Decentralized Autonomous Organizations (DAOs) as subjects of law

The recognition of DAOs in the Swiss legal order

Master's Thesis

Master of Law

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To those who believed in me

Table of contents

List of abbreviations

AGP	Aragon Governance Proposal
ANT	Aragon Network Token
Art.	Article(s)
ATF	Recueil officiel des arrêts du Tribunal fédéral suisse (= Official collection of the decisions of the Swiss Federal Tribunal)
BaKomm	Basler Kommentar
BBLLC	Blockchain-Based Limited Liability Company (Vermont)
CC	Swiss Civil Code of 10 December 1907 (RS 210)
CISA	Federal Act of 23 June 2006 on Collective Investment Schemes (Collective Investment Schemes Act) (RS 951.31)
CISO	Ordinance of 22 November 2006 on Collective Investment Schemes (Collective Investment Schemes Ordinance) (RS 951.311)
CL	Convention de Lugano (= LC)
CO	Federal Act of 30 March 1911 on the Amendment of the Swiss Civil Code (Part five: The Code of Obligations) (RS 220)
CoRo	Commentaire Romand
DAC	Decentralized Autonomous Company (or Corporation)
DAO	Decentralized Autonomous Organization
DApp	Decentralized Application
DLT	Distributed Ledger Technology
DOrg	Decentralized Organization
DP-CO	Draft proposal of 22 March 2019 of the Federal Act on the adaptation of federal law to developments in distributed ledger technology (https://www.newsd.admin.ch/newsd/message/attachments/56196.pdf) (last accessed on 09.10.19)
ed.	editor

edit.	edition
eds	editors
e.g.	*exempli gratia* (= for example)
EPRS	European Parliament Research Service
etc.	*et cetera* (= and so forth)
ff	and the following
FF	Feuille fédérale (= Federal gazette)
FINMA	Swiss Financial Market Supervisory Authority
FTA	Swiss Federal Tax Administration
GAFA	Google, Apple, Facebook, and Amazon
GDP	Gross Domestic Product
ICO	Initial Coin Offering
i.e.	*id est* (= in other words)
IPO	Initial Public Offering
IPRG	Bundesgesetz über das Internationale Privatrecht (= PILA)
IT	Information Technology
ITA	Innovative Technology Arrangements (Malta)
ITAS	Innovative Technology Arrangements and Services Act of 20 July 2018 (Malta)
ITS	Innovative Technology Services (Malta)
KAG	Kollektivanlagengesetz (= CISA)
KSI	Keyless Signature Infrastructure
LC	Convention of 30 October 2007 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters (Lugano Convention) (RS 0.275.12)
LDIP	Loi fédérale sur le droit international privé (= PILA)

IV

let.	letter
LFus	Federal Act of 3 October 2003 on Merger, Demerger, Conversion and Transfer of Assets and Liabilities (Merger Act) (RS 221.301)
LLC	Limited Liability Company
Ltd.	Limited company
MB	Megabyte(s)
MDI	Malta Digital Innovation Authority Act of 10 July 2018 (Malta)
MDIA	Malta Digital Innovation Authority (Malta)
no.	number(s)
p.	page(s)
para.	paragraph
PILA	Swiss Private International Law Act of 18 December 1987 (RS 291)
PoS	Proof of Stake
PoW	Proof of Work
RFID	Radio-Frequency Identification
RS	Recueil systématique du droit fédéral (= Classified compilation of federal law)
RTGS	Real-time Gross Settlement System
SA	Société anonyme (= Company limited by shares)
SEC	U.S. Securities and Exchange Commission (USA)
SICAV	Société d'investissement à capital variable (= Investment company with variable capital)
STO	Security Token Offering
TGE	Token Generating Event
tps	transactions per second
TWh	Terawatt hour(s)

UK	United Kingdom
UNCITRAL	United Nations Commission on International Trade Law
US	United States
U.S.	United Sates
USA	United States of America
vers.	version
VFA	Virtual Financial Assets Act of 20 July 2018 (Malta)
vol.	volume
V.S.A.	Vermont Statutes Annotated (Vermont)
$	United States dollar
§	section

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1. Introduction

The Internet has been the technology that revolutionized the end 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 pertaining to our lives. This virtual environment is known as the Internet 2.0: a digital space accessible to everyone, a space where physical boundaries are removed. The Internet is taking such a crucial role in our everyday lives that it represented 10% of the 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 the GAFA[2] have risen from the Internet area, centralizing power in the hands of very few actors, blockchain technology promises to redistribute power of any central institution in 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 undermines the control of 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 on a blockchain, which allows the automation of the transfer of capital according to predefined conditions. Building on the architecture of smart contracts, new forms of entities are now emerging from the blockchain environment, called Decentralized Autonomous Organizations (DAOs).

DAOs are entities, which are currently constituted of crypto assets managed through predefined governance rules. The aforesaid rules are inscribed on a series of smart contracts deployed on a blockchain. They provide the framework that defines how the participants of 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 are already interacting with the Swiss legal order, which raises legal issues.

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[1] Hooton Christopher, Measuring the U.S. Internet Sector: 2019, p. 5.
[2] GAFA stands for Google, Apple, Facebook, and Amazon.

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 qualifying them under Swiss substantive law. As a result, 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 let DAOs exist in their present construct, while recognizing their legal effects within the Swiss legal order. The solution to this issue should be sought in private international law. In this paper, we will explore this preferred pathway in the hopes that this analysis will buttress current reflections on how those new forms of entities, which have similar characteristics to companies, can be dealt with in Swiss private law.

2. The underlying technology behind DAOs

2.1. Blockchain technology

2.1.1. General characteristics

When mentioning blockchain technology, bitcoin[3] is generally the first thing that comes to mind. The reason is that the bitcoin cryptocurrency was the first application of this new technology when it was launched in 2009. However, blockchain technology, which is a form of Distributed Ledger Technology (DLT) has now found numerous other applications than bitcoin by offering a new way to securely share data through a distributed trustless consensus system operating on a network of nodes that can be used in many different settings. 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 those transactions being placed into blocks that are linked to one another, forming a chain of blocks. The characteristics of the blockchain have brought DLT to a whole new level and the many new possibilities it offers in the digital space are truly revolutionizing.

The key innovation introduced by Bitcoin was the creation of a distributed system that fixed the double spending problem with a protocol that requires the verification of each transaction through a consensus mechanism on a distributed ledger. This is crucial to understand why bitcoin and other cryptocurrencies have been such a disruptive model of currency and how they have possibly revolutionized the currency market. Up until then, in a distributed system where no central institution was in charge of the reliability of the information, digital entries could be easily duplicated and

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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   Peters Gareth/ Panayi Efstathios, Blockchain and banking, p. 3.

transferred more than once, making digital currencies impossible to imagine because one could not trust that the digital asset received had not already been transferred to someone else. The only way to guarantee the proper transfer of values digitally was to rely on a trusted central institution such as a bank to keep track of all digital transfers and enter them on a central ledger. Bitcoin was specifically introduced in order to circumvent 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 when verifying transactions. Trust is thus shifted on the architecture of the system itself and the decisive role that each node plays in the system.

The blockchain is a peer-to-peer network where the ledger containing all information is distributed to all participants, called "nodes", so that there is "no single point of failure, making the technology available and reliable"[5]. It is trustless because users do not have to trust the information given by other users, but rather, by having a copy of the blockchain they can verify that all transactions written on the ledger are valid. Once the value is put onto the blockchain, it is time-stamped, tamper-proof, and cannot be deleted[6]. Miners, i.e., some of the nodes, verify and validate transactions and are kept from trying to cheat the system through game-theoretic incentives[7]. They provide a service, adding their work into the system "purely out of self-interest, but in doing so, they fulfill a socially beneficial role"[8]. Furthermore, they get remunerated with cryptocurrency (e.g., bitcoins) when they validate a transaction.

In order for a new block to be added to the chain, it has to be validated through a consensus mechanism. Since users are exchanging information (a value of cryptocurrency in the case of Bitcoin) in an environment where they cannot trust other users, it is essential that they can access the ledger and verify information. Cryptographic technology assures that information cannot be altered by providing each piece of information its own cryptographic signature.

In the case of Bitcoin, this translates into a system where a value of cryptocurrency cannot be duplicated in order to wrongfully create additional value. Each unit of value is securely linked to an account through a cryptographic signature system made up of two keys, a public and a private key, where values cannot be transferred from one account[9] to another without the proper private key[10]. The owner of an account holds a public key that can be seen by all users of the blockchain, and a private

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[5] WALDMAN JONATHAN, Blockchain Fundamentals, p. 21.
[6] LEGALER, Blockchain for Lawyers, p. 11.
[7] WERBACH KEVIN, Trust, But Verify: Why the Blockchain Needs the Law, p. 493.
[8] WERBACH KEVIN, Trust, But Verify: Why the Blockchain Needs the Law, p. 506.
[9] An account is also referred to as a wallet.
[10] WERBACH KEVIN, Trust, But Verify: Why the Blockchain Needs the Law, p. 503.

key which is kept secret and that has to be computed into the protocol in order to validate the transfer of values. When a transaction is made between two accounts, there has to be distributed consensus within the network that the transaction effectively happened. The combination of both cryptography and game-theoretic incentives delivers a trustless mechanism where no central institution is required, empowering individual participants of the system.

The consensus mechanism is crucial for the well-functioning of a blockchain, as "[a] blockchain based system is as secure and robust as its consensus model"[11]. There are many different consensus models, but the most important ones remain Proof of Work (PoW) and Proof of Stake (PoS)[12].

2.1.2. Consensus mechanism

a) Proof of Work (PoW)

PoW is the consensus mechanism used by major blockchains such as Bitcoin and Ethereum. PoW has the advantage of being extremely secure by requiring a large amount of computing power in order to verify a transaction and add a new block to the chain. This results in any attack on the system being very costly in hardware and electricity, making an attack economically non-viable even if an actor were to assemble the necessary equipment[13]. However, many view the computing power required to verify a block unnecessary[14] and criticize the resulting energy consumption of the system[15]. The consensus mechanism of each blockchain has its own specifics, but it is roughly the same for all PoW blockchains. In order to understand how this mechanism works, the transfer mechanism of a unit of bitcoin will be described hereafter.

Each unit of bitcoin is linked to a public key. In order to transfer any unit of bitcoin, the private key corresponding to the public key must be delivered, otherwise the system will not unlock the units for the transfer[16]. When units of bitcoin are transferred from one account to another, the transaction is broadcasted in pools of unverified transactions. First, miners verify if the operation is valid by checking on the blockchain ledger that the account transferring the units of bitcoin actually holds the amount it

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[11] BALIGA ARATI, Understanding Blockchain Consensus Models, p. 4.
[12] See generally BALIGA ARATI, Understanding Blockchain Consensus Models.
[13] See *infra* Chapter 2.1.4.
[14] Research has been carried out in order to improve the mining process of the Bitcoin blockchain. See for example GOUTAM PAUL/ PRATIK SARKAR/ SARBAJIT MUKHERJEE, Towards a More Democratic Mining in Bitcoins, p. 186 ff.
[15] As of 2019, the energy consumption generated by the mining on the Bitcoin blockchain was estimated at 64 TWh per year, which is more than the energy consumption of Switzerland (58 TWh per year). See M.H., Le bitcoin consomme davantage d'énergie que la Suisse. See also G.F., Why bitcoin uses so much energy; FARINE MATHILDE, Le bitcoin, désastre écologique en perspective?.
[16] HAMILTON DANNY, Re: Question on how Transaction Verification Works.

is transferring. Then, miners gather transactions from the pools in order to form a block, which can be of a maximum size of 1 megabyte (MB), limiting the number of transactions in each block.

