wish of Gnosis to "support community governance, upgradeability, and the network effects",[57] which has been identified as a necessity for managing the permissionless trading protocol DutchX that the company has also developed. The dxDAO will also introduce community governance within other DAOs and will not limit its scope to DutchX.

While Gnosis was responsible for the creation, marketing, support and launch of the dxDAO, Gnosis has never held voting power in the dxDAO. Furthermore, Gnosis has followed its initial plan of cutting all ties with the dxDAO on 12 July 2019. Gnosis has stopped all communication and promotion of the dxDAO by archiving accounts it held on dedicated communication platforms (Twitter, DAOtalk and Telegram), archived the GitHub repository that allowed Gnosis to make updates to the dxDAO's codebase, and pledged not to fund proposals in relation to the dxDAO through its funding programme, the Gnosis Ecosystem Fund (GEGO).[58] The dxDAO is now fully owned by its members, and its future will depend entirely on their actions. This has created an uncommon legal situation where a company is responsible for the creation and the launch of an entity and then claims that no link exists between the company and that entity.

C.   DAO Definition

As observed above, the concept of a DAO is relatively new, and since Daniel Larimer, Stan Larimer and Vitalik Buterin introduced the concept[59] it has been a widely discussed subject. However, no common DAO definition has emerged yet. We will hereafter outline recurring characteristics from DAO definitions used by selected IT and legal authors. This will help us to come up with a comprehensive definition that will serve the rest of this article.

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[56] GNOSIS, The dxDAO has awoken, *Medium*, 29 May 2019, available at https://blog.gnosis.pm/the-dxdao-has-awoken-78cb2e39661c on 5.3.2020.

[57] DxDAO, Toward Super-Scalable Organizations, *DAOstack*, 2019, available at https://dxdao.daostack.io on 5.3.2020.

[58] GNOSIS, Gnosis is Stepping Back from the dxDAO, *Medium*, 12 July 2019, available at https://blog.gnosis.pm/gnosis-is-stepping-back-from-the-dxdao-5d368bc269a3 on 5.3.2020.

[59] See *supra* Chapter III. A.

1. *Common Characteristics of Existing DAO Definitions*

The most prominent characteristic featuring in DAO definitions proposed by authors is that a DAO is a form of organized entity.[60] Some authors go so far as to compare DAOs to companies.[61] Each definition mentions that DAOs perform tasks in accordance with some governance rules similar to bylaws.[62] This indicates that it is commonly understood that DAOs are internally organized and are capable of performing tasks that have external impacts.

On the technical side, some authors link DAOs directly to smart contracts and blockchain technology, stating at least implicitly that DAOs are a network of smart contracts running on a blockchain.[63] One author even says that a DAO can only run on a permissionless blockchain.[64] Others try to emphasize more general technical aspects of DAOs by describing them as software running on a cryptographically secure peer-to-peer network.[65]

Tying DAOs to a specific technology seems problematic. Even while it should be acknowledged that DAOs have emerged from blockchain technology, a definition used for legal purposes should be as neutral as possible in order to cover the widest possible range of concrete situations. The definition should take into account the evolution of technology so that it will remain relevant in the future. Inspiration can be drawn from legal frameworks introduced for internet, telecoms and data protection. In those fields, regulations have been shaped with technology neutrality in mind. This means that "the regulatory principles should apply regard-

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[60] V. BUTERIN (note 40); Y.-Y. HSIEH *et al.*, Bitcoin and the Rise of Decentralized Autonomous Organizations, *Journal of Organization Design*, Vol. 7, No 14, 2018, p. 2; S. TUAL, A Primer to Decentralized Autonomous Organizations (DAOs), *Medium*, 3 March 2016, available at https://blog.slock.it/a-primer-to-the-decentralized-autonomous-organization-dao-69fb125bd3cd on 5.3.2020; V. MIGNON, Blockchain – perspectives and challenges, in D. KRAUS/ T. THIERRY/ O. HARI (eds), *Blockchains, Smart Contracts, Decentralised Autonomous Organisations and the Law*, Cheltenham/ Northampton 2019, p. 5; B. CARRON/ V. BOTTERON, How smart can a contract be?, in D. KRAUS/ T. OBRIST/ O. HARI (eds), *Blockchains, Smart Contracts, Decentralised Autonomous Organisations and the Law*, Cheltenham/ Northampton 2019, p. 110; L. CAISLEY *et al.*, Decentralized Autonomous Organizations, *Allen & Overy LLP*, July 2016, pp. 2 *et seq.*, available at https://www.allenovery.com/global/-/media/sharepoint/publications/sitecollectiondocuments/article20decentralized20autonomous20organizations.pdf?la=en-gb&hash=96E20EBED5E7F8FD205E5B6279044FCE on 5.3.2020.

[61] V. MIGNON (note 60), p. 5; B. CARRON/ V. BOTTERON (note 60), p. 110.

[62] V. BUTERIN (note 40); Y.-Y. HSIEH *et al.* (note 60), p. 2; S. TUAL (note 60); V. MIGNON (note 60), p. 5; B. CARRON/ V. BOTTERON (note 60), p. 110; L. CAISLEY *et al.* (note 60), pp. 2 *et seq.*

[63] Y.-Y. HSIEH *et al.* (note 60), p. 2; S. TUAL (note 60); V. MIGNON (note 60), p. 5; B. CARRON/ V. BOTTERON (note 60), p. 110.

[64] Y.-Y. HSIEH *et al.* (note 60), p. 2.

[65] L. CAISLEY *et al.* (note 60), pp. 2 *et seq.*

less of the technology used",[66] leaving room for future innovations. In our opinion, the same should be done with DAOs, starting with their definition.

2. *Proposal of a DAO Definition*

In view of the above, we define a DAO as the entity created by the deployment of an autonomous and self-executing software running on a distributed system that allows a network of participants to interact and manage resources on a transparent basis and in accordance with the rules defined by the software code.

If we break down our definition, the following seven elements emerge:

a) *The Entity*

An entity can be defined as "something that exists separately from other things and has a clear identity of its own".[67] A DAO forms an identifiable entity, as it exists separately from its developers and its participants.

b) *Created by the Deployment of an Autonomous and Self-Executing Software*

One fundamental characteristic of a DAO is that, once its software is deployed, it becomes autonomous from any other entity and any legal or natural person. Furthermore, the software executes itself according to the encoded rules and enforces the resulting outcome.

c) *Running on a Distributed System*

At the moment, the technology used to deploy DAOs is blockchain. The defining characteristic of this technology is that the system does not depend on one computer or server, but rather that the information is distributed onto all the nodes of the network. The source code of a DAO is therefore distributed onto all the nodes of the blockchain it is based on. This makes the system extremely secure, as a hacker would have to edit more than half of the nodes' copies of the blockchain in order to corrupt a DAO.[68] Furthermore, a distributed system ensures the

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[66] M. WINSTON/ M. BOURREAU, Technology Neutrality in Internet, *Telecoms and Data Protection Regulation, Computer and Telecommunications Law Review*, No 1, Vol. 21, 2015, p. 1, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id= 2529680 on 5.3.2020.

[67] Collins English Dictionary, available at https://www.collinsdictionary.com/ dictionary/english/entity on 5.3.2020.

[68] See *supra* Chapter II. A.

independence of a DAO so that only the community of participants as a whole can dictate its actions, in accordance with its governance rules.[69]

d)   *That Allows a Network of Participants*

DAOs are made up of a network of participants just as a company is made up of shareholders or members. The participants can make collective decisions within the DAO in accordance with its governing rules. Furthermore, participants can enter and exit the DAO without affecting its existence. In other words, a DAO's existence is not dependent on one particular participant.

e)   *To Interact and Manage Resources*

Like any form of organized entity, a DAO must have resources in order to function.[70] Participants can decide how those resources are to be used, in accordance with the governance rules of the DAO. Existing DAOs hold resources in the form of cryptocurrencies. Those assets can be directly used for transactions. DAOs running on Ethereum must always hold a sufficient amount of cryptocurrency to pay for gas, which is an amount of cryptocurrency that must be paid into the system in order to run transactions or smart contracts.[71] While cryptocurrencies are a vital resource for DAOs, some could potentially hold other forms of asset, such as properties and rights.[72]

f)   *On a Transparent Basis*

The code of a DAO must be available to all its participants. This is a key element, as the code of a DAO is similar to the bylaws of a company: it rules how the organization runs. In order to make an informed choice to join a DAO, participants must have access to the code so that they are able to understand how the DAO is organized, what the DAO's purpose is, the amount of its assets, how the participants interact with and within the DAO, etc.

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[69] Our definition intentionally omits any mention of blockchain technology in order to allow DAOs to be deployed on future forms of distributed system (if any).

[70] According to C. JENTZSCH (note 46), p. 2, "[w]ithout ether, a DAO can not [sic] do anything so a DAO's first order of business is to receive ether".

[71] See *supra* Footnote 30.

[72] See *infra* Chapter V.

g) *And According to the Rules Defined by the Software Code*

The software code defines the governance within the DAO. Any action of the DAO must stem from the code. Participants cannot influence a DAO in any way other than that provided as rules by the software code. Accordingly, each process must be executed in accordance with the encoded rules. In other words, a DAO can perform a certain action only if its code allows for it and if the action has been approved under the DAO's governance rules.

3. Scope of the Proposed DAO Definition

The scope of the proposed definition is intentionally broad and leads us to formulate a subdivision of DAOs, namely "ground layer DAOs" and "top layer DAOs".

By ground layer DAOs, we mean blockchains that are sufficiently organized to be characterized as DAOs and that, in certain cases, can also serve as a ground system for other DAOs to function on. They do not operate in a similar way to legal entities as their goal resides in providing a ground structure. Blockchains such as Bitcoin and Ethereum fit into this category of ground layer DAOs.[73]

By top layer DAOs, we mean DAOs that tend to resemble the structure and governance of legal entities such as companies. They require a ground layer DAO in order to operate. Examples of such entities have been outlined above and include The DAO, the Aragon Network and the dxDAO.

As top layer DAOs can perform legal acts or even institute legal proceedings, their legal nature needs to be analysed in order to ascertain whether they are subjects of law. We will concentrate for the rest of this article on these types of DAOs.

IV. The Legal Understanding of DAOs

A. Legal Problems Arising from the Case of The DAO

In the case of The DAO,[74] although the equivalent of $70 million were misappropriated and then re-appropriated, the situation has generated no civil or criminal consequences. Many legal questions nevertheless arise. First of all, one may wonder whether "theft" of tokens constitutes a theft, or more broadly an illegal act.

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[73] Pioneers such as Daniel Larimer, Stan Larimer and Vitalik Buterin also viewed Bitcoin as a DAO. Y.-Y. HSIEH *et al.* (note 60), p. 2, describe how Bitcoin fits the definition of an organization and can therefore be characterized as a DAO. See also V.G. VINEB, The State of the DAOs, *Hackernoon*, 17 April 2019, available at https://hackernoon.com/the-state-of-the-daos-b7cba318460b on 5.3.2020, who argues that Bitcoin was the first DAO.

[74] See *supra* Chapter III. B.

It remains to be determined which state's law would have been applicable and, especially, which country's authorities would have had jurisdiction to judge the aforesaid question.

The Ethereum community chose to resolve the situation by force instead of going to a state court to seek compensation for the damage suffered by The DAO. Owing to the lack of rules specifically designed for this kind of situation, the uncertainty regarding the applicable law and the jurisdiction, and the fact that the defendant was probably impossible to identify, it was unlikely that the outcome of a judgment would have been satisfactory. In any case, the enforcement on the blockchain of a condemnatory judgment would have been difficult if not impossible, given the tamper resistance of blockchain technology.[75] However, the decision of the Ethereum community was disproportionate from a legal point of view in the sense that the person who misappropriated the funds did not have the opportunity to assert his or her rights of defence. Furthermore, a hard fork was imposed upon all participants of The DAO and all ether holders, although only a few of them had any say over the matter.

B.   Overview of Existing Legal Frameworks for DAOs

So far, DAOs have attracted little interest from legal scholars and lawmakers. The great economic opportunities that DAOs offer are confronted with crypto-friendly jurisdictions that nevertheless exclude DAOs from their regulatory framework, diminishing the effectiveness of their newly developed legislation. To date, lawmakers in only very few jurisdictions have introduced legislation to include new forms of company running on blockchain technology. While DAOs are rapidly gaining attention, their legal implications are still not fully understood.

Monaco has attempted to deal with many aspects of blockchain technology in a bill published in December 2017.[76] One innovative aspect of the bill was that it defined a smart contract and recognized its legally binding effect. It went even further by introducing the concept of an "*entreprise algorithmique*" (algorithmic company), which is a company constituted of smart contracts.[77] However, it did not grant such organizations legal personality even though they were intended to be new legal vehicles. Matters of private international law were also dealt with by

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[75] According to P. DE FILIPPI/ A. WRIGHT, *Blockchain and the Law: The Rule of Code*, Cambridge (Massachusetts) 2018, p. 144, traditional enforcement mechanisms may have a hard time applying to property held by DAOs.

[76] CONSEIL NATIONAL DE MONACO, *No 237 – Proposition de loi de M. Thierry Poyet, relative à la blockchain*, 4 December 2017, available at http://www.conseil-national.mc/index.php/textes-et-lois/propositions-de-loi/les-propositions-de-loi-en-cours/item/download/1042_bd3dc21a0f406b1f6a9a8c280d569e94 on 5.3.2020.

[77] Draft Art. 3 reads as follows: "*L'entreprise algorithmique est l'opération par laquelle un ou plusieurs contrats intelligents, agissant dans un but déterminé au profit d'un ou plusieurs bénéficiaires, émettent ou reçoivent, transfèrent des actifs, des biens, des droits ou des sûretés, ou un ensemble d'actifs, de biens, de droits ou de sûretés, présents ou futurs, à des tiers*".

defining connecting criteria for the application of Monegasque law and granting jurisdiction to Monegasque courts. This bill evolved in May 2019 into a draft law that unfortunately focuses exclusively on ICOs.[78]

Malta adopted three bills on blockchain and cryptocurrency on 4 July 2018.[79] These bills set up a regulatory framework applicable to the blockchain environment and are collectively referred to as "The Digital Innovation Framework".[80] The Innovative Technology Arrangements and Services Act (ITAS) introduces the legal concepts of Innovative Technology Arrangements (ITAs).[81] Smart contracts as well as DAOs can fall within the definition of an ITA.[82] Instead of granting ITAs legal personality, the Maltese legislator has created a legal link between an ITA and a person, who is referred to as the provider of Innovative Technology Services (ITS provider).[83] Transparency and accountability of the ITA are guaranteed, as the ITS provider is identifiable by investors and authorities and is liable for the activities of the ITA.[84]

More recently, the U.S. state of Vermont introduced an act that was signed into law on 28 August 2018,[85] which adds a new form of company to its legal

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[78] CONSEIL NATIONAL DE MONACO, *No 995 – Projet de loi relative à la technologie Blockchain*, 4 June 2019, available at http://www.conseil-national.mc/index.php/textes-et-lois/projets-de-loi/item/download/1152_1bc1b8db7c55a074329922c9ab5e9d64 on 5.3.2020.

[79] WELCOME CENTER MALTA, *ICO & Crypto Regulation in Malta*, available at https://www.welcome-center-malta.com/blockchain-services-in-malta/ico-crypto-regulation-in-malta/ on 5.3.2020.

[80] M. FALZON/ A. VALENZIA, Malta, in J. Dewey (ed.), *Global Legal Insight – Blockchain & Cryptocurrency Regulation*, London 2018, p. 378. See also R. WOLFSON, Maltese Parliament Passes Laws That Set Regulatory Framework For Blockchain, Cryptocurrency And DLT, *Forbes*, 5 July 2018, available at https://www.forbes.com/sites/rachelwolfson/2018/07/05/maltese-parliament-passes-laws-that-set-regulatory-framework-for-blockchain-cryptocurrency-and-dlt/#4e53149a49ed on 5.3.2020.

[81] Maltese Bill No C 689, Innovative Technology Arrangements and Services Act, 2018, available at http://justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29078&l=1 on 5.3.2020.

[82] First schedule, Art. 2 and 8, para. 2 ITAS (note 81).

[83] The preliminary report discussed the possibility of granting ITAs legal personality when they did not have an underlying ownership structure such as a corporation. However, the final bill does not deal with this issue. See PARLIAMENTARY SECRETARIAT FOR FINANCIAL SERVICES, DIGITAL ECONOMY AND INNOVATION - OFFICE OF THE PRIME MINISTER, *Malta: A Leader in DLT Regulation*, 2018, p. 18, available at https://meae.gov.mt/en/Public_Consultations/OPM/Documents/PS%20FSDEI%20-%20DLT%20Regulation%20Document%20OUTPUT.PDF on 5.3.2020.

[84] P. FELICE, Presenting Innovative Technology Arrangements & Services Act, *Finance Malta*, 18 July 2018, available at https://www.financemalta.org/publications/articles-interviews/articles-and-interviews-detail/second-reading-in-parliament-for-blockchain-bills-the-innovative-technology-arrangements-and-services-act/?source=post_page-------------------------- on 5.3.2020.