This is when the race begins between the miners. They must find a series of numbers called a nonce that, when added to the block, generates a certain signature called a hash. This is made possible thanks to a cryptographic hash function which turns any string of input into a unique 64-digit string of output[17]. The difficulty is that the resulting 64-digit signature must be under a certain threshold set by the system in order to be accepted[18]. The first miner that can generate a nonce, which in turn generates a compatible signature for its block, gets to add the block to the chain and is remunerated with units of newly-created bitcoins[19]. When a new block is added to the chain, all the nodes of the blockchain can easily verify that the block was properly hashed, as a hash function is easy to verify even though it is very hard to solve[20]. The system then recognizes the longest string of blocks as the consensus reality and all the nodes update their copy of the blockchain to match this new version. Then, miners must restart the process from the beginning by forming new blocks of transactions from the pools.

This mechanism ensures that blocks are linked to one another and form a chain distributed over all the nodes, making it virtually impossible to alter the information of past blocks. Since each consecutive block must hold the signature of the previous block and that the slightest change in a block alters completely its signature, modifying past blocks requires recalculating the nonce of all subsequent blocks so that the signature of each one of them fits the threshold. The older the block is, the harder it gets to launch such an attack, as more blocks would have to be solved by the perpetuator[21]. This is without considering that over the course of the attack, other miners keep adding new blocks to the chain every ten minutes, adding a layer of complexity to the attack for each new block created.

b)   *Proof of Stake (PoS)*

While PoW is the consensus mechanism chosen for Bitcoin and Ethereum, there are other mechanisms that allow to reach distributed consensus, namely the PoS mechanism. PoS has gained much attention recently as new options are being explored in order to lower computing power requirements and energy consumption generated by blockchains. This alternative promises a high level of security while requiring a fraction of the computing power and electricity needed for PoW[22]. The Ethereum

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[17]   SINNIGE JIMI, How does Blockchain work.
[18]   SINNIGE JIMI, How mining works.
[19]   Miners literally create bitcoins trough their work and this will continue until 21 million bitcoins will have been created. After this threshold, miners will be solely remunerated by the transaction fees added by users in each transaction. See PHAM JOHNNY, A gentle introduction to Bitcoin – Part 1.
[20]   SINNIGE JIMI, How mining works.
[21]   SINNIGE JIMI, How mining works.
[22]   FARINE MATHILDE, Le bitcoin, désastre écologique en perspective?.

community trusts the security promised by this alternative so much that it is currently transitioning its consensus mechanism from PoW to PoS[23].

Nodes working to validate a transaction are here called forgers instead of miners[24]. Forgers are not asked to solve a complex problem in order to be able to validate a transaction and get remunerated, but rather, they are selected in a semi-random procedure to take part in the validation process. The first selection criterion is the amount of cryptocurrency forgers are willing to stake, i.e., to lock and potentially lose if they act maliciously. The bigger the amount at stake, the more chances a forger will have to be selected by the system for the validation of a block. However, in order to avoid a permanent advantage for forgers holding large amounts of a cryptocurrency, potentially creating a system where only affluent forgers are selected and keep getting enriched, a second criterion influences the selection process. Different PoS blockchains use different criteria, but they usually take the form of specific selection procedures called the "Randomized Block Selection" or the "Coin Age Selection"[25].

While being considered as a secure consensus mechanism, PoS relies mainly on the incentive for a forger not to cheat the system because its own digital assets are at stake in the procedure[26]. This is seen by experts as a less secure system. However decentralization is said to be better guaranteed as it is easier to access the validation process of blocks than it is for PoW, as no special hardware is required and very little energy consumption is involved[27]. This encourages more users to participate in the block validation process, resulting in a more democratic blockchain[28].

2.1.3. Permissionless and permissioned blockchains

The consensus mechanism is not the only characteristic that makes blockchains differ from one another. 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'"[29]. 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

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[23]   THAKE MAX, What is Proof of Stake? (PoS).
[24]   THAKE MAX, What is Proof of Stake? (PoS).
[25]   For detailed explanation of those criteria, see THAKE MAX, What is Proof of Stake? (PoS).
[26]   RAY SHAAN, What is Proof of Stake ?.
[27]   RAY SHAAN, What is Proof of Stake?.
[28]   For the rest of this work, "miners" is used for convenience and may represent miners in a PoW mechanism as well as forgers in a PoS mechanism.
[29]   CACHIN CHRISTIAN/ VUKOLIĆ MARKO, Blockchain Consensus Protocols in the Wild, p. 1.

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permissionless blockchain is usually public and accessible to anyone, users operate anonymously. Bitcoin, Ethereum, and Ripple, as well as many other cryptocurrencies, are based on this type of blockchain[30].

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"[31]. 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. 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"[32]. Those characteristics can make permissioned blockchains very advantageous for institutions and corporations[33].

The use of this type of blockchain is booming with banks, corporations, and governments looking to reduce transaction costs by taking advantage of blockchain technology to backup and share data in a safe, decentralized, and encrypted manner, while retaining control over the sharing process and users' access rights[34]. The most successful example of such a blockchain is Hyperledger, which is an open-source private blockchain solution backed by the Linux foundation and IBM[35]. It is aimed at businesses that want to keep track over their transactions in a decentralized manner in order to improve their logistics. Hashgraph[36] and Corda[37] are other examples of permissioned blockchains which are aimed at businesses.

There is a fundamental philosophical difference between those two types of blockchains. With the introduction of Bitcoin, blockchain technology was envisioned as a technology which would get rid of central institutions, ideally empowering all individuals that are part of the network and guaranteeing them anonymity[38]. Those characteristics are considered crucial for certain types of blockchains, such as blockchains running cryptocurrencies, by those who think that no one should be denied access to

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[30] See https://coinmarketcap.com, which lists 2,957 cryptocurrencies as of October 2019 (last accessed on 09.10.19).
[31] CACHIN CHRISTIAN/ VUKOLIĆ MARKO, Blockchain Consensus Protocols in the Wild, p. 1.
[32] MASSESSI DEMIRO, Public Vs Private Blockchain In A Nutshell.
[33] BUTERIN VITALIK, On Public and Private Blockchains; IVANOV SACHA, What closed blockchain is for.
[34] IANSITI MARCO/ LAKHANI KARIM, The truth about blockchain, p. 5; PETERS GARETH/ PANAYI EFSTATHIOS, Blockchain and banking, p. 16-18.
[35] LECAN DAMIEN, L'essentiel sur Hyperledger, la superstar de la blockchain privée.
[36] For more details on Hashgraph: https://www.hedera.com/whitepaper (last accessed on 09.10.19).
[37] For more details on Corda: https://docs.corda.net (last accessed on 09.10.19).
[38] See *supra* Chapter 2.1.1.

this payment method[39]. Permissionless blockchains are even viewed by purists as the only "real" type of blockchain.

However, in our opinion, having this kind of openness and anonymity can be unsuited for some use cases of blockchain technology, especially in the financial sector or for the use by governments, where identity is crucial. In those sectors, users must, in most cases, be identifiable. The reason is that businesses and governments need to know who they are dealing with, generally due to Know Your Customer (KYC) regulations. Furthermore, influential actors have already emerged from major permissionless blockchains either by owning large portions of the blockchain's currency or by operating a large share of their consensus mechanism[40]. Permissionless blockchains are thus prone to attacks and democracy within those networks is not guaranteed, as it was initially intended to be, since powerful actors can have a significant impact over the system[41]. Their influence over the blockchains is not fully understood, nor can it be controlled. This results in an opaque power distribution over economic systems that are worth billions of dollars[42]. The apparition of such actors has shown that identification can be essential to secure the rights of other users and limit cases of possible abuse. Therefore, permissioned blockchains and the restrictions that come with them are a necessary compromise in certain use cases in order to enjoy the many benefits that blockchain technology has to offer, while keeping a certain level of control necessary for the democratization of the technology and its wide-spread use by economic and governmental entities and the general public.

2.1.4. Security aspects

A blockchain can be described as a "distributed, immutable, transparent, secure and auditable ledger"[43]. In contrast with permissioned blockchains, permissionless blockchains cannot rely on a central institution in order to guarantee the safety and the integrity of the information stored on the blockchain[44], but rather, they solely rely on the proper functioning of their consensus mechanism[45]. This is the case of the most widely used blockchains, such as Bitcoin and Ethereum. However, there is a way to maliciously alter their consensus mechanism and potentially corrupt the security and the proper functioning of those blockchains: the "50% + 1 attack".

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[39]   MASSESSI DEMIRO, Public Vs Private Blockchain In A Nutshell.
[40]   See *infra* Chapter 2.1.4.
[41]   See KHARIF OLGA, The Bitcoin Whales.
[42]   As of 9 October 2019, Bitcoin had a market capitalization of more than 146 billion dollars and Ethereum of 18 billion dollars. See https://athcoinindex.com (last accessed on 09.10.19).
[43]   THE WORLD ACADEMY OF RESEARCH IN SCIENCE AND ENGINEERING, An Overview on Integrating Machine Learning with Blockchain, p. 40.
[44]   See *supra* Chapter 2.1.3.
[45]   See *supra* Chapter 2.1.2.

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 reality[46]. In such a scenario, attackers can prevent transactions to occur between some or all users of the blockchain[47]. Attackers can also reverse transactions that occurred under their control, allowing them to double-spend coins[48]. While the range of action of the attackers would be limited to those two kinds of attacks and the blockchain as a whole could not be taken down, an attack would destabilize the entire blockchain for some days[49]. This could lower trust in the system.

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 perpetuate such an attack and the costs that would be incurred. This is especially the case with largely adopted blockchains such as Bitcoin and Ethereum. However, as much as blockchain technology is profiling itself as a decentralized technology, external factors such as the price of electricity have created a vulnerable situation of extreme centralization for the two major blockchains. Analysts have found that as much as 60% of the mining power of Bitcoin comes solely from China[50]. Concentration of the consensus power is also a problem on the Ethereum blockchain, where as few as five mining pools, which are miners gathering their mining power in order to be more successful[51], represent as much as 84% of the total mining power of the blockchain[52]. Nevertheless, permissionless blockchains can be considered to be a safe technology and are capable of bringing the necessary trust for the system to function without a central institution.

2.2. Blockchain as a multipurpose technology

2.2.1. Distributed ledger

The blockchain's architecture allows for several types of uses of the technology. It is first of all a distributed and decentralized ledger and can be used as such. The Estonian government pioneered this use in 2013 by migrating all registers of natural and legal persons in the country to a distributed registry

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[46] 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.

[47] PRITZKER YAN, Is Bitcoin mining centralization a Threat?.

[48] PRITZKER YAN, Is Bitcoin mining centralization a Threat?.

[49] The phenomenon of distrust has been observed with the Ethereum blockchain when the market value of ethers plummeted after The DAO attack. See *infra* Chapter 3.2.

[50] According to Prof. Bryan Ford, the mining concentration means that if it had the political will, the Chinese government could take control over the Bitcoin blockchain. See UEBERSCHLAG LEILA, L'actuelle dynamique de la blockchain nous conduit droit dans le mur.

[51] See *supra* Chapter 2.1.2.

[52] SUI DANNING/ RICCI SAULO/ PFEFFER JOHANNES, Are Miners Centralized? A Look into Mining Pools.

system called Keyless Signature Infrastructure (KSI). Other governments are studying the possibility of this kind of migration[53].

Banks and other industries also see an opportunity in this tamper-proof distributed ledger technology[54]. UBS thinks that blockchain technology "could indeed catalyze significant transformation for [the] industry"[55]. Likewise, auditing could take advantages of blockchain technology as a distributed ledger by acting as an "intermediary that automates transaction storage and verification"[56]. The healthcare sector could develop a blockchain-based electronic health record (EHR) that could meet new standards of security while considerably lowering costs[57]. Similarly, food safety and quality could benefit from this model of a decentralized ledger system to improve agri-food supply chain traceability at reasonable costs [58].

The above-mentioned developments are just a few handpicked examples of current and foreseen industry-oriented applications. In our view, they show that blockchain technology is not just a new form of distributed ledger, but rather, thanks to its characteristics and its security, it has the potential to deeply transform many industries and help the development of new business models and value-creating processes through modern digitalization. Even if this technology still has a niche market, we are only at the forefront of what blockchain technology has to offer. Wide-spread usage might not be ready just yet, but the possibilities could be countless.

2.2.2. Bitcoin and other cryptocurrencies

While the blockchain's very architecture provides a new kind of secure ledger, this technology was originally envisioned by its creator Satoshi Nakamoto to be the ground for a new type of payment method[59]. By resolving for the first time the double spending problem coupled with digital scarcity[60], blockchain technology has enabled the creation of a cheap, secure, and decentralized cryptocurrency open to any person around the world fitted with an electronic device connected to the Internet[61]. Bitcoin has revolutionized the transfer of funds, in particular for international transactions. Hence, as

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[53] The UK government published a report in 2016 exploring this possibility. See WALPORT MARK, Distributed Ledger Technology: beyond blockchain, p. 65-71.
[54] See in general PETERS GARETH/ PANAYI EFSTATHIOS, Blockchain and banking.
[55] BALTIN ALEX et al., UBS on Blockchain, p. 8.
[56] KOKINA JULIA/ MANCHA RUBEN/ PACHAMANOVA DESSISLAVA, Blockchain for Accounting, p. 97.
[57] LINN LAURE A./ KOO MARTHA B., Health IT, p. 7.
[58] TIAN FENG, Blockchain for agri-food supply chain traceability, p. 6.
[59] NAKAMOTO SATOSHI, Electronic Cash System.
[60] See *supra* Chapter 2.1.1.
[61] It is 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 NAKAMOTO SATOSHI, Electronic Cash System.

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the transaction costs to transfer bitcoins from one account to another are virtually down to nothing, especially compared to that of an international bank transfer[62].

However, bitcoins should not be confused with fiat currencies issued by Sates. The most noticeable difference between a fiat currency and a unit of bitcoin is that a fiat currency is legal tender, meaning that it is backed by a central bank and is the official payment method of a State[63, 64]. Also, Bitcoin has a cap of 21 billion bitcoins[65], unlike fiat currencies which can be indefinitely produced by central banks. This characteristic could, in theory, make bitcoin resistant to inflation because no central institution can inject more of the currency in the market. In reality, a large portion of bitcoins is held by just a few accounts, giving power to the holders of these accounts to influence the market value of bitcoins[66]. Another characteristic that differentiates bitcoins from fiat currencies is that, in the Bitcoin system there, is no need for a third party to carry out a transaction, such as a central issuer or a payment system[67]. This is attractive to many people who do not trust centralized powers and governments.

With the success of bitcoin, many other cryptocurrencies called "altcoins" (alternative coins) have emerged throughout 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) to tokenize rights to access a digital network or a service and are not designed as an alternative currency[68]. The Ethereum blockchain and its ether cryptocurrency were launched in July 2015 by the Swiss-based Ethereum foundation and is the second largest capitalized cryptocurrency behind bitcoin. It is not purely designed as an alternative to fiat currencies per say, which is the approach taken by bitcoin, but rather as a way to execute smart contracts and remunerate miners that validate transactions. Unlike Bitcoin, the Ethereum protocol was specifically developed to allow a second layer of programming[69]. As such, a cryptocurrency transfer can be conditioned to a set of rules that are programmed on top of the Ethereum protocol.

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[62] As of 9 October 2019, fees to have a transaction mined within the next hour correspond to $0.04. See https://bitcoinfees.info (last accessed on 09.10.19).
[63] Taking the French format as a reference, the word "State" (in French "Etat") will hereafter refer to a nation.
[64] HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 430.
[65] HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 427.
[66] According to KHARIF OLGA, The Bitcoin Whales, 40% of bitcoins are held by as few as 1,000 people called whales and they sometimes coordinate their bitcoin moves, giving them great influence over the market.
[67] HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 425-426.
[68] See *infra* Chapter 2.2.4.
[69] 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.

Ripple's cryptocurrency is an altcoin designed as a "real-time gross settlement system (RTGS), currency exchange and remittance network"[70], meaning that it allows the direct transfer of any form of currency in cross-border transactions by being more scalable than Bitcoin. The main advantage of Ripple over Bitcoin is that any fiat currency, as well as gold and silver can be instantaneously transferred thanks to the system's capacity to handle levels of transactions equal to that of the credit card provider Visa[71].

Another category of cryptocurrencies called "stable coins" is gaining interest amongst governments and large corporations. Stable coins are a kind of cryptocurrency that "is pegged to another stable asset"[72], usually to fiat currencies or precious metals[73]. Its main benefit is to avoid the volatility that typical cryptocurrencies are known for[74]. As "[a]n optimal cryptocurrency should have the following: price stability, scalability, privacy, and decentralization"[75], stable coins are a more realistic alternative to money for daily transactions than traditional cryptocurrencies such as bitcoin and ether. One notable example of stable coin is tether, which maintains a 1-to-1 ratio with the U.S. dollar and for which each coin in circulation is backed by an equivalent amount in fiat currency[76]. However, like many other players in the crypto-world, Tether has been recently in the line of sight of U.S. regulators after $31 million worth of tethers were stolen and the growing suspicion that not all issued coins are backed as guaranteed[77].

A more recent player has entered the crypto-scene. The giant corporation Facebook has recently announced it will launch through the independent Swiss-based Libra association a stable coin called libra. Facebook hopes to create a new global cryptocurrency that billions of people can use around the world, facilitating global trade and offering access to the financial system to the 1.7 billion people around the world who do not have access to a traditional bank[78]. With a user-friendly interface and a large customer base, Facebook could possibly become the key player that will bring the use of cryptocurrencies mainstream. However, French, U.S., and British officials, among others, have already

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[70] GORDON SHAWN, What is Ripple?.
[71] Ripple can process 50,000 transactions per second (tps). This is extremely high in comparison to Bitcoin's 3 to 6 tps capacity and Ethereum's 15 tps capacity. See GORDON SHAWN, What is Ripple?.
[72] LEE SHERMAN, Explaining Stable Coins, The Holy Grail Of Cryptocurrency.
[73] DUPASQUIER ULYSSE, Cryptomonnaies.
[74] There was a historical fluctuation in late 2017 when the price of a bitcoin went from CHF 3,696 on 25 September 2017 to CHF 18,608 on 18 December 2017 before plunging down to CHF 7,080 on 5 February 2018. And while prices haven't been as volatile since then, bitcoin and other cryptocurrencies are still prone to large fluctuations. The price of Bitcoin can be retrieved at https://www.coinbase.com/price/bitcoin?locale=fr (last accessed on 09.10.19). See also LUU LOI, State-Issued Coin, who explains how State-issued coins could serve as stable coins.
[75] LEE SHERMAN, Explaining Stable Coins, The Holy Grail Of Cryptocurrency.
[76] FRANKENFIELD JAKE, Tether (USDT).
[77] FRANKENFIELD JAKE, Tether (USDT).
[78] LIBRA ASSOCIATION MEMBERS, White Paper – An Introduction to Libra, p. 1.

expressed their concerns regarding the project and seem uneasy with the idea of a privately-owned global currency[79].

Some countries are exploring the possibility of creating a national stable coin, with Venezuela as a frontrunner. In a move to try and counter U.S. economic sanctions, Venezuela launched in February 2018 the petro crypto, which is a national cryptocurrency backed by the nation's oil, gas, gold, and diamond reserves[80]. Russia has been considering since 2017 to launch its own cryptocurrency[81], and the Russian central bank has recently expressed its interest in moving forward with the project by developing a cryptocurrency pegged to gold[82]. Also, in 2017, Chinese officials have called the country's central bank to consider issuing a national cryptocurrency in order to help stabilize the Yuan[83], resulting in the possible development of an official Chinese cryptocurrency called "renminbi"[84]. Similarly, the Sveriges Riksbank (Sweden's Central Bank) has published two reports exploring the possibilities for the development of a cryptocurrency with legal tender called "e-krona"[85]. Further assessment of the project's feasibility will be undertaken until 2020, when they plan to make a decision based on their conclusions[86].

While it is unsure that the first attempt by the government of Venezuela to launch a cryptocurrency really was a success[87], there is a clear interest from governments around the globe to explore the benefits cryptocurrencies have to offer. In our opinion, if widespread adoption of national cryptocurrencies occurs, or if a privately-owned global cryptocurrency is embraced by the general public, the global monetary structure could be revolutionized, and the role of financial institutions and even central banks could be redefined. Transactions using blockchain technology could mean the beginning of a more inter-connected digital era where boundaries become ever so small, empowering market players from more authoritarian and less stable countries.

However, while a possible shift of power away from central institutions could occur, some governments already have a history of using technology to the detriment of their citizens' privacy and freedom. In our view, if a digital identity is necessarily linked to a crypto-account, the use of national

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79   FARINE MATHILDE, L'opposition à la libra de Facebook monte.
80   ULMER ALEXANDRA/ BUITRAGO DEISY, Enter the "petro": Venezuela to launch oil-backed cryptocurrency.
81   PALMER DANIEL, Russian Central Bank.
82   TASS, Bank of Russia may consider gold-backed cryptocurrency.
83   WILMOTH JOSIA, PBoC Digital Currency Chief Calls for State Cryptocurrency.
84   TAPSCOTT DONALD, Interview with Bloomberg TV.
85   The reports can be accessed at https://www.riksbank.se/en-gb/payments--cash/e-krona/ (last accessed on 09.10.19).
86   SVERIGES RIKSBANK, The Riksbank's e-krona project – Report 2, p. 41.
87   Venezuela's officials have stated that the ICO has brought 3.3 billion dollars. However, no independent audit was able to verify this information. See MOSKVITCH KATIA, Inside the bluster and lies of Petro, Venezuela's cryptocurrency scam.

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cryptocurrencies could be diverted from Nakamoto's original paradigm of empowering individuals' economic freedom and privacy, and instead be used as a means to strengthen surveillance over individuals' behavior by monitoring how they spend their money, or even refraining certain individuals from carrying out certain transactions. Therefore, appropriate regulations on how information generated by the use of blockchain technology should be put in place, with a balance between monetary safety and practicality, and guarantees to privacy.