[85] Vermont Act No 205 (S.269), An act relating to blockchain business development, available at https://legislature.vermont.gov/Documents/2018/Docs/ACTS/ACT205/ACT205%20As%20Enacted.pdf on 5.3.2020.

order: the Blockchain-Based Limited Liability Company (BBLLC).[86] A BBLLC can be described as a DAO incorporated as a Limited Liability Company (LLC) in Vermont's jurisdiction. This act allows a DAO to validly enter into contractual agreements and protects its "owners, managers and blockchain participants from unwarranted liability".[87] General provisions related to LLCs apply to BBLLCs, as they are a specific form of LLC. The key innovation is that the governance of a BBLLC can be fully or partially provided through blockchain technology, and votes regarding the operation and activities of a BBLLC can be recorded on blockchain-based smart contracts. The state of Vermont has already seen its first BBLLC incorporated as the dOrg LLC,[88] which is believed to be the "first legal entity that directly references blockchain code as its source of governance".[89]

C.   Absence of Legal Status for DAOs in Switzerland

It follows from the foregoing chapters that new forms of entity are being created in the blockchain environment, whether they are governed by the laws of existing jurisdictions (hereafter "regulated DAOs") or simply exist on the internet independently of any jurisdiction (hereafter "maverick DAOs"). In our opinion, the case of The DAO and the more recent emergence of other DAOs – such as the dxDAO, dOrg LLC, and many others which remain in the anonymity of the blockchain environment – show that these new forms of entity have the potential to generate legal implications within Switzerland's jurisdiction, regardless of their creation under a legal order. But most importantly, the case of The DAO has demonstrated the existence of a legal uncertainty regarding jurisdiction over maverick DAOs and the law applicable to their internal organization and to the legal effects they generate.[90] This case has left individuals unsure of their rights and

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[86] Title 11, Chapter 25, Subchapter 12 of the Vermont Statutes Online: Blockchain-based Limited Liability Companies, available at https://legislature.vermont.gov/statutes/fullchapter/11/025 on 5.3.2020.

[87] PROPY, Vermont S.269 (Act 205) and Blockchain-Based Limited Liability Companies (BBLLCs), *Hodl alert*, 31 August 2018, available at https://www.hodlalert.com/2018/08/31/vermont-s-269-act-205-and-blockchain-based-limited-liability-companies-bbllcs/ on 5.3.2020.

[88] O. GOODENOUGH/ C. BURKE, dOrg Launches First Limited Liability DAO, *Gravel & Shea*, June 2019, available at https://www.gravelshea.com/2019/06/dorg-launches-first-limited-liability-dao/?source=post_page--------------------------- on 5.3.2020. See also M. BODDY, DOrg LLC Purports to be First Legally Valid DAO Under US Law, *Cointelegraph*, 12 June 2019, available at https://cointelegraph.com/news/dorg-llc-purports-to-be-first-legally-valid-dao-under-us-law on 5.3.2020.

[89] O. GOODENOUGH/ C. BURKE (note 88).

[90] On legal uncertainties of The DAO, see T. MACHEEL, The DAO Might Be Groundbreaking, But Is It Legal?, *American Banker*, 19 May 2016, available at https://www.americanbanker.com/news/the-dao-might-be-groundbreaking-but-is-it-legal on 5.3.2020.

obligations and has forced the Ethereum community to react, resulting in a situation that is very uncertain from a legal point of view.

The Swiss legislator has yet to show any interest in DAOs and the issues that have arisen from the case of The DAO. There is currently no draft Swiss DAO legislation.[91] We must therefore make use of existing laws in order to include DAOs in our legal order. In the next chapters, we will analyse how DAOs can be treated under Swiss law in order to remedy the current legal uncertainty. The aim is to guarantee both regulated DAOs and maverick DAOs legal existence in Switzerland for the purpose of safeguarding the rights of all parties interacting with them within the Swiss legal order, and to guarantee legal certainty.

V.   The Legal Existence of DAOs in Switzerland

A.   Analysis through the Medium of Private International Law

At present, DAOs cannot be constituted under Swiss law. Regulated DAOs are therefore necessarily entities of foreign law. Maverick DAOs are inherently international entities. Thus it can be concluded that currently any DAO trying to pursue activities in Switzerland inevitably creates an international situation.[92] As a result, DAOs as entities must be recognized and characterized through the medium of private international law in order to define their legal effects in Switzerland.[93] Conflict of laws rules fulfil this role by connecting a legal situation to a legal order.[94] The recognition of foreign DAOs in Switzerland is thus determined by the Swiss Private International Law Act (PILA).[95]

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[91] In Switzerland, the concern of the legislator with regard to blockchain technology was initially centered on the regulatory framework and, in particular the law of the financial markets. This led to the FINMA and the Federal Tax Administration (FTA) publishing guidelines on how ICOs and cryptocurrencies are to be treated. In a second phase, the Swiss Federal Counsel called for the preparation of draft legislation providing targeted adaptation of many laws, mainly in order to adapt the financial sector to the new possibilities offered by crypto tokens and distributed ledgers. It also provides the possibility of holding rights on a distributed ledger and treating them as negotiable securities, for example shares in a company.

[92] See F. GUILLAUME, Blockchain: le pont du droit international privé entre l'espace numérique et l'espace physique, in I. Pretelli (ed.), *Conflict of Laws in the Maze of Digital Platforms*, Geneva/ Zurich/ Basel 2018, p. 175, who states that using a blockchain is enough to confer an international scope upon a transaction, unless it is completed on a permissioned blockchain where all the nodes and users are located within the same territory.

[93] The same issue exists in the case of smart contracts. See F. GUILLAUME (note 92), p. 172.

[94] F. GUILLAUME (note 92), p. 175.

[95] Federal Act on Private International Law of 18.12.1987 (Private International Law Act; PILA; SR 291).

The critical issue at hand is to determine how DAOs are characterized under the PILA. If a DAO can be characterized as a company within the definition of Art. 150 par. 1 PILA, Chapter 10 of the PILA governing companies is applicable. If a DAO cannot be characterized as a company, it is to be characterized as a contract and governed by the provisions of Chapter 9 of the PILA (Art. 150 par. 2 PILA). If a DAO is to be characterized as a company, it remains to be determined whether it is validly constituted under the law of the state it is governed by according to Art. 154 PILA, so that it can be recognized as a legal entity in Switzerland. The issue of the recognition of a DAO as a validly constituted company is pivotal to its existence as a subject of rights and obligations, without which a DAO cannot perform legal acts or institute legal proceedings.[96] A priori, the characterization and recognition of regulated DAOs should be similar to that of other forms of company, leading to a determinable result. However, owing to the unclear status of maverick DAOs, their characterization and recognition are currently unpredictable. This situation creates a legal uncertainty[97] which, in our view, can be remedied thanks to a modern interpretation of the concept of a company under Art. 150 PILA, and an innovative interpretation of what constitutes a "state" and a "law" under Art. 154 PILA, but within the existing practical and functional legal landscape.

B.   Are DAOs Companies?

In order to determine whether a DAO can be characterized as a company under Art. 150 par. 1 PILA, the different elements of the definition must be analysed. It should be noted that the definition of a company in the PILA is independent of its definition under Swiss substantive law,[98] meaning that it is not bound by the *numerus clausus* of companies specified in the Swiss Civil Code (SCC),[99] the Swiss Code of Obligations (SCO)[100] and other Acts.

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[96] F. GUILLAUME, *Lex societatis, Principes de rattachement des sociétés et correctifs institués au bénéfice des tiers en droit international privé suisse*, thesis Lausanne, Zurich 2001, p. 64. See also J.-F. PERRIN, *La reconnaissance des sociétés étrangères et ses effets*, Geneva 1969, p. 10.

[97] According to F. GUILLAUME, Aspects of Private International Law Related to Blockchain Transactions, in D. KRAUS/ T. OBRIST/ O. HARI (eds), *Blockchains, Smart Contracts, Decentralised Autonomous Organisations and the Law*, Cheltenham/ Northampton 2019, p. 60, "[t]he rules of private international law are intended to remedy legal uncertainty by connecting a particular legal relationship with the legal order of a State".

[98] F. GUILLAUME, Art. 150-165 PILA, in A. BUCHER (ed.), *Commentaire Romand, Loi sur le droit international privé, Convention de Lugano*, Basel 2011, Art. 150, No 2.

[99] Swiss Civil Code of 10.12.1907 (SCC; SR 210).

[100] Federal Act of 30.3.1911 on the Amendment of the Swiss Civil Code (Part five: The Code of Obligations; SCO; RS 220).