2.2.3. Smart contracts

The architecture of some blockchains, mainly Ethereum, allows for a second layer of program to be added on top of the blockchain's protocol when transferring an amount of cryptocurrency. That way, parties can enter into a conditioned transfer of cryptocurrency where performance of the transfer is automated according to programmed conditions. It is also possible to integrate external input from a third party, sometimes referred to as an oracle, in order to trigger a programmed outcome.

Those transactions are commonly referred to as "smart contracts". This term was originally used by computer scientist and legal scholar Nick Szabo who defined in 1994 a smart contract as "a computerized transaction protocol that executes the terms of a contract"[88]. As specific contractual terms can be added upon a cryptocurrency transfer on the Ethereum blockchain, and the transfer becomes automated according to the encoded terms, those transactions may be qualified as "smart" contracts.

The great advantage of smart contracts is that the performance of the cryptocurrency transfer is automatically triggered when the programmed conditions are fulfilled. And vice-versa, the transfer of cryptocurrencies is only triggered if/when the conditions are fulfilled. Once the smart contract is deployed on the blockchain, the code automatically executes itself and none of the parties can withdraw from the agreement or edit the terms, generating an immutable and decentralized contract. This ensures, in theory at least, the perfect execution of the contract according to the predefined conditions encoded on the blockchain. In doing so, the mutually agreed amount of cryptocurrency is transferred only if and when the conditions occur[89].

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[88] Szabo Nick, Smart Contracts.

[89] One example of a smart contract integrating 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. That way, the buyer pays only if the package gets delivered, and the seller knows that upon delivery the cryptocurrency transfer will automatically be triggered.

When two or more parties who do not trust each other enter into a standard agreement, they either rely on a trusted third party such as a bank or a trustee to hold the funds and execute the transfer[90], or they rely on state enforcement mechanisms to ensure the proper execution of the contract. However, when entering into a smart contract, the parties shift their trust from the trusted third party to the code itself, and State enforcement mechanisms become virtually unnecessary as the contract executes itself automatically. This has the advantage of greatly lowering transaction costs, as the costs of a trusted third party and the costs to initiate an enforcement procedure can be quite high[91].

In our view, smart contracts are only at the beginning of their development and could soon become the standard way to enter into a contract. Many industries including insurance, aviation, commodities trading, consumer services, and other large industries are having a rapidly growing interest in this technology in order to lower transaction costs and ensure customers quicker and easier procedures for benefit payments and refunds.

However, it is currently still unclear how to legally qualify smart contracts occurring on a blockchain, and whether or not they even qualify as contracts in legal terms. No legislation formally recognizing smart contracts as legally binding has been introduced to date[92]. This subject has generated much literature from legal scholars and lawyers in Switzerland and around the world[93]. A key issue is determining whether smart contracts generated on a blockchain require an underlying contract in the physical world in order to be legally binding, or if they are self-sufficient for the creation of a legally-binding relationship. In this second assumption, the identity of the parties can be an issue, as on-chain actors can be anonymous, and the identity of the parties can be an essential element of the contract under Swiss contract law[94].

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[90] The trusted third party should not be confused with the oracle, the latter's role being only to confirm the occurrence of an external event.

[91] According to LEGALER, Blockchain for Lawyers, p. 14, onerous, costly services like trust accounting and tracking custody of assets could become massively simplified, possibly increasing affordability for clients and expanding business into new markets.

[92] Monaco has introduced a bill that would recognize smart contracts as legally binding. However, this bill has not been adopted at the time of writing. See CONSEIL NATIONAL DE MONACO, Proposition de loi de Monaco relative à la blockchain, Art. 2.

[93] See in general HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 443-444; CARRON BLAISE/ BOTTERON VALENTIN, Le droit des obligations face aux "contrats intelligents"; MÜLLER CHRISTOPH, Les "Smart Contracts" en droit suisse; MÜLLER CHRISTOPH, Smart Contracts; FURRER ANDREAS, Die Einbettung von Smart contracts in das schweizerische Privatrecht; EGGEN MIRJAM, Smart Contracts und allgemeine Geschäftsbedingungen; MÖSLEIN FLORIAN, Smart Contracts im Zivil- und Handelsrecht.

[94] Of that opinion, see MÜLLER CHRISTOPH, Les "Smart Contracts" en droit Suisse, no. 42; MÜLLER CHRISTOPH, Smart Contracts, p. 344. *Contra*: FURRER ANDREAS, Die Einbettung von Smart contracts in das schweizerische Privatrecht, p. 106-107.

2.2.4. Initial Coin Offerings (ICOs) or Token Generating Events (TGEs)

Enthusiasm for cryptocurrencies has introduced a new way for companies to raise funds. An Initial Coin Offering (ICO) also called a Token Generating Event (TGE), is similar to an Initial Public Offering (IPO), with the difference that, instead of a company's shares, investors are granted cryptographic tokens to which rights are generally attached. The tokens are generated on a new or an existing blockchain and are exchanged via smart contracts against cryptocurrencies[95]. Hence, the company is capitalized in cryptocurrency, most often in bitcoin or ether. This new form of financing for start-up companies is rapidly attracting new investors with a total of $90 million raised in 2016, growing to $6.2 billion in 2017 and $7.8 billion in 2018[96].

The Swiss Financial Market Supervisory Authority (FINMA) has classified tokens issued through an ICO in three categories: payment, utility, and asset tokens[97]:

Payment tokens are a form of currency and can be exchanged to buy goods and services by means of a value transfer. Their value is exclusively determined by what the users of the network are willing to give them. This usually stems from scarcity of the currency, which is a similar mechanism than the one determining the price of gold. The most notable example of a payment token is the bitcoin cryptocurrency[98].

Utility tokens give their holders the right to access a digital network or a service (i.e., tokenization of rights). Their value comes from the function they represent or the service they give access to. What differentiates them from payment tokens is that they grant the holder "certain rights that are enforceable against third parties"[99]. They are the main type of token being issued through ICOs because they represent an easy way for investors who believe in a project to help fund it. But most importantly, utility tokens do not fall within the scope of securities in Switzerland[100], avoiding compliance with many regulations and making it easier for initiators to carry out the ICO. Examples of ICOs performed through the emission of utility tokens include Golem[101] or Sirin Labs Token[102].

Asset tokens are comparable to bonds and shares in that they can represent a promise for a future share of profit or capital flow. They can also be backed by real-world assets and therefore have a

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[95] A token represents units of the newly generated cryptocurrency, which is then tradable.
[96] According to statistics available on https://www.icodata.io (last accessed on 09.10.19).
[97] See FINMA, Guidelines. A quick overview of the classification can also be accessed at https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/ (last accessed on 09.10.19).
[98] See *supra* Chapter 1.2.2.
[99] HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 431.
[100] FINMA, Guidelines, p. 5. See *infra* Chapter 2.3.
[101] See https://golem.network (last accessed on 09.10.19).
[102] See https://sirinlabs.com (last accessed on 09.10.19).

tangible trading value. Just like utility tokens, the holder can have his or her rights enforced against third parties. ICOs issuing asset tokens are also called Security Token Offerings (STOs)[103]. Even though only a few STOs have been issued to date, they represent a growing portion of all ICOs, as asset tokens provide investors more tangible financial rights "including dividends, shares and other financial instruments, depending on design"[104]. One recent example is the LakeDiamond token, which was sold through the Swissquote platform[105].

Some tokens fall within more than one category and can be labeled as hybrid tokens. Tokens can even evolve over time and enter new categories, depending on the properties users grant them[106]. Traditionally, token issuers tend to avoid having their tokens be categorized as asset tokens because this makes them subject to securities laws[107]. However, this tendency is reversing, especially in Switzerland where a clear trend towards STOs can be observed[108]. Before initiating an ICO in Switzerland, entrepreneurs must reach the FINMA in order to analyze the project at hand and formally categorize the tokens to be issued and the applicable regulation.

While ICOs and IPOs can appear quite similar at a first glance, they are not intended for the same kind of companies. ICOs are aimed at financing projects or companies in their early stage of life, whereas companies seeking an IPO must show a track record[109]. Nonetheless, there are two main advantages for a start-up company to seek financing through an ICO. The first advantage is that the start-up company can "quickly and directly receive money from investors"[110]. There is no need to go through an intermediary such as a bank to hold the funds. But most importantly, entrepreneurs can easily attract investors from all over the world with very few jurisdictional issues[111]. The second advantage is that, by seeking investment through an ICO, entrepreneurs avoid capital dilution. When investors buy tokens, they do not participate in the share capital of the start-up company. The result is that the entrepreneurs keep full control over their venture, and they are bound by no commitment, achievement, or target return[112].

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[103] BENNAÏM YVES, Les STO, la nouvelle mode après les ICO.
[104] DAVIES STEVE et al., 4th ICO / CTO Report – A Strategic Perspective, p. 5.
[105] RUCHE SÉBASTIEN, Swissquote va piloter l'ICO d'une start-up, une première.
[106] HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 431.
[107] FINMA, Guidelines, p. 5.
[108] FINTECHNEWS SWITZERLAND, Security Token Offerings.
[109] HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 431-432.
[110] MIGNON VINCENT, Blockchain – perspectives and challenges, p. 4.
[111] ICOs generated outside of the U.S. usually ban American investors from buying tokens, as the U.S. Securities and Exchange Commission (SEC) has a much broader definition of asset token and any ICO issuing asset tokens aimed at American investors must comply with U.S. securities laws.
[112] MIGNON VINCENT, Blockchain – perspectives and challenges, p. 4.

However, this investment method raises problems concerning the protection of investors. In return for their investment, ICO investors generally receive a utility token which gives the holder no right over the company's business. This is unlike investors who buy shares of a company limited by shares (SA) and who are protected by shareholder's rights under the Code of Obligations (CO) and other legislations such as the Merger Act (LFus)[113]. There has been a frenetic boom in ICOs during the course of 2016 through 2018. Many of the projects were fraudulent and others simply did not live up to expectations[114]. This has left countless investors with tokens that have depreciated very quickly, leading to the near total evaporation of their investment and with no protection. The DAO case[115] in particular, has pushed financial authorities around the globe to react to this new world of crypto-investment, leading to the U.S. Securities and Exchange Commission's (SEC) regulatory guidance and the FINMA's guidelines, which are currently the references in crypto-regulation[116].

Thanks to the openness towards blockchain technology of its institutions, great economic, legal and political stability, and advantageous tax rates, Switzerland has positioned itself on the front scene of the crypto-world. With six out of the twelve largest ICOs since 2016 having been carried out within its borders[117], the country is benefitting from a strategic position and the Zug area is even commonly referred to as the "Crypto Valley". In our opinion, if blockchain becomes the key technology of the next decade as many have predicted, the strategic positioning of Switzerland could bring large revenues to the country and maintain its central position in the development of new digital technologies. By publishing its guidelines, the FINMA has shown its capacity to quickly adapt and clarify how existing laws apply to new technologies. While the FINMA was quick to react by applying existing laws to the use of blockchain technology, the Swiss legislator should recognize that this technology opens new possibilities and activities, for some of which a new regulatory framework could be beneficial to allow for their development.