1.   *Concept of a Company under Art. 150 PILA*

Both an "organized association of persons" and "organized assets" fall within the definition of a company under Art. 150 par. 1 PILA. The legal form of the company and whether or not it has legal personality are not relevant criteria.[101] Similarly, the goal pursued by the company can be either economic or ideal.[102] What can be characterized as a company is intentionally very broad, as the definition must include all social combinations that have a social organization or that are at least organized as a whole.[103]

The key criterion for determining whether an entity falls within the definition of a company is the notion of "organization", meaning that any sufficiently organized entity can be characterized as a company.[104] This leaves room for interpretation in determining whether an entity can be characterized as a company within the meaning of Swiss private international law.[105] In order to consider an entity as sufficiently organized, some authors only require a minimal form of organization for the internal relationships of the entity.[106] Other authors go further and require an organized internal structure where tasks and activities are exercised within a goal-oriented internal organization defined by rules of behaviour.[107] In addition, the organized entity must be recognizable from the outside.[108] In practice, this could mean, for example, that one or more shareholders, who are given management powers, are vested with the power to represent the company externally and with the ability to validly bind the company.[109]

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[101] F. GUILLAUME (note 98), Art. 150, No 2.

[102] F. VISCHER/ T. WEIBEL, Art. 150-156 PILA, in M. MÜLLER-CHEN/ C. WIDMER LÜCHINGER (eds), *Zürich Kommentar zum IPRG*, Vol. II, Art. 108a-200, 3rd edit., Zurich/ Basel/ Geneva 2018, Art. 150, No 3-4.

[103] CONSEIL FÉDÉRAL, *Message concernant une loi fédérale sur le droit international privé (loi de DIP)*, 10 November 1982, FF 1983, p. 425.

[104] F. GUILLAUME (note 98), Art. 150, No 3.

[105] F. GUILLAUME (note 98), Art. 150-165, No 2.

[106] P. NOBEL, Zum Internationalen Gesellschaftsrecht im IPR-Gesetz, in R. MOSER (ed.), *Beiträge zum neuen IPR des Sachen-, Schuld- und Gesellschaftsrechts, Schweizer Studien zum internationalen Recht*, Vol. 51, Zurich 1987, p. 183; F. GUILLAUME (note 98), Art. 150, No 5.

[107] B. DUTOIT, *Droit international privé suisse, Commentaire de la loi fédérale du 18 décembre 1987*, 5th edit., Basel 2016, Art. 150, No 5; S. EBERHARD/ A. VON PLANTA, Art. 150-155 PILA, in H. HONSELL/ N.P. VOGT / A.K. SCHNYDER/ S.V. BERTI (eds), *Basler Kommentar, Internationales Privatrecht*, 3rd edit., Basel 2013, Art. 150, No 16; L. HUBER, *Das Joint-Venture im internationalen Privatrecht (Schriftenreihe des Instituts für Internationales Recht und Internationale Beziehungen*, thesis Basel, Basel/ Frankfurt-am-Main 1992, p. 61.

[108] Decision of the Swiss Federal Tribunal 4A_582/2008 of 27 February 2009, ground 3.1. See also F. GUILLAUME (note 98), Art. 150, No 3; B. DUTOIT (note 107), Art. 150, No 5.

[109] S. EBERHARD/ A. VON PLANTA (note 107), Art. 150, No 16.

An organized association of persons need only meet the general criteria of a company outlined above. There are no additional specific criteria applicable. For example, no written document is required for the constitution of an organized association of persons.[110] In order to facilitate the characterization, parallels can be drawn between the foreign entity to be characterized and forms of company known under Swiss substantive law.[111] However, foreign entities unknown under Swiss substantive law are also characterized as companies, provided that they have a sufficiently organized internal structure.[112] Examples of such unknown foreign entities are partnerships and business associations, which originate from common law jurisdictions.[113]

In addition to the general criteria, organized assets must meet three complementary criteria in order to be characterized as a company: assets must be administered by an administrator, they must be independent of the administrator's assets, and they must have a proper goal.[114] As a result, a set of assets may be characterized as a company under Art. 150 par. 1 PILA under conditions that are more stringent than those for an organized association of persons. When assessing the foreign entity, all factual elements must be taken into consideration.[115] Examples of such entities are foundations,[116] associations and private equity funds.[117]

The main distinguishing criterion between the two kinds of entity falling within the definition of a company under Art. 150 par. 1 PILA is that an organized association of persons is predominantly composed of members, as opposed to assets.[118] In case of doubt regarding the characterization, when a foreign entity is sufficiently organized it must be characterized as an organized association of persons rather than organized assets.[119] In our opinion, the distinction between the two is not of great significance, as both definitions result in the characterization of the entity as a company under Art. 150 par. 1 PILA and the application of Chapter 10 of the PILA. However, the distinction should not be completely disregarded, as it may help us to understand the functioning of a particular DAO.

Simple partnerships that are not sufficiently organized must be characterized as contracts (Art. 150 par. 2 PILA), thus making the foreign entity subject to Chapter 9 of the PILA. This implies that simple partnerships can either be of a contractual nature or a form of company under private international law, depending on their level of organization.[120] The definition of a simple partnership under

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[110] F. GUILLAUME (note 98), Art. 150, No 5.

[111] F. GUILLAUME (note 98), Art. 150, No 5.

[112] F. GUILLAUME (note 98), Art. 150, No 5.

[113] B. DUTOIT (note 107), Art. 150, No 3.

[114] F. GUILLAUME (note 98), Art. 150, No 6.

[115] F. GUILLAUME (note 96), p. 23.

[116] ATF 135 III 614, ground 4.1.1.

[117] B. DUTOIT (note 107), Art. 150, No 6.

[118] F. GUILLAUME (note 98), Art. 150, No 6.

[119] F. GUILLAUME (note 96), p. 24.

[120] F. VISCHER/ T. WEIBEL (note 102), Art. 150, No 18.

Swiss substantive law, provided by Art. 530 SCO, is not relevant for the characterization of the foreign entity.[121] Art. 150 par. 2 PILA refers to the term "simple partnership" only to help distinguish contracts from companies, as this form of entity is halfway between the two.[122] Entities that are not organized in accordance with one of the forms of company provided by the *numerus clausus* of Swiss law are not necessarily characterized as a simple partnership of a contractual nature under Art. 150 par. 2 PILA.[123] A foreign entity is deemed to be a simple partnership of a contractual nature only if it cannot be characterized as an organized association of persons or organized assets within the meaning of Art. 150 par. 1 PILA.[124]

There are a multitude of elements that have to be considered when assessing whether a simple partnership is to be characterized as a company or as a contract, and no single element is decisive on its own.[125] The first element to consider is whether the simple partnership has an internal structure where tasks and activities are functionally arranged within the framework of a purposeful internal organization.[126] For the legislator, a key indicator that a foreign entity can be characterized as a company is whether or not it has a "a strong enough organization".[127] The Swiss Federal Tribunal has refused to characterize foreign entities as companies because they were not organized and were lacking an "institutionalized management".[128] Other elements that tend to demonstrate that the foreign entity is a company are whether the entity has more than two members, whether decisions within the entity are taken by the majority, whether the entity is independent from its members, whether the entity continues to exist if one of the members leaves, and whether the entity has goals that are to be pursued over a long period of time.[129]

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[121] B. DUTOIT (note 107), Art. 150, No 8.

[122] F. GUILLAUME (note 98), Art. 150, No 10.

[123] F. GUILLAUME (note 98), Art. 150, No 10; B. DUTOIT (note 107), Art. 150, No 8.

[124] F. VISCHER/ T. WEIBEL (note 102), Art. 150, No 18; F. GUILLAUME (note 98), Art. 150, No 11; B. DUTOIT (note 107), Art. 150, No 8.

[125] F. GUILLAUME (note 98), Art. 150, No 11; S. EBERHARD/ A. VON PLANTA (note 107), Art. 150, No 23.

[126] S. EBERHARD/ A. VON PLANTA (note 107), Art. 150, No 16.

[127] CONSEIL FÉDÉRAL (note 103), p. 425.

[128] ATF 142 III 466, ground 5.2; decision of the Swiss Federal Tribunal 4A_582/2008 of 27 February 2009, ground 3.1.

[129] F. GUILLAUME (note 98), Art. 150, No 11; J. KREN KOSTKIEWICZ, *IPRG/LugÜ Kommentar, Bundesgesetz über das Internationale Privatrecht, Lugano-Übereinkommen und weitere Erlasse*, 2nd edit., Zurich 2019, Art. 150, No 6; B. DUTOIT (note 107), Art. 150, No 8; F. VISCHER/ T. WEIBEL (note 102), Art. 150, No 22; S. EBERHARD/ A. VON PLANTA (note 107), Art. 150, No 17.

2.   *Characterizing DAOs under Art. 150 PILA*

Existing forms of regulated DAO include the Maltese Innovative Technology Arrangement (ITA) and Vermont's Blockchain-Based Limited Liability Company (BBLLC). Since they are both forms of company of foreign law, we can generally assume that a DAO constituted according to those laws would be sufficiently organized in the sense of Art. 150 PILA. As such, we consider dOrg LLC to be an organized association of persons under Art. 150 PILA.

However, a similar general assumption applicable to all maverick DAOs would be inadequate, as they can include any entity that falls within our definition of a DAO provided above[130] and that is not regulated under the law of a state. It would be wrong to assume that all maverick DAOs are sufficiently organized to be characterized as companies under Art. 150 PILA, just as it would be wrong to assume that none of them should be characterized as such. Therefore, when dealing with a maverick DAO, its structure must be analysed in light of Art. 150 PILA, which is what we shall now do with respect to the three identified maverick DAOs.

a)   *The DAO*

The DAO was a blockchain-based entity that was designed to function in a similar way to a venture capital fund. Its governance and operational rules were programmed in its smart contracts. A parallel can be drawn with collective investment schemes governed by the Collective Investment Schemes Act (CISA)[131] in Swiss law. However, in light of Art. 150 PILA, it is unnecessary to proceed to a full analysis in order to determine whether The DAO had the necessary characteristics to be characterized as a collective investment scheme under the CISA.[132] Even if The DAO did not have all the required characteristics prescribed by the CISA, similarities were sufficiently apparent for some authors to carry out this analysis before concluding that the characterization was not possible.[133] Similarities with collective investment schemes included the internal organization of The DAO and

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[130] See *supra* Chapter III. C.

[131] Federal Act of 23.6.2006 on Collective Investment Schemes (Collective Investment Schemes Act; CISA; RS 951.31).

[132] In order to be considered sufficiently organized under Art. 150 PILA, a company does not need to correspond to a form of company under Swiss substantive law. There would therefore be no point in determining whether The DAO had the necessary characteristics to be characterized as an investment scheme.

[133] O. HARI, The Protection of the Investors in the Fintech Context (Podcast), in *Jusletter IT Flash*, 26 January 2017, available at https://jusletter-it.weblaw.ch/en/flash/flash/26-januar-2017/podcast-hari.html on 5.3.2020; M. HESS/ P. SPIELMANN, Cryptocurrencies, Blockchain, Handelsplätze & Co. – Digitalisierte Werte unter Schweizer Recht, in T.U. REUTTER/ T. WERLEN (eds), *Kapitalmarkt – Recht und Transaktionen XII*, Zurich/ Basel/ Geneva 2017, pp. 192 *et seq.*, available at https://www.wengervieli.ch/getattachment/9e2e0b00-f2e4-425c-8222-ce252c01e165/171006_Hess_Spielmann_KAPITALMARKT-EIZ_XII.pdf.aspx on 5.3.2020.

the goal it was pursuing.[134] Furthermore, information regarding those elements was publicly available in The DAO's white paper.[135] In our view, this shows that The DAO had a distinctive goal-oriented internal organization that was enough to satisfy the first condition for considering it sufficiently organized under Art. 150 PILA.

Token holders of The DAO could be seen as shareholders, as they were granted voting rights proportional to their investment. Even though The DAO was not represented externally by an individual, it could only release certain of its funds if a majority of the token holders agreed to this. There was collective functioning that was clearly apparent to third parties. Thus the second condition prescribed by the established doctrine was also met. The DAO was sufficiently organized within the meaning of Art. 150 PILA to be characterized as a company.

In order to determine whether The DAO was an organized association of persons or organized assets, one fundamental element to consider was whether The DAO was predominantly composed of members or of assets. The DAO was primarily formed of token holders, and they were seeking a return on investment. Also, the investments they held in The DAO were not independent of their assets. The DAO could therefore be characterized as an organized association of persons under Art. 150 PILA.

b)   *Aragon Network*

The Aragon Network is a DAO that serves as a dispute resolution protocol and works similarly to an online court. When a dispute is submitted to the Aragon Network, a pool of jurors must vote on a predefined number of possible outcomes in order to determine the final ruling.[136] The option that receives most votes is the winning ruling. Jurors are incentivized to pick "the right solution" by a majority mechanism on which their remuneration depends. This mechanism is publicly disclosed in the DAO's white paper.[137] The Aragon Network thus has an internal structure with an organized economic flow and an organized governance flow.[138] This shows that the Aragon Network has a distinctive goal-oriented internal organization, which is enough to satisfy the first condition for considering it sufficiently organized under Art. 150 PILA.

The governance of the Aragon Network is operated by the DAO's token holders, similarly to the shareholders of a company. Furthermore, the Aragon Network is easily recognizable as an entity by third parties that submit a dispute and jurors who vote on an outcome. The Aragon Network is therefore sufficiently

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[134] See O. HARI (note 133), for whom The DAO had many similarities with collective investment schemes.

[135] C. JENTZSCH (note 46).

[136] ARAGON NETWORK (note 52).

[137] ARAGON NETWORK (note 52).

[138] L. CUENDE (note 51).

organized both internally and externally to be characterized as a company under Art. 150 PILA.

The Aragon Network is formed predominantly of its token holders. The DAO's assets are only a means of making it function. The Aragon Network can therefore be characterized as an association of persons under Art. 150 PILA.

c)   dxDAO

The dxDAO was designed to govern the decentralized trading platform DutchX and enhance its upgradeability. Users wishing to participate in the governance processes had to earn some voting power called "Reputation" via a staking mechanism that operated during a 30-day initialization process. Henceforth, each time an upgrade or governance change is proposed, users can vote in proportion to the Reputation they have earned. The full description of this mechanism is available in the dxDAO's white paper.[139] The dxDAO clearly has an internal organization and its existence serves a goal, meaning that it satisfies the first necessary condition required for it to be considered sufficiently organized under Art. 150 PILA.

Actions of the dxDAO are commissioned by its participants through the voting process. Furthermore, to third parties it is a distinguishable entity that governs the DutchX trading platform. Therefore, the dxDAO is sufficiently organized both internally and externally to be characterized as a company under Art. 150 PILA.

The participants holding Reputation in the dxDAO predominantly form the company. Here too, the DAO's assets are only a means of making it function. The dxDAO can therefore be characterized as an organized association of persons under Art. 150 PILA.

C.   What Law Governs DAOs?

After having established that both regulated DAOs and maverick DAOs may be characterized as companies under Swiss private international law, it remains to be determined whether DAOs can be recognized in Switzerland and considered subjects of law. The recognition of a foreign company in Switzerland can only occur if the company has been validly constituted. The search for the law governing a DAO is therefore a necessary step in determining whether or not it can be recognized in Switzerland.

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[139] VELENIR, *dxDAO: Toward super-scalable organizations*, pp. 11-16 available at https://github.com/gnosis/dx-daostack/raw/master/dxdao_whitepaper_v1.pdf on 5.3.2020.

1. *Law Governing Companies under Art. 154 PILA*

A company must be validly constituted in accordance with the law of a state in order to exist in law.[140] Art. 154 PILA establishes connecting factors that determine the law governing the company. This law, also called the *lex societatis*, governs the company's legal structure, its internal organization and the requirements for registration in a company register.[141] In this respect, the legal existence of a company depends on the validity of its constitution according to the *lex societatis*.[142]

Art. 154 PILA provides a cascading system for determining the *lex societatis*. The general rule points to the law of the state under which the company is organized (Art. 154 par. 1 PILA). This stems from the theory of incorporation.[143] Alternatively, the law of the state where the company is actually administered is applicable (Art. 154 par. 2 PILA). This should not, however, be considered a reference to the theory of the seat of administration.[144]

A company is validly constituted within the meaning of Art. 154 par. 1 PILA if it meets the formal publicity and registration requirements set out in the law according to which it is organized or, where such requirements do not exist, if it is correctly organized according to that same law.[145]

If the conditions set forth in Art. 154 par. 1 PILA are not fulfilled, the alternative solution contained in Art. 154 par. 2 PILA is applicable. In that case, the state where "the company is actually administered"[146] must be determined. It appears that this wording refers to the administrative headquarters as defined in Art. 21 par. 2 PILA.[147] This is an objective criterion that requires that the state with which the company has the closest connections in regard to its administration be determined.[148] It corresponds to the state where the fundamental decisions are made and where the company's operational management is usually located.[149] Indicators that can help determine the relevant state include the place where the company's directors meet, the place where the general assemblies are held, the administrative centre where the accounts are kept, and the place where the company's clients

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[140] F. GUILLAUME (note 98), Art. 154, No 1.

[141] F. GUILLAUME (note 98), Art. 154, No 1.

[142] F. GUILLAUME (note 98), Art. 154, No 1.

[143] ATF 117 II 494, grounds 5-6. See also B. DUTOIT (note 107), Art. 154, No 5; F. GUILLAUME (note 98), Art. 154, No 1.

[144] F. GUILLAUME (note 98), Art. 154, No 20; S. EBERHARD/ A. VON PLANTA (note 107), Art. 154, No 12. *Contra*: B. DUTOIT (note 107), Art. 154, No 5.

[145] F. GUILLAUME (note 98), Art. 154, No 15-17.

[146] The French version of Art. 154 par. 2 PILA refers to "*le droit de l'Etat dans lequel elle est administrée en fait*".

[147] F. VISCHER/ T. WEIBEL (note 102), Art. 154, No 27; F. GUILLAUME (note 98), Art. 154, No 19.