2.3. Overview of existing legal framework for blockchain technology

With the emergence of blockchain technology, many legal questions have to be answered[118]. Individuals and companies have already been using this technology for several years and invested

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[113] HARI OLIVIER/ DUPASQUIER ULYSSE, Blockchain and DLT, p. 431.
[114] BENNAÏM YVES, Les STO, la nouvelle mode après les ICO.
[115] See *infra* Chapters 3.2 and 4.1.
[116] See *infra* Chapter 2.3.
[117] PwC, How do ICOs work? – launching your ICO in Switzerland, p. 7.
[118] For example, the legal situation for a mere transfer of rights of owner ship over a blockchain is not clear at a first glance and requires an elaborate legal construct to grant it legal effects. See HARI OLIVIER/ BURRUS LOUIS, Limites du droit actuel.

millions of dollars. Each State must therefore offer an adequate legal framework to ensure legal certainty. Several projects are currently being studied in different States.

In Switzerland, the concern of the legislator has been initially centered on the regulatory framework and in particular the law of the financial markets[119]. After highlighting that existing regulations are applicable to cryptocurrencies and ICOs on 29 September 2017[120], the FINMA has indicated on 16 February 2018 that it recognizes three categories of cryptocurrencies, subjecting each of them to existing laws, and also described how ICOs had to be treated from a tax liability point of view[121, 122]. As a result of Facebook's project to deploy the libra currency from Switzerland[123], the FINMA released on 11 September 2019 a complementary report dedicated to the special case of stable coins[124]. The FINMA differentiated stable coins and the resulting applicable laws based on whether they are linked to currencies or to commodities. In the case of stable coins linked to currencies, applicable laws may differ depending on whether the assets are managed for the account and risk of the token holder or for the account and risk of the issuer. Most recently, on 27 August 2019 the Swiss Federal Tax Administration (FTA) released a well-anticipated working document that clarifies the tax liability for cryptocurrencies and ICOs at both the federal and cantonal levels[125].

The U.S. has no federal law regulating blockchain technology, but various agencies have classified cryptocurrencies in different ways for their own purpose. For example, cryptocurrencies such as bitcoin are classified by the U.S. Treasury as convertible decentralized virtual currencies[126]. The U.S. Commodity Futures Trading Commission (CFTC) has classified certain cryptocurrencies such as bitcoin as commodities under the Commodity Exchange Act (CEA)[127]. After investigating The DAO case[128], the SEC has issued a statement that "DAO Tokens" are securities under the Securities Act of 1933 (Securities Act) and that future tokens issued for the purpose of ICOs and DAOs must "ensure

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[119] See the work of the blockchain and ICOs working group set up by the Swiss Federal Council: https://www.admin.ch/gov/fr/accueil/documentation/communiques.msg-id-72001.html (last accessed on 09.10.19).

[120] FINMA, Regulatory treatment of ICOs, p. 2-4.

[121] FINMA, Guidelines.

[122] See *supra* Chapter 2.2.4.

[123] See *supra* Chapter 2.2.2.

[124] FINMA, Stable Coins. See also LUX TOBIAS, La FINMA prend position sur les "stablecoins".

[125] See ADMINISTRATION FÉDÉRALE DES CONTRIBUTIONS, Impôt pour les cryptomonnaies et les ICOs.

[126] Financial Crimes Enforcement Network, Statement of Jennifer Shasky Calvery, Director, Financial Crimes Enforcement Network, United States Department of the Treasury, Before the United States Senate Committee on Banking, Housing, and Urban Affairs Subcommittee on National Security and International Trade and Finance Subcommittee on Economic Policy, 19 November 2013, https://www.fincen.gov/news/testimony/statement-jennifer-shasky-calvery-director-financial-crimes-enforcement-network (last accessed on 09.10.19).

[127] U.S. COMMODITY FUTURES TRADING COMMISSION, Bitcoin Basics, p. 1.

[128] See *infra* Chapters 3.2 and 4.1.

compliance with the U.S. federal securities laws"[129]. Accordingly, certain ICOs are classified by the SEC as securities offerings, subjecting them to existing regulations[130]. In addition to federal securities laws, each U.S. state has its own laws and may treat the issuance of tokens differently[131].

In Switzerland and the U.S., but also in other countries, national regulatory agencies have reacted faster than State legislators and have subjected certain crypto-assets and crypto-activities to their jurisdiction[132]. However, in our opinion, a uniform legislation regulating all aspects of blockchain technology is the preferred option, as many other legal issues remain unanswered and contradicting decisions can be rendered by different authorities.

In a more comprehensive approach, the government of Liechtenstein has accepted on 7 May 2019 a report and motion on the creation of a blockchain law that was proposed in November 2018[133]. The aim of that bill is to regulate all aspects of the token economy and not only known applications such as cryptocurrencies and ICOs. The bill is also designed to accommodate to future developments of the technology[134]. Therefore, in order to be as broad and technologically neutral as possible, the bill refers to blockchain technology as "transaction systems on the basis of trustworthy technologies" (TT systems)[135].

Similarly, the Swiss Federal Counsel has, in a second phase, adopted on 7 December 2018 a report to provide a legal framework for blockchain and DLT in the financial sector. At the same time, it has instructed the Federal Department of Finance to elaborate a draft legislation on the subject together with the Federal Department of Justice and Police[136]. A draft legislation to adapt the federal laws to DLT has been published on 22 March 2019[137]. This draft legislation provides targeted adaptations in many laws, mainly to accommodate the financial sector to the new possibilities offered by crypto

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[129] U.S. SECURITIES AND EXCHANGE COMMISSION, The DAO report, p. 2.

[130] U.S. SECURITIES AND EXCHANGE COMMISSION, Spotlight on Initial Coin Offerings (ICOs).

[131] DEWEY JOSIAS, USA, p. 479.

[132] See HOMSY BIBA, Aspects of Swiss financial regulation, p. 145-146.

[133] MINISTERIUM FÜR PRÄSIDIALES UND FINANZEN, Bericht und Antrag zum "Blockchain-Gesetz" verabschiedet. For the proposed law, see MINISTERIUM FÜR PRÄSIDIALES UND FINANZEN, Blockchain-Gesetz, p. 137 ff (for the German version) and MINISTERIUM FÜR PRÄSIDIALES UND FINANZEN, Blockchain law, p. 116 ff (for the English version).

[134] MINISTERIUM FÜR PRÄSIDIALES UND FINANZEN, Bericht und Antrag zum "Blockchain-Gesetz" verabschiedet.

[135] MINISTERIUM FÜR PRÄSIDIALES UND FINANZEN, Blockchain law, p. 6.

[136] CONSEIL FÉDÉRAL, Bases juridiques pour DLT et blockchain.

[137] Draft Bill of the Federal Act on the Adaptation of Federal Law to the Developments of Distributed Ledger Technology, accessible at https://www.newsd.admin.ch/newsd/message/attachments/56196.pdf (last accessed on 09.10.19).

tokens and distributed ledgers. It also provides the possibility to hold rights on a distributed ledger and treat them as negotiable securities, for example shares of a company[138].

More recently, in the U.S., the states of Montana, Colorado, and Wyoming have passed crypto-friendly bills[139]. Montana's bill recognizes utility tokens and exempts them from the state's securities laws[140]. Colorado passed a bill that exempts digital tokens from its securities laws[141]. Wyoming recognizes digital assets of all types and applies towards them the "same rules that apply to money"[142].

All pieces of legislations discussed above focus on the financial aspect of cryptocurrencies, dealing, for example, with the qualification of the different types of tokens, the regulation of cryptocurrency exchanges, the protection of crypto investors, the seizure of crypto assets in case of bankruptcy, or the dematerialization of securities. However, none of them regulate new forms of entities running on blockchain. In our opinion, this is a missed opportunity for jurisdictions investing resources in the introduction of legislation on blockchain technology. Although the Swiss government has had a generally positive attitude towards blockchain technology and cryptocurrencies[143], the Swiss legislator only took a shy step towards the dematerialization of share ownership[144]. The dematerialization of many more aspects of company law, such as voting procedures, seems obvious enough.

3. The notion of DAO

3.1. Genesis of DAOs

The idea of a decentralized and autonomous entity running on a blockchain originates from blockchain entrepreneur Daniel Larimer's blogpost over the hidden costs of Bitcoin, which was published on 7 September 2013[145]. Daniel Larimer was making the point that a cryptocurrency could be seen as a

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[138] See DÉPARTEMENT FÉDÉRAL DES FINANCES, Rapport Suisse sur la DLT, p. 13-14 and p. 28-34, according to which a public limited company should, in the future, be allowed by law to issue, by means of distributed ledger technology, shares as electronic securities in accordance with Art. 973d DP-CO.

[139] PARTZ HELEN, Montana Bill.

[140] PALMER DANIEL, Montana Bill. See also Montana House bill no. 584, https://leg.mt.gov/bills/2019/HB0599/HB0584_1.pdf (last accessed on 09.10.19).

[141] ALEXANDRE ANA, US State of Colorado Passes Crypto Exemptions Bill Into Law. See also Colorado Senate bill 19-023 signed on 6 March 2019, https://leg.colorado.gov/sites/default/files/2019a_023_signed.pdf (last accessed on 09.10.19).

[142] LONG CAITLIN, What Do Wyoming's 13 New Blockchain Laws Mean?; POLLOCK DARRYN, Wyoming Blockchain Bill. See also Wyoming Senate bill SF0125 adopted on 26 February 2019, https://www.wyoleg.gov/Legislation/2019/SF0125 (last accessed on 09.10.19).

[143] HAEBERLI DANIEL/ OESTERHELT STEFAN/ MEIER URS, Switzerland, p. 443.

[144] The Polish legislator is exploring similar possibilities with the dematerialization of bonds and other securities and with the introduction of a new form of capital company dedicated to start-up companies where the shareholders' register could be kept on a decentralized database such as a blockchain. See GLADKOWSKI JAKUB/ KULASZA ALEKSANDER, New technologies in Polish law, p. 4 and 14.

[145] See LARIMER DANIEL, The Hidden Costs of Bitcoin.

Decentralized Autonomous Corporation (DAC) where the source code represents bylaws and token holders are shareholders. In his comparison, Daniel Larimer went on by saying that the DAC's purpose is to maximize value for its token holders by performing activities on the free market, while paying services it needs for its operation with its own shares (i.e., tokens from the DAC)[146].

The metaphor of cryptocurrencies as DACs was further developed by Daniel Larimer's father, Stan Larimer, in a blogpost published on 14 September 2013[147]. The focus of the post was on determining whether Bitcoin would be better suited with 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"[148] that can be executed independently from 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"[149]. He was the first to truly see the potential of blockchain technology as a new way to implement governance within a digital entity, and ultimately to serve as a vehicle to conduct business. However, in his view, DACs were necessarily independent from any jurisdiction and they should not be regulated, or rather, they could not be regulated[150].

Shortly after, blockchain entrepreneur Vitalik Buterin took the concept of the DAC and deepened the reflection in a series of three blogposts. In his first post, he oriented his writing on the technical challenges to the development of a completely distributed "virtual corporation" on the Bitcoin blockchain[151]. This was before the Ethereum blockchain was created, and the identification of the Bitcoin blockchain's shortcomings in this post undoubtedly influenced him in the development of

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[146] 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 amount of ethers the miner will be remunerated. See RAJEEVAN ARUN, Tokens, Gas and Gas limit in Ethereum.

[147] See LARIMER STAN, Bitcoin and the Three Laws of Robotics.

[148] LARIMER STAN, Bitcoin and the Three Laws of Robotics.

[149] LARIMER STAN, Bitcoin and the Three Laws of Robotics.

[150] LARIMER STAN, Bitcoin and the Three Laws of Robotics.

[151] BUTERIN VITALIK, DAC Part I.