[148] F. GUILLAUME (note 98), Art. 154, No 19.

[149] F. GUILLAUME (note 98), Art. 154, No 19.

reside.[150] If the operations of the company are managed from a number of countries, the place where the head office is located, *i.e.* where the company's headquarters are, is decisive.[151]

If the company meets all the constitution requirements outlined in the law of the state under which it is organized (when Art. 154 par. 1 PILA applies) or, alternatively, in the law of the state where it is actually administered (when Art. 154 par. 2 PILA applies), the company is automatically (*ipso jure*) recognized in Switzerland and exists as a subject of law.[152] However, if the company does not meet all applicable constitution requirements as required under Art. 154 PILA, it is not considered to be validly constituted under Swiss private international law, regardless of its characterization as a company under Art. 150 PILA. Such a company does not exist in the Swiss legal order.[153]

The Swiss legislator wrote Art. 154 PILA in such a way as to prevent this last situation from happening. Art. 154 par. 2 PILA offers a "second chance" to companies that are not validly constituted under Art. 154 par. 1 PILA. The reason is that, in order to preserve transaction security, the legislator wanted to avoid the situation of a company constituted under a foreign law not having legal existence in Switzerland.[154] The legislator therefore designed a flexible system that prioritizes the interests of third parties who rely on the appearance that a company has legal existence on Swiss territory.[155] The principle of automatic recognition of foreign entities (*i.e.* the *favor recognitionis* principle) is thereby applicable,[156] meaning that foreign entities are generally and *ipso jure* recognized in Switzerland.[157]

2. Determining the Law Governing DAOs under Art. 154 PILA

A regulated DAO such as a Maltese ITA or a Vermont BBLLC may be recognized *ipso jure* as a company if it is validly organized under the law of that state. In other words, it may be granted legal existence in Switzerland. That is, if dOrg LLC is validly constituted according to Vermont law, it is recognized *ipso jure* in Switzerland and has a legal existence. As a result, dOrg LLC is the subject of rights and

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[150] S. EBERHARD/ A. VON PLANTA (note 107), Art. 154, No 14; F. GUILLAUME (note 98), Art. 154, No 19; J. KREN KOSTKIEWICZ (note 129), Art. 154, No 14.

[151] F. VISCHER/ T. WEIBEL (note 102), Art. 154, No 26; F. GUILLAUME (note 98), Art. 154, No 19.

[152] F. GUILLAUME (note 98), Art. 154, No 44.

[153] F. GUILLAUME (note 98), Art. 154, No 18; F. VISCHER/ T. WEIBEL (note 102), Art. 150-156, No 29; B. DUTOIT (note 107), Art. 154, No 5.

[154] CONSEIL FÉDÉRAL (note 103), pp. 428 *et seq*.

[155] CONSEIL FÉDÉRAL (note 103), p. 428.

[156] ATF 117 II 494, ground 6.b; see also F. VISCHER/ T. WEIBEL (note 102), Art. 150-156, No 26; F. GUILLAUME (note 98), Art. 154, No 43.

[157] F. VISCHER/ T. WEIBEL (note 102), Art. 150-156, No 9; F. GUILLAUME (note 98), Art. 150-165, No 9; F. GUILLAUME (note 96), pp. 65-68; KREN KOSTKIEWICZ (note 129), Art. 154, No 15.

obligations within the Swiss legal order, to the same extent as any other foreign company.

However, maverick DAOs are, by definition, not organized in accordance with the law of a state, as they exist on the internet independently of any jurisdiction.[158] Accordingly, a literal or strict interpretation of Art. 154 par. 1 PILA lead us to consider that maverick DAOs cannot be considered to be validly constituted under the law of a state.

It must then be determined whether the *lex societatis* can be established via the subsidiary connecting factor provided by Art. 154 par. 2 PILA, which points to the law of the state where the company is actually administered. As mentioned above,[159] this is an objective criterion for which the State with which the company has the closest connections in regards to its administration must be determined.[160] The indicators will be analysed hereafter for each of the three selected maverick DAOs, that is to say The DAO, the Aragon Network and the dxDAO.[161]

a)   The DAO

All governance and operational rules of The DAO were programmed on the Ethereum blockchain. Projects to be funded could be submitted by any participant and were approved or rejected by the community of participants by vote. Since there was no hierarchy within The DAO, there was no directors' meeting. The community of participants could be viewed as the general assembly. However, participants were anonymous, meaning that the place of residence of a participant could not serve as a connecting factor, and they never met in a physical space. Furthermore, every decision made by The DAO and all communications took place over the internet. Similarly, there was no administrative centre within a state jurisdiction, as all decisions were made by vote on the internet. No link existed between The DAO and a specific state jurisdiction. The "place" where The DAO was actually administered as understood in Art. 154 par. 2 PILA was online.

b)   *Aragon Network*

The Aragon Network is run by holders of the Aragon Network Token (ANT). All governance decisions are made by voting with ANT. A member of the Aragon Network can propose changes to the DAO's governance through a specific procedure called the Aragon Governance Proposal (AGP).[162] One stage of the procedure currently requires the proposal to be approved by the Aragon Association board of

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[158] See *supra* Chapter IV. C.

[159] See *supra* Chapter V. C. 1.

[160] F. GUILLAUME (note 98), Art. 154, No 19.

[161] See *supra* Chapter III. B.

[162] The detailed procedure can be accessed at https://github.com/aragon/AGPs/blob/master/AGPs/AGP-1.md on 5.3.2020.

directors before it can be submitted to the community for voting. The Aragon Association being a Swiss-based entity, this step in the proposal procedure could be enough to create a link between the Aragon Network and Swiss jurisdiction. However, this power of filtering proposals is the only one given to the Aragon Association. As a result, its board of directors cannot be considered to be the Aragon Network's directors. The final decisions are made by the community of ANT holders. They are anonymous and can potentially reside anywhere in the world. Since all governance decisions are made by the community of ANT holders, the general assembly can be assumed to be held online, just as the administrative centre of the Aragon Network can be considered to be on the internet. Even if a weak link with Swiss jurisdiction does exist, the "place" where the Aragon Network is actually administered as understood in Art. 154 par. 2 PILA is online.

c)   *dxDAO*

Here also a link exists between the dxDAO and a state jurisdiction. The dxDAO was developed and launched by Gnosis Ltd. However, all ties to this Gibraltar-based company have been severed. Decisions about the dxDAO's processes and assets are made solely by participants holding Reputation, who are anonymous and can potentially reside anywhere in the world. Also, there is no hierarchy among Reputation holders, such that there are no directors. While anyone can submit a proposal to update the dxDAO's protocol, only Reputation holders can participate in the voting procedure to accept or refuse the update. As a result, it can be considered that the general assembly of the dxDAO is held online. Furthermore, communications within the community are made via the internet. Even if a very weak link with Gibraltar's jurisdiction does exist, the "place" where the Aragon Network is actually administered as understood in Art. 154 par. 2 PILA is online.

VI.   The Emergence of an Online Jurisdiction

A.   Expanding the Notions of "State" and "Law" under Art. 154 PILA

As seen above,[163] maverick DAOs cannot be linked to a state, as they are not organized according to the law of a state and they are not administered within a state jurisdiction. Using a traditional interpretation of what constitutes a "state" and a "law", maverick DAOs have no legal existence in the Swiss legal order.[164] This situation is unsatisfactory from a legal point of view as it leaves a legal

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[163] See *supra* Chapter IV. C.

[164] See *supra* Chapter V. C. 1.

uncertainty for maverick DAOs, their participants and possible third parties that interact with them.[165]

The possibility that a company is not recognized as validly constituted under Art. 154 PILA has traditionally been admitted by the Swiss legislator in the case of companies that refuse to comply with the registration and publicity requirements of the law under which they choose to organize or the law under which they are administered. However, such circumstances are considered to be very unlikely thanks to the system established by Art. 154 PILA, which refers to the law of the organization of the company as a primary connection and the law of the administration of the company as a subsidiary connection.[166] The situation with regard to maverick DAOs is unforeseen, as they are a new type of company that the Swiss jurisdiction has yet to bring within its orbit.[167] Founders of maverick DAOs do not choose to elude constitution requirements outlined in a legal system. Instead, they use the new technology that is available to them to constitute whole new corporate forms that are unregulated within state jurisdictions. The Maltese ITA and Vermont's BBLLCs are forms of company that, while incorporating the use of blockchain technology to some degree, still operate in line with the traditional model of a company. Maverick DAOs do not fit this standard model, as they place the power to define organizational modalities solely in the hands of the community of users.

This, however, does not mean that maverick DAOs should exist outside of the law. It is in the interest of state jurisdictions, participants and third parties to allow maverick DAOs to exist as subjects of law. For this reason, the first reaction of many authors has been to try to characterize maverick DAOs under substantive law in order to grant them legal existence. This exercise has been attempted by Swiss authors who have tried to force The DAO into forms of company known under Swiss substantive law.[168] However, they had no choice but to note that, while The DAO resembled many aspects of some forms of company, it did not fit the constitutive criteria of any form of Swiss company.[169]

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[165] The legal uncertainty exists in a general sense for any individual interacting with blockchain systems. See for example O. HARI, The protection of the owners of cryptocurrencies, in particular bitcoin: selected aspects of Swiss financial market and insolvency law, in D. KRAUS/ T. OBRIST/ O. HARI (eds), *Blockchains, Smart Contracts, Decentralised Autonomous Organisations and the Law*, Cheltenham/ Northampton 2019, pp. 207-214.

[166] F. GUILLAUME (note 96), pp. 193 *et seq*.

[167] As seen *supra* Chapter V. B., maverick DAOs can be regarded, under certain conditions, as companies under the PILA.

[168] M. HESS/ P. SPIELMANN (note 133), pp. 191-193; O. HARI (note 133).

[169] M. HESS/ P. SPIELMANN (note 133), pp. 191-193 tried to characterize The DAO as a simple company (Art. 530 ff SCO), as a collective investment scheme (Art. 7 CISA and Art. 5 of the Ordinance of 22.11.2006 on Collective Investment Schemes [Collective Investment Schemes Ordinance; CISO; RS 951.311]), and as an investment club (Art. 1a CISO). For each form of company, the authors had to conclude that The DAO did not fit the legal definition. Likewise, O. HARI (note 133) has doubts as to whether The DAO, in the

Thus, applying Swiss substantive law to maverick DAOs is not the right way to integrate them into the Swiss legal system. Not only could it not be done in the particular case of The DAO but, since each maverick DAO is governed differently and has its own structure, no general rule could be applied to all maverick DAOs. A different solution must be considered, one that is appropriate for all maverick DAOs that are organized under Art. 150 PILA to a sufficient extent to be characterized as companies. This can only be done by departing from the traditional interpretation of the reference to a state and a law in the conflict of laws rules. The understanding of the words "state" and "law" under Art. 154 PILA must be broadened in order to include the online space and the code upon which it is constituted. This translates into the recognition of an online jurisdiction that is independent of any state jurisdiction.

B.   Rationale behind an Online Jurisdiction

The concept of a new community-based jurisdictional order in the online space is not new and has been developed with the rise of the internet to address the phenomenon whereby "corporations and communities regulate themselves and constitute their own jurisdictional order".[170] This jurisdictional order can be referred to as an online jurisdiction. Founders of maverick DAOs and their participants are organizing themselves with this idea of self-governance in mind. They are using blockchain technology to organize and govern their assets in such a way that they do not need to rely on a central government to provide them with a legal framework for their operations and the protections that come with it. They are relying solely on the technology itself and on the principle of "code is law".[171] Founders of maverick DAOs and their participants makes themselves subject to the rules governing the DAO in the same way as they would to the rules of the company law of a state jurisdiction. Maverick DAOs regulate themselves and determine their own jurisdictional order. They do not need the intervention of a state to legitimise their existence.

The founders of a maverick DAO choose the code of the DAO as the law governing their company,[172] just as the founders of a Swiss LLC choose Art. 772 ff

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event of Swiss law being applicable, could have been legally characterized as a collective investment scheme.

[170] U. KOHL, *The Net and the Nation State – Multidisciplinary Perspectives on Internet Governance*, Cambridge (UK)/ New York 2017, p. 192.

[171] The idea of "code is law" comes from L. LESSIG, Code Is Law – On Liberty in Cyberspace, *Harvard Magazine*, 1 January 2000, available at https://harvardmagazine.com/2000/01/code-is-law-html on 5.3.2020. It establishes the principle that code regulates behaviour on the internet. This idea is very popular in the blockchain ecosystem, where it is generally accepted that the only rules that can regulate behaviour within a system (such as a DAO) are the ones set in the code. Any participant in a blockchain system agrees to the rules of the code, and any behaviour allowed by the code is right.

[172] Here, a DAO can be referred to as a company, assuming that it is sufficiently organized under Art. 150 PILA.

SCO as the law governing theirs. By analogy with the choice of law of a state provided for in Art. 154 par. 1 PILA, the founders of a maverick DAO should be granted the freedom to choose the code of the DAO as the *lex societatis*. In doing so, the founders submit to their own digital jurisdictional order, *i.e.* to an online jurisdiction. And by entering into a maverick DAO, participants submit to this online jurisdiction as well.

The recognition by the Swiss legal order of an online jurisdiction would enable maverick DAOs to choose their code as their *lex societatis*. In this context, Art. 154 par. 1 PILA provides that a maverick DAO would have to be validly constituted under its code in order to be automatically recognized in Switzerland. By the simple fact of existing, maverick DAOs would, by definition, be validly constituted according to their *lex societatis*, *i.e.* according to their code, and would thus be granted legal existence in Switzerland provided that they were organized to a sufficient extent under Art. 150 PILA. The direct consequence would be that maverick DAOs could become subjects of rights and obligations in the Swiss legal order. This would grant legal existence in Switzerland to contractual relationships between a DAO and third parties. In this way, all parties could benefit from the contractual protections and the enforcement mechanisms offered by the Swiss legal order when a DAO is operating outside the blockchain environment.

In addition, granting maverick DAOs legal existence would provide Swiss courts with the necessary legal tools to apply provisions of company law in specific cases, which would be impossible if they continued to exist outside of the law. Indeed, if a maverick DAO is considered to be a validly constituted company under Art. 154 PILA and is granted legal existence in Switzerland, the mechanisms provided by Art. 15 and 17 to 19 PILA, which allow the revision of the *lex societatis* of the DAO by providing alternative connecting factors, would be applicable.[173] This would guarantee, for example, the preservation of the Swiss public order through Art. 17 PILA. A maverick DAO misleading a contracting party into thinking it was governed by Swiss law could be made subject to Swiss company law regulations in order to preserve the interests of third parties. Similarly, mandatory provisions of Swiss law could be imposed upon the maverick DAO through Art. 18 PILA.[174] In this way, if the participants in the DAO used their company to act in a manner that abused the rights of third parties, a Swiss court could apply to the DAO any principle that is part of the Swiss public order, such as the prohibition of abuse of rights that stems from Art. 2 par. 2 SCC.

In order for the legal theory as developed above to be valid, we must find a way to incorporate the concept of online jurisdiction into the notion of "state" under Art. 154 PILA, which would also allow us to consider the code of a DAO as its law. While simply proposing an extensive interpretation of the reference to a state in this conflict of laws rule could be an option, another line of reasoning based on stronger legal means might exist. Some legal challenges arising from the use of new technologies could be addressed with the incorporation of a new

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[173] ATF 117 II 494, ground 7; ATF 135 III 614, ground 4.2.

[174] Mandatory provisions of foreign law could also be imposed in the same way through Art. 19 PILA.

principle into the Swiss legal order: the principle of functional equivalence. This principle could also be the key to substantiating our legal theory, as the next section will demonstrate.

C.   Functional Equivalence as the Enabler of the Online Jurisdiction Concept

With the development of smart contracts, many authors have written about recognition of their legally binding effect.[175] Some authors are pushing for the principle of functional equivalence to be introduced into the Swiss legal order in order to circumvent legal challenges arising from smart contracts, without having to introduce new legislation.[176] At an international level, this principle "was established for the first time in air freight transport"[177] and exists today in other parts of transport law, such as maritime freight, cross-border road transport, railway freight and maritime trade. It was also incorporated into the UNCITRAL Model Laws on Electronic Commerce,[178] on Electronic Signature[179] and on Electronic Transferable Records.[180]

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[175] See in general O. HARI/ U. DUPASQUIER, Blockchain And Distributed Ledger Technology (DLT): Academic Overview Of The Technical And Legal Framework And Challenges For Lawyers, *International Business Law Journal*, No 5, 2018, pp. 423-447; B. CARRON/ V. BOTTERON, Le droit des obligations face aux "contrats intelligents", in B. CARRON/ C. MÜLLER (eds), *3e Journée des droits de la consommation et de la distribution, Blockchain et Smart Contracts – Défis juridiques*, Basel 2018, pp. 1-50; C. MÜLLER, Die Smart Contracts aus Sicht des Schweizerischen Obligationenrechts, *Zeitschrift des Bernischen Juristenvereins*, Vol. 5, 2019, pp. 330-352; A. FURRER, Die Einbettung von Smart Contracts in das schweizerische Privatrecht, *Anwaltsrevue*, No 3, 2018, pp. 103-115; M. EGGEN, Smart Contracts und allgemeine Geschäftsbedingung, in S. Emmenegger *et al.* (eds), *Brücken bauen: Festschrift für Thomas Koller*, Berne 2018, pp. 155-175; F. MÖSLEIN, Smart Contracts im Zivil- und Handelsrecht, *Periodical for Overall Commercial and Business Law*, Vol. 183, 2019, pp. 254-293.