Ethereum[152]. In his second blogpost, Buterin tried to figure out a way for DACs to interact with the "real world"[153]. His third blogpost was focused on determining cases where DACs could 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[154]. Those posts were the first foundations that brought 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"[155]. With this new term in use and other confusing concepts associated to blockchain technology circulating on the Internet, Buterin decided shortly after to create a guide to some of the terminologies 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"[156]. He differentiated DACs from DAOs by saying that DACs were "basically a subclass of DAOs" and that DACs introduced the concept of shares, therefore they were for-profit entities, while DAOs were defined as non-profit entities, even though money could be made by participating in their ecosystem[157]. Building on this, Daniel Larimer claimed later on that the word "company" from DAC had simply been abandoned in favor of "organization" in order to avoid unnecessary legal entanglements"[158]. For this reason, he also adopted the term "DAO" instead of "DAC".

According to Daniel Larimer, the first entity that had the characteristics of a what he considered a DAO was created in 2013 when he was working on developing the first decentralized cryptocurrency exchange market place called BitShares[159]. 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"[160]. However, the launch of The DAO in 2016 was the real turning point in popularizing the concept of a DAO.

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[152] Vitalik Buterin later co-developed with Gavin Wood the Ethereum blockchain. He published in November 2013 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 BUTERIN VITALIK, Ethereum White Paper; WOOD GAVIN, Ethereum Yellow Paper.
[153] BUTERIN VITALIK, DAC Part 2.
[154] BUTERIN VITALIK, DAC Part 3.
[155] See BUTERIN VITALIK, Ethereum White Paper, p. 1.
[156] BUTERIN VITALIK, Terminology Guide.
[157] BUTERIN VITALIK, Terminology Guide.
[158] LARIMER DANIEL, Is The DAO going to be DOA?.
[159] LARIMER DANIEL, Is The DAO going to be DOA?.
[160] LARIMER DANIEL, Is The DAO going to be DOA?.

3.2. 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 project defined the understanding of what a Decentralized Autonomous Organization is. The DAO was a form of venture capital fund organized as a network of smart contracts deployed on the Ethereum blockchain and where participants could submit projects to be funded[161]. Investors were granted voting rights proportionally to their investment in order to participate in the project selection process and to carry out the operations of The DAO[162]. Programming all governance and operational rules on the blockchain was supposed 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 from many other investors, creating "the largest crowdfunding project ever"[163]. At the time, it demonstrated "the potential for business associations to exist on the blockchain"[164]. As such, the blockchain community had high hopes that this project would be the ground for a blockchain revolution.

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 over a large portion of the funds, bringing the project to a halt[165]. As a consequence, the Ethereum community revised the blockchain code to restore misappropriated funds. This process caused the Ethereum blockchain to split (hard fork) 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 from Aragon and Gnosis, among others, have been developed since then.

The Aragon project, which was born in November 2016, is a platform that provides entrepreneurs and investors an ecosystem of tools in order to create and manage DAOs[166]. It introduced in November 2018 the Aragon Network, which is a DAO that serves as an online court, the Aragon 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"[167]. The Aragon project is currently stewarded by a Swiss-based association, meaning that it is connected to a legal person and thereby is connected to a legal order. However, the Aragon project is seeking independence from its underlying legal person and wishes to cut all ties to any legal order in the near future. This will fulfill the platform's vision of being self-

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[161] ATMANI MEHDI, La DAO.
[162] JENTZSCH CHRISTOPH, The DAO White Paper, p. 1-2.
[163] DELOITTE, The DAO Chronology, p. 4.
[164] RODRIGUEZ USHA R., Law and the Blockchain, p. 24.
[165] BOUCHER PHILIP, Blockchain technology, p. 21.
[166] CUENDE LUIS, The Aragon Manifesto.
[167] ARAGON NETWORK, Aragon White Paper.

sovereign[168]. However, it is unclear what the legal status will be for the Aragon project and the Aragon Network and its participants, once the legal ties are cut.

Gnosis Ltd., which is a company incorporated in Gibraltar, has set as its main goal the creation of a blockchain-based prediction market platform[169]. In the pursuit of this goal, Gnosis has launched on 29 May 2019 the dxDAO, which is a DAO aimed at introducing community governance within other DAOs[170]. The need has originated from Gnosis' wish to "support community governance, upgradeability, and the network effects"[171] that are necessary for the permissionless trading protocol DutchX that the company has also developed. While Gnosis was responsible for the creation, the marketing, the support, and the launch of the dxDAO, the former has followed its initial plan to cut all ties with the latter on 12 July 2019[172]. The dxDAO is now fully owned by its members and its future will depend entirely on their actions. This creates 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 two.

The common properties of the three aforementioned DAOs include a set of assets that are organized and managed by governing rules encoded into smart contracts that run on the Ethereum blockchain. As such, we can conclude that the DAOs in our sample have three common characteristics: they are assets, they are organized according to some governing rules, and by using smart contract functions running on the Ethereum blockchain, their operation is decentralized (i.e., the control is shared between all participants) and distributed (i.e., the protocol is distributed within a peer-to peer system)[173].

3.3. DAO definition

The concept of a DAO is relatively new and since Daniel Larimer, Stan Larimer, and Vitalik Buterin laid the foundations[174], it has been a widely discussed subject. However, no common DAO definition has emerged yet. We will hereafter outline definitions that have been used by IT and legal authors. We will

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[168] CUENDE LUIS, The Aragon Manifesto.
[169] GNOSIS, Gnosis White Paper, p. 5-7.
[170] GNOSIS, The dxDAO has awoken.
[171] DxDAO, Toward Super-Scalable Organizations.
[172] Gnosis has never held voting power in the dxDAO, as such it has cut ties with the dxDAO in three steps: it has stopped all communication and promotion of the dxDAO by archiving accounts it held on dedicated communication platforms (Twitter, DAOtalk, and Telegram), it has archived the GitHub repository that allowed Gnosis to make updates to the dxDAO's codebase, and it has pledged not to fund proposals in relation to the dxDAO through its funding program called Gnosis Ecosystem Fund (GEGO). See GNOSIS, Gnosis is Stepping Back from the dxDAO.
[173] See *supra* Chapter 2.1.1.
[174] See *supra* Chapter 3.1.

then highlight key characteristics that emerge from each definition. This will help us come up with a comprehensive definition that will serve the rest of this paper.

3.3.1. DAO definition from IT authors

According to one IT author, a DAO "is 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"[175]. Furthermore, "a DAO contains some kind of internal property that is valuable in some way, and it has the ability to use that property as a mechanism for rewarding certain activities"[176]. It follows from this definition that DAOs have some assets that are used according to a set of governing rules. This entity is said to run over the Internet, without mention of blockchain technology. However, the author refers to the concept of autonomy, which implies the use of a peer-to-peer network.

A second author defines DAOs as "non-hierarchical organizations that perform and record routine tasks on a peer-to-peer, cryptographically secure, public network, and rely on the voluntary contributions of their internal stakeholders to operate, manage, and evolve the organization through a democratic consultation process"[177]. The first characteristic that stands out from this definition is that this author considers DAOs as entities that have an internal organization. Secondly, the author outlines the technical conditions of DAOs, again without mentioning blockchain technology, but by describing its basic functioning, which corresponds to blockchain technology. Finally, the author requires the use of a public network, which rules out of his definition any DAO-like entity running on a permissioned private blockchain[178].

A third author describes a DAO as "an organization [that is] self-governing and not influenced by outside forces: its software operates on its own, with its by-laws immutably written on the blockchain, not controlled by its creators"[179]. According to him, "DAOs are formed by groups of like-minded individuals with specific projects and goals in mind. [A DAO's] identity is formed through consensus. Its authority is defined through voluntary endorsement and, ultimately, network effects"[180]. Finally, the author describes a DAO as being "purely software: in itself it does not have the capabilities to manufacture a product, write code, develop hardware or sweep the streets. It requires actors in the physical world for this purpose, called Contractors"[181]. This definition also describes a DAO as being an

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[175] BUTERIN VITALIK, Terminology Guide.
[176] BUTERIN VITALIK, Terminology Guide.
[177] HSIEH YING-YING et al., Bitcoin and the Rise of DAOs, p. 2.
[178] See *supra* Chapter 2.1.3.
[179] TUAL STEPHAN, A Primer to Decentralized Autonomous Organizations (DAOs).
[180] TUAL STEPHAN, A Primer to Decentralized Autonomous Organizations (DAOs).
[181] TUAL STEPHAN, A Primer to Decentralized Autonomous Organizations (DAOs).

organized entity. It goes even further by introducing the notion of a common goal of its members. Furthermore, this author vindicates the right to independence of DAOs, which should be able to function by themselves without the help of a legal or natural person. On the technical side, for this author a DAO clearly runs on a blockchain.

3.3.2. DAO definition from legal authors

One legal author defines a DAO as a "new form of social and corporatist organization"[182] that is "decentralized because the organization's statutes are incorporated in the smart contracts and executed on the blockchain; it is autonomous because once deployed on the blockchain, it is regulated by the rules fixed in the smart contracts and removed from its creators"[183]. The notion of an entity organized as a form of corporation emerges from this definition. This author also links DAOs to the use of blockchain technology and more specifically smart contracts.

Another author defines a DAO as "[a] smart contract that connects multiple parties, all taking part in a common project"[184]. The author further describes that "[i]n a DAO, a network of interacting smart contracts is executed to allow two or more parties to conduct projects without a central body. The network of smart contracts is used to create a fully autonomous organization, based on the blockchain, that is capable of carrying out the same functions as traditional companies."[185]. According to the author, a DAO "operates in accordance with its original computer code, and independently of its original developers. Its activity is organized algorithmically"[186]. This author describes DAOs as autonomous entities that are organized in a similar manner as companies. In his definition, DAOs function necessarily through the use of smart contracts that are running on a blockchain.

According to a third author, a DAO is "a computer program, running on a peer-to-peer network, incorporating governance and decision-making rules"[187]. Furthermore, "[a] DAO is effectively a community, with its resources organized according to rules agreed in advance and set out in its code. DAOs are open source software, capable of modification through member consensus"[188]. Again, the notion of DAOs being an organized entity is found in this definition. For the technical aspect, this definition does not mention blockchain technology, but only a software running on a peer-to-peer network. It is thus a more technologically-neutral approach than the two other legal definitions.

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[182] MIGNON VINCENT, Blockchains – perspectives and challenges, p. 5.
[183] MIGNON VINCENT, Blockchains – perspectives and challenges, p. 5.
[184] CARRON BLAISE/ BOTTERON VALENTIN, How smart can a contract be?, p. 110.
[185] CARRON BLAISE/ BOTTERON VALENTIN, How smart can a contract be?, p. 110.
[186] CARRON BLAISE/ BOTTERON VALENTIN, How smart can a contract be?, p. 110.
[187] CAISLEY LAWSON et al., DAOs, p. 2.
[188] CAISLEY LAWSON et al., DAOs, p. 3.

Nonetheless, this author underlines the necessity of a peer-to-peer network. The importance of the existence of a community of persons and an internal organization based on a set of rules are here again emphasized.

3.3.3. Comprehensive DAO definition

As it has been seen above[189], the definition of a DAO is not homogenous within the IT community nor the legal community. However, recurring characteristics can indicate what the general understanding of a DAO is.

The most prominent characteristic is that a DAO is a form of organized entity. Some authors go as far as comparing DAOs to companies. Each definition mentions that DAOs perform tasks according to some governance rules similar to bylaws. This indicates that it is of common understanding that DAOs are internally organized and are capable of performing tasks that have external impacts.

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

Tying DAOs to a specific technology seems problematic. Even as it should be acknowledged that DAOs have emerged from blockchain technology, a definition used for legal purposes should be as neutral as possible to cover as many concrete situations as possible. The definition should take into consideration the evolution of technology so that it will stay relevant in the future. Inspiration can be taken 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 regardless of the technology used"[190], leaving room for future innovations. In our opinion, the same should be done with DAOs, starting with their definition.

Considering the above, we define a DAO as the entity created by the deployment of an autonomous software running on a distributed system that allows a network of participants to interact and manage resources on a transparent basis and according to the rules defined by the software code.

If we break down our definition, the following seven elements emerge: the entity (a) created by the deployment of an autonomous software (b) running on a distributed system (c) that allows a network

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[189] See *supra* Chapters 3.3.1 and 3.3.2.
[190] Winston Maxwell/ Bourreau Marc, Technology Neutrality, p. 1.

of participants (d) to interact and manage resources (e) on a transparent basis (f) and according to the rules defined by the software code (g). Each of these elements deserves a few words of explanation.

a) the entity

An entity can be defined as "something that exists separately from other things and has a clear identity of its own"[191]. The most recurring characteristic that has been observed throughout Chapter 3 is that a DAO forms an identifiable entity, as it exists separately from its developers and its participants.

b) created by the deployment of an autonomous software

One fundamental characteristic of a DAO is that, once deployed, it becomes autonomous from any other entity and any legal or natural person. A DAO can make a certain action only if its code allows for it and if the action has been approved according to the DAO's governance rules.

c) running on a distributed system

At the moment, the technology used to deploy DAOs is blockchain. The characteristic of this technology is that the system does not depend on one computer or server, but rather, 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[192]. This makes the system extremely secure as a hacker would have to edit more than half of the nodes' copy of the blockchain in order to corrupt a DAO[193]. Furthermore, a distributed system ensures the independence of a DAO so that only the community of participants as a whole can dictate its actions according to its governance rules. Our definition purposefully does not mention blockchain technology in order to allow DAOs to be deployed on future (if any) forms of distributed systems.

d) that allows a network of participants

DAOs are made up of a network of participants just like a company is made up of shareholders or members. The participants can make collective decisions within the DAO according to 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.

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[191] Collins English dictionary, https://www.collinsdictionary.com/dictionary/english/entity (last accessed on 09.10.19).

[192] See *supra* Chapter 2.1.1.

[193] See *supra* Chapter 2.1.4.

e)   *to interact and manage resources*

As any form of organized entity, a DAO must have resources in order to function[194]. Participants can decide how the other resources must be used, according to the governance rules of the DAO. Existing DAOs hold resources in the form of a cryptocurrency, which is a kind of asset that can be directly used for transactions. DAOs running on Ethereum must always hold a sufficient amount of cryptocurrency in order to pay for gas, which is an amount of cryptocurrency that must be paid to the system in order to run transactions or smart contracts[195]. If resources of DAOs are currently limited to cryptocurrencies, DAOs could potentially hold in a near future other forms of assets, such as properties and rights.

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: they rule how the organization runs. In order to make an educated 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.

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 another way than what the rules defined by the software code provide for. Accordingly, each process must be executed according to the encoded rules.

3.3.4. Scope of the DAO definition

As with any definition, the range of entities that are considered DAOs can be more or less restricted by the chosen terms. The scope of the proposed definition is voluntarily broad, because the goal is to cover as many entities as possible.

This definition leads us to formulate a subdivision of DAOs into two categories that we could describe as the "ground layer DAOs" and the "top layer DAOs":

By ground layer DAOs, we mean DAOs that tend to have the characteristics of a DAO but serve as a ground system for other DAOs to function. Blockchains such as Bitcoin and Ethereum fit this category

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[194] According to JENTZSCH CHRISTOPH, The DAO White Paper, p. 2, "[w]ithout ether, a DAO can not do anything so a DAO's first order of business is to receive ether".
[195] See *supra* Footnote 145.

of ground layer DAOs[196]. As such, our definition aligns with the concept of a DAO first imagined by pioneers such as Daniel Larimer, Stan Larimer, and Vitalik Buterin[197].

By top layer DAOs, we mean DAOs that tend to resemble the structure and governance of a virtual company and 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[198].

Ground layer DAOs do not appear to operate with the purpose of functioning in a manner that can be understood to be similar to legal entities. Although they fit the definition of a DAO, their purpose is only to serve as a payment mechanism by "issuing" a cryptocurrency and eventually allow more complex forms of DAOs to use their infrastructure in order to operate. This is different from top layer DAOs, as they tend to function similarly to legal entities such as companies, and they often aspire to deploy legal effects in some jurisdictions by performing legal acts or by instituting legal proceedings[199]. Therefore, we will concentrate for the rest of this work on top layer DAOs and determine whether they can be considered as subjects of law.

4. The legal understanding of DAOs

4.1. Legal problems arising from The DAO case

In the case of The DAO[200], 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 the "theft" of tokens constitutes a theft or, more broadly, an illegal act. It remains to be determined the law of which State would have been applicable, but especially the authorities of which country would have had jurisdiction to judge the aforesaid question.

The Ethereum community chose to re-establish the situation by force instead of going to a State court to seek compensation for the damage suffered by The DAO. Due 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 the judgment would have been satisfying. In any case, the enforcement on the blockchain of a

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[196] HSIEH YING-YING et al., Bitcoin and the Rise of DAOs, p. 2 describe how Bitcoin fits the definition of an organization and therefore qualifies as a DAO. See also VINEB VU GABA, The State of the DAOs, who argues that Bitcoin was the first DAO.
[197] See *supra* Chapter 3.1.
[198] See *supra* Chapter 3.2.
[199] See *infra* Chapter 5.1.
[200] See *supra* Chapter 3.2.

condemnatory judgment would have been difficult if not impossible[201]. 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 defense. Furthermore, the hard fork was imposed upon all participants of The DAO and all ether holders, while only few of them had any say over the matter.

The DAO case illustrates that the legal scope of DAOs is still uncertain and depends on the recognition of their legal effects, which in turn depends on their qualification in the legal systems of the different States[202].

4.2. Overview of existing legal framework for DAOs

So far, DAOs have drawn little interest from legal scholars and lawmakers. For the most part, they still have not tackled the legal challenges that have arisen from The DAO case[203]. The potential of a dematerialized and decentralized company is still not fully understood[204], nor are the legal implications that come with it. DAOs are a rapidly evolving field of study. The great economic opportunities that DAOs promise are confronted with crypto-friendly jurisdictions that keep DAOs out of their regulatory framework, diminishing the effectiveness of their newly-developed legislation. Still, it should be noted that lawmakers in very few jurisdictions had the foresight to introduced legislation to integrate new forms of companies running on blockchain technology.

Monaco has attempted to deal with many aspects of blockchain technology by introducing a pioneering bill in December 2017 that still has not been adopted at the time of writing[205]. One innovative aspect is that Art. 2 of the draft bill defines a smart contract and recognizes its legally binding effect. The draft bill goes even further by introducing in its Art. 3 the concept of an "*entreprise algorithmique*" (i.e., algorithmic company). This new form of company is defined as the operation by which one or more smart contracts, acting for a specific purpose for the benefit of one or more beneficiaries, emit, receive or transfer assets, property, rights or securities, or a set thereof, present or future, to third parties[206]. Art. 5 of the draft bill also deals with matters of private international law

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[201] According to DE FILIPPI PRIMAVERA/ WRIGHT AARON, Blockchain and the Law, p. 144, traditional enforcement mechanisms may have a hard time applying to property held by DAOs.

[202] On legal uncertainties of The DAO, see MACHEEL TANAYA, Is The DAO Legal?.

[203] See *supra* Chapter 4.1.

[204] See FENWICK MARK/ KAAL WULF A./ VERMEULEN ERIK P.M., Why Blockchain will disrupt corporate organizations, p. 24-26, who outline some features DAOs have to offer to the corporate world.

[205] CONSEIL NATIONAL DE MONACO, Proposition de loi de Monaco relative à la blockchain, p. 1.

[206] 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".

by defining connecting criteria for the application of Monegasque law and for granting jurisdiction of Monegasque courts. As a result, the bill pushes for the recognition of DAOs running on blockchain that are connected in some ways to the Monegasque jurisdiction. However, it does not grant such organizations legal personality and does not deal with questions of governance, nor the rights and obligations of participants.

Malta has been more effective than Monaco by actually accepting three bills on blockchain and cryptocurrency on 4 July 2018[207]. Those bills set up a regulatory framework applicable to the blockchain environment and are collectively referred to as "The Digital Innovation Framework"[208]. The first Maltese bill, referred to as the Innovative Technology Arrangements and Services Act (ITAS), regulates entities running on DLT (i.e., DAOs)[209]. The second bill, referred to as the Virtual Financial Assets Act (VFA), regulates cryptocurrency exchange platforms, provides a legal framework for ICOs, and sets guidelines on how they must be conducted and licensed[210]. The third bill, referred to as the Malta Digital Innovation Authority Act (MDI), establishes a supervisory authority for the aforementioned activities[211].

The ITAS bill introduces the legal concepts of Innovative Technology Arrangements (ITAs), which are defined in the first schedule of the bill as "software and architectures which are used in designing and delivering DLT which ordinarily, but not necessarily: (a) uses a distributed, decentralized, shared and, or replicated ledger; (b) may be public or private or hybrids thereof; (c) is permissioned or permissionless or hybrids thereof; (d) is immutable; (e) is protected with cryptography; and (f) is auditable"[212]. Smart contracts as well as DAOs fall within the definition of an ITA[213]. In addition to the definition, the bill deals with the recognition (part II of the bill) and the certification (part III of the bill) of ITAs, and requires the registration of a service provider (part IV of the bill) to run an ITA. Instead of granting ITAs legal personality, the Maltese legislator created a legal link between an ITA and a person

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[207] WELCOME CENTER MALTA, ICO & Crypto Regulation in Malta, https://www.welcome-center-malta.com/blockchain-services-in-malta/ico-crypto-regulation-in-malta/ (last accessed on 09.10.19).

[208] FALZON MALCOLM/ VALENZIA ALEXIA, Malta, p. 378. See also WOLFSON RACHEL, Maltese Regulatory Framework.

[209] Maltese Bill no. C 689, Innovative Technology Arrangements and Services Act, 2018, http://justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29078&l=1 (last accessed on 09.10.19).

[210] Maltese Bill no. C 778, Virtual Financial Assets Act, 2018, http://justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29079&l=1 (last accessed on 09.10.19).

[211] Maltese Bill no. C 901, Malta Digital Innovation Authority Act, 2018, http://justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29080&l=1 (last accessed on 09.10.19).

[212] First schedule, Art. 2 and 8, para. 1 ITAS.

[213] First schedule, Art. 2 and 8, para. 2 ITAS.

providing Innovative Technology Services (ITS provider)[214]. The ITS provider, which can be a legal or natural person, must register with the Malta Digital Innovation Authority (MDIA) for a specific activity that it wants to pursue through an ITA. Transparency and accountability of the ITA is guaranteed, as the ITS provider is identifiable by investors and authorities[215].