[176] A. FURRER/ L. MÜLLER, *"Functional equivalence" of digital legal transactions – A fundamental principle for assessing the legal validity of legal institutions and legal transactions under Swiss law*, 18 June 2018, available at https://www.mme.ch/fileadmin/files/documents/MME_Compact/2018/180619_Funktionale_AEquivalenz.pdf on 5.3.2020 [translation from A. FURRER/ L. MÜLLER, "Funktionale Äquivalenz" digitaler Rechtsgeschäfte – Ein tragendes Grundprinzip für die Beurteilung der Rechtsgültigkeit von Rechtsinstituten und Rechtsgeschäften im schweizerischen Recht, *Jusletter*, 18 June 2018]; C. MÜLLER, Les "Smart Contracts" en droit suisse, in B. CARRON/ C. MÜLLER (eds), *3e Journée des droits de la consommation et de la distribution, Blockchain et Smart Contracts – Défis juridiques*, Basel 2018, pp. 51-114, No 80-87.

[177] A. FURRER/ L. MÜLLER (note 176), p. 5, No 14.

[178] UNCITRAL, *Model Law on Electronic Commerce with Guide to Enactment*, 1996, pp. 20 *et seq.*, available at https://www.uncitral.org/pdf/english/texts/electcom/05-89450_Ebook.pdf on 5.3.2020.

As proposed by some authors, the principle of functional equivalence could be recognized in the Swiss legal order in the following form: "[i]nsofar as Swiss law attaches the validity of legal transactions or the existence of a legal institution to substantive or formal requirements, these requirements shall be deemed to be fulfilled if a digital system can functionally replace the legal protection concerns behind these requirements on an equivalent basis".[181] Accordingly, where the law provides for a register, blockchain technology would be recognized as an equivalent without the need to change the law.[182] Likewise, an ownership transfer operated on a blockchain ledger would also be recognized.[183]

One possible approach to an extensive interpretation of the notion of "state" under Art. 154 PILA in order to incorporate the concept of an online jurisdiction is that of applying the principle of functional equivalence in a similar way to the approach being developed for smart contracts. This would lead to an interpretation of the notion of a state under Art. 154 PILA that accords with the aim of the legal provision rather than the constitutional law definition of a state. In its teleological interpretation, Art. 154 PILA serves as a means to provide a company with a legal framework within which to organize and as a legitimizer of its existence as a legal entity. As we have seen above,[184] the code of a maverick DAO serves as the law under which it is organized. Likewise, it legitimizes itself solely by its existence. A maverick DAO does not need a state jurisdiction to provide it with a legal framework in order to organize and to grant it legal personality in order to exist, but rather, it simply exists online in accordance with its code as an entity independent of any state jurisdiction. As such, the online space that we refer to as the online jurisdiction can functionally replace the state as a legal framework provider and an existence legitimizer. The application of the principle of functional equivalence would not extend disproportionately the notion of "state" under Art. 154 PILA, since it would be consistent with the aim of the legal provision.

The principle of functional equivalence could then allow us to recognize that a maverick DAO's code can serve as its *lex societatis* and that the code is legitimized by the online jurisdiction. In this way, we would be able to grant legal existence in Switzerland to maverick DAOs that can be characterized as companies under Art. 154 PILA. The legal recognition of maverick DAOs has the advantage of bringing legal security to all parties interacting with such companies within the Swiss legal order. In this way, a maverick DAO's participants know that the activities they are undertaking are the source of rights and obligations within the

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[179] UNCITRAL, *Model Law on Electronic Signatures with Guide to Enactment*, 2001, No 154, available at https://www.uncitral.org/pdf/english/texts/electcom/ml-elecsig-e.pdf on 5.3.2020.

[180] UNCITRAL, *Model Law on Electronic Transferable Records*, 2018, Art. 8-11, available at https://www.uncitral.org/pdf/english/texts/electcom/MLETR_ebook.pdf on 5.3.2020.

[181] A. FURRER/ L. MÜLLER (note 176), p. 4, No 9.

[182] A. FURRER/ L. MÜLLER (note 176), p. 4, No 11.

[183] A. FURRER/ L. MÜLLER (note 176), p. 4, No 11.

[184] See *supra* Chapter VI. B.

Swiss legal order. It also provides third parties with the assurance that, when they contract with a maverick DAO, the underlying legal relationships are legally binding in Switzerland. Finally, it provides Swiss courts with the legal instruments to guarantee the preservation of the Swiss public order and the application of mandatory provisions of Swiss law.

VII. Conclusion

We identified two broad categories of DAO, after precisely defining what a DAO is by first analysing the underlying technology – blockchain technology –, and then taking inspiration from both IT and legal authors and examining existing entities that identify as DAOs. We then noted that two states have already introduced legislation to create blockchain-based companies, which we referred to as regulated DAOs. Finally, we acknowledged the existence of blockchain-based entities that exist outside of any legal order, which we referred to as maverick DAOs.

Taking the Swiss legal order as an example, our aim has been to find a way to recognize the legal existence of both categories of DAO in order to guarantee legal certainty for all actors interacting with them, that is to say, participants and contracting parties. We have acknowledged that DAOs are already engaging in activities within the Swiss legal order even though such entities do not exist under Swiss law. As a result, the legal scope of those activities is currently unclear. We determined that the preferred pathway for improving legal certainty is to use existing legal tools in the Swiss legal order, namely provisions of Swiss private international law.

It emerges from our analysis that the recognition in Switzerland of regulated DAOs – namely, for the time being, the Maltese ITA and Vermont's BBLLC – does not raise any particular legal issue. Both types of regulated DAO can be recognized in the Swiss legal order on the basis of Chapter 10 of the PILA in the same way as traditional companies, as they are sufficiently organized under Art. 150 PILA to be characterized as companies in private international law. For this reason, if a regulated DAO is validly constituted in accordance with the law under which it is organized, it exists *ipso jure* in the Swiss legal order pursuant to Art. 154 par. 1 PILA.

However, we have found that the recognition of maverick DAOs in the Swiss legal order is less straightforward. Since maverick DAOs are not regulated by a legal framework, they can take many different shapes. As a consequence, each maverick DAO must be individually analysed in order to determine whether it is sufficiently organized under Art. 150 PILA to be characterized as a company. We came to the conclusion that the three maverick DAOs we took as examples, that is, The DAO, the Aragon Network and the dxDAO, can all be characterized as companies under Art. 150 PILA. At the same time, we found that the next stage in the legal reasoning that would underlie recognition of the legal existence in Switzerland of maverick DAOs becomes more challenging.

Since the wording of Art. 154 PILA requires a company to be organized in accordance with the law of a state, and given that maverick DAOs exist outside of

any legal order, we introduced the concept of an online jurisdiction. This concept is based on the acknowledgment that founders of, and participants in, maverick DAOs voluntarily choose to operate outside of existing legal frameworks offered by states. For this reason, it is our opinion that the code of a DAO must be recognized as its governing law and that this code exists within an online jurisdiction. This led us to consider that the word "state" used in Art. 154 PILA could be understood as referring to the online jurisdiction when dealing with maverick DAOs. Likewise, the word "law" in the same provision could be understood as meaning the code of maverick DAOs. This legal construct allows maverick DAOs to be recognized and, consequently, to be granted legal existence in Switzerland pursuant to Art. 154 PILA, provided that they are sufficiently organized under Art. 150 PILA.

In our opinion, the aforesaid legal construct can be legitimized by the interpretation of Art. 154 PILA through the lens of the principle of functional equivalence. The incorporation of this principle into the Swiss legal order is already being suggested by legal authors to allow for recognition of the legal effects of smart contracts, without having to make any changes to Swiss legislation. The application of this principle is also appropriate in the case of DAOs, since current DAOs exist on the basis of a series of smart contracts. Admitting that the code of a maverick DAO is its governing law and recognizing that the code exists in an online jurisdiction, thanks to the use of the principle of functional equivalence when interpreting Art. 154 PILA, provides an efficient way to grant maverick DAOs legal existence in the Swiss legal order.

Our legal analysis has demonstrated that the means to handle regulated DAOs already exist in the Swiss legal order even though it is not possible to constitute a DAO under Swiss substantive law. The characterization of regulated DAOs as companies allows them to be granted legal existence in Switzerland in the same way as any other foreign company. While the legal existence of regulated DAOs is not an issue, maverick DAOs risk being kept outside of the law. The legal construct that we propose in this paper grants maverick DAOs legal existence by characterizing them as companies without amendment of Swiss law. It is of paramount importance that both types of DAO be recognized, as this will provide the necessary legal security and grant Swiss courts the proper legal tools to guarantee the preservation of the Swiss public order.