More recently, the U.S. state of Vermont introduced an act that was signed into law on 28 August 2018[216], which adds a new form of company to its legal order: the Blockchain-Based Limited Liability Company (BBLLC)[217]. 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 contractual agreements and protects its "owners, managers and blockchain participants from unwarranted liability"[218]. Hence, the BBLLC is part of Title 11, Chapter 25 of the Vermont Statutes Annotated (V.S.A), which deals specifically with LLCs. As such, general provisions related to LLCs apply to BBLLCs (11 V.S.A. § 4176). The key innovation in this act is that the governance of a company can be fully or partially provided through blockchain technology (11 V.S.A. § 4173, par. 1). The act also recognizes the use of blockchain-based smart contracts for carrying out votes regarding the operation and activities of a BBLLC (11 V.S.A. § 4173, par. 2, let. c). The state of Vermont has already seen its first BBLLC incorporated as the dOrg LLC[219]. The BBLLC dOrg is believed to be the "first legal entity that directly references blockchain code as its source of governance"[220]. By incorporating BBLLCs into its legal order, the state of Vermont has offered blockchain actors "an enforceable legal framework to create custom governance and organizational structures that fit their unique technology and circumstances"[221].

These two first DAO legislations call for the following observations. The Maltese ITA's administrative burden appears overly complicated and too much responsibility is put on the ITS provider, which is contrary to the spirit of DAOs early adopters. However, the ITAS bill has solved a great legal challenge by recognizing blockchain-based entities. Amendments to the bill could, for example, grant ITAs legal

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[214] The preliminary report discussed the possibility to grant ITAs legal personality when they do 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 OF THE OFFICE OF THE PRIME MINISTER, Malta: A Leader in DLT Regulation, p. 18.

[215] FELICE PAUL, Presenting Innovative Technology Arrangements & Services Act.

[216] Vermont Act no. 205 (S.269), An act relating to blockchain business development, https://legislature.vermont.gov/Documents/2018/Docs/ACTS/ACT205/ACT205%20As%20Enacted.pdf (last accessed on 09.10.19).

[217] Title 11, Chapter 25, Subchapter 12 of the Vermont Statutes Online: Blockchain-based Limited Liability Companies, https://legislature.vermont.gov/statutes/fullchapter/11/025 (cited: 11 V.S.A.) (last accessed on 09.10.19).

[218] PROPY, Vermont Act.

[219] GRAVEL & SHEA, dOrg LLC. See also BODDY MAX, First legal DAO.

[220] GRAVEL & SHEA, dOrg LLC.

[221] PROPY, Vermont Act.

personality and reduce the responsibility of the ITS providers[222]. The Vermont BBLLC, while enabling the dematerialization of many aspects of a company, keeps at its very core the structure of an LLC. This can be reassuring for some and not innovative enough for others. The key takeaway of this legal structure is that a BBLLC is a blockchain-based entity that has legal personality, which benefits both investors and third parties.

The Maltese ITA is vividly criticized by entrepreneurs. As for the Vermont BBLLC, it is well received within the blockchain community. Nevertheless, it has only attracted one entity at the time of writing. It is important to underscore that it is too soon to assess whether or not the two aforementioned models of DAO legislations can be considered a success. In any case, they have the merit of trying to embrace the technological revolution of blockchain for the benefit of entrepreneurship and are therefore groundbreaking.

4.3. Absence of legal status for DAOs in Switzerland

As we have seen above[223], new forms of entities are being created in the blockchain environment, whether they are governed by the laws of existing jurisdictions (hereafter "regulated DAOs"), or they simply exist on the Internet, independently from any jurisdiction (hereafter "maverick DAOs"). In our opinion, The DAO case shows that those new forms of entities all have the potential to generate legal implications within Switzerland's jurisdiction, regardless of their creation under a legal order. But most importantly, this case has demonstrated the existence of a legal uncertainty regarding the jurisdiction over DAOs, and the law applicable to their internal organization and to the legal effects they generate. The DAO case has left individuals unsure of their rights and obligations and forced the Ethereum community to take actions, resulting in a situation that is very disputable from a legal point of view.

The Swiss legislator has yet to show its interest in the issues that have arisen from The DAO case. There is currently no draft of Swiss DAO legislation. With a lack of specific legislation adapted to those new forms of entities, we must make use of existing laws in order to apprehend them in our legal order. In the next chapters, we will analyze how DAOs can be treated under Swiss law in order to remedy the current legal uncertainty. We will recognize that the Swiss legal system has existing tools that can allow the apprehension of DAOs through its private international law. We will outline the mechanism which allows the recognition of DAOs existing outside of the Swiss legal order, whether they are ruled under the laws of a State or not. The aim is to guarantee to both regulated DAOs and maverick DAOs legal

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[222] Some authors have expressed the necessity to grant ITAs legal personality. See TENDON STEVE/ GANADO MAX, Legal Personality for Blockchains, DAOs and Smart Contracts, p. 4.

[223] See *supra* Chapters 3.3 and 4.2.

existence in Switzerland for the purpose of safeguarding the rights of all parties interacting with them within the Swiss legal order and guarantee legal certainty.

5. The recognition of foreign DAOs in Switzerland

5.1. Foreign DAOs as legal entities in the Swiss legal order

Since Switzerland's substantive law does not address DAOs, regulated DAOs are necessarily entities of foreign law. For their part, maverick DAOs are inherently international entities. Thus, it can be concluded that currently, any DAO trying to pursue activities in Switzerland necessarily creates an international situation[224]. As a result, DAOs as entities must be recognized and qualified through private international law in order to define their legal effects in Switzerland[225]. Conflict of laws rules fulfil this role by connecting a legal situation to a legal order[226]. The recognition of foreign DAOs in Switzerland is thus determined by the Swiss Private International Law Act (PILA).

The critical issue at hand is to determine whether a DAO qualifies as a company under the definition of Art. 150 par. 1 PILA, so that chapter 10 of the PILA governing companies is applicable. If a DAO does not qualify as a company, it is to be qualified as a contract and governed by the provisions of chapter 9 of the PILA (Art. 150 par. 2 PILA). If a DAO does qualify 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 the DAO can be recognized as a legal entity in Switzerland. The issue of the recognition of a DAO as a validly constituted company, is the founding of its existence as a subject of rights and obligations, without which a DAO cannot perform legal acts or institute legal proceedings[227]. A priori, the qualification and recognition of regulated DAOs should be similar to other forms of companies, leading to a determinable result. However, due to the unclear status of maverick DAOs, their qualification and recognition is currently unpredictable. This situation creates a legal uncertainty[228] which, in our view, can be remedied thanks to a modern interpretation of the concept of an organized company under Art. 150 PILA, and an innovative interpretation of what constitutes a "State" and what

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[224] See GUILLAUME FLORENCE, Le pont du droit international privé, p. 175, who states that using a blockchain is enough to confer an international scope to a transaction, unless it is completed on a permissioned blockchain where all the nodes and the users are located within the same territory.

[225] The same issue exists with smart contracts. See GUILLAUME FLORENCE, Le pont du droit international privé, p. 172.

[226] GUILLAUME FLORENCE, Le pont du droit international privé, p. 175.

[227] GUILLAUME FLORENCE, Lex societatis, p. 64. See also PERRIN JEAN-FRANÇOIS, La reconnaissance, p. 10.

[228] According to GUILLAUME FLORENCE, Blockchain Transactions, 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".

can be considered a "law" under Art. 154 PILA, but within the existing practical and functional legal landscape.

5.2. Qualifying DAOs under Art. 150 PILA

5.2.1. General criteria defining a company

In order to determine whether a DAO qualifies as a company under Art. 150 par. 1 PILA, the different elements of the definition must be analyzed. It must be noted that the definition of a company in the PILA is autonomous from its definition under Swiss substantive law, meaning that it is not bound by the *numerus clausus* of companies specified in the Civil Code (CC), the Code of Obligations (CO), and other Acts[229]. Both an "organized company" 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[230]. Similarly, the goal pursued by the company can be either economic or ideal[231]. What qualifies as a company is willingly very broad, as the definition must include all social combinations that have a social organization or that are at least organized as a whole[232]. This leaves a large degree of discretion to the qualification[233].

The key criteria to determine whether an entity falls within the definition of a company is the notion of "organization", meaning that any sufficiently organized entity qualifies as a company[234]. In order to be considered sufficiently organized, some authors only require a minimal form of organization for the internal relations of the entity[235]. Other authors go further and require an organized internal structure where tasks and activities are exercised within a goal-oriented order defined by rules of behavior[236]. In addition, the organized entity must be recognizable from the outside[237]. 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[238].

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[229] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 2.
[230] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 2.
[231] VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150, no. 3-4.
[232] CONSEIL FÉDÉRAL, Message LDIP, p. 425.
[233] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150-165, no. 2.
[234] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 3.
[235] NOBEL PETER, Gesellschaftsrecht im IPRG, p. 183; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 5.
[236] DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 5; EBERHARD STEFAN/ VON PLANTA ANDREAS, BaKomm IPRG, Art. 150, no. 16; HUBER LUCIUS, Joint-Venture, p. 61.
[237] Decision of the Swiss Federal Tribunal 4A_582/2008 of 27 February 2009, ground 3.1. See also GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 3; DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 5.
[238] EBERHARD STEFAN/ VON PLANTA ANDREAS, BaKomm IPRG, Art. 150, no. 16.

5.2.2. Distinction between an organized company and organized assets

An organized company must 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 company[239]. In order to facilitate the qualification, parallels can be drawn between the foreign entity to be qualified and forms of companies known under Swiss substantive law[240]. However, foreign entities unknown under Swiss substantive law are also qualified as companies, provided that they have a sufficiently organized internal structure[241]. Examples of such unknown foreign entities are partnerships and business associations which originate from common law jurisdictions[242].

In addition to the general criteria, organized assets must meet three complementary criteria to qualify as a company: assets must be administered by an administrator, they must be autonomous from the administrator's assets, and they must have a proper goal[243]. As a result, the qualification of a set of assets as a company under Art. 150 par. 1 PILA is more stringent than that for an organized company. When assessing the foreign entity, all factual elements must be taken into consideration[244]. Examples of such entities are foundations[245], but also associations and private equity funds[246].

The main distinctive criteria between the two kinds of entities falling within the definition of a company under Art. 150 par. 1 PILA is that an organized company is predominantly composed of members as to opposed to assets[247]. In case of doubt regarding the qualification, when a foreign entity is sufficiently organized it must be qualified as an organized company rather than organized assets[248]. In our opinion, the distinction between the two is not of great significance, as both definitions result in the qualification of the entity as a company under Art. 150 par. 1 PILA and the application of chapter 10 PILA. However, this distinction should not be completely disregarded as it may help us understand the functioning of a particular DAO.

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[239] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 5.
[240] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 5.
[241] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 5.
[242] DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 3.
[243] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 6.
[244] GUILLAUME FLORENCE, Lex societatis, p. 23.
[245] ATF 135 III 614, ground 4.1.1.
[246] DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 6.
[247] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 6.
[248] GUILLAUME FLORENCE, Lex societatis, p. 24.

5.2.3. Distinction between a company and a contract

Art. 150 par. 2 PILA states that simple partnerships that are not sufficiently organized must be qualified as contracts, thus subjecting the foreign entity to chapter 9 PILA[249]. This implies that simple partnerships can be either of contractual nature or a form of company under private international law, depending on their level of organization[250]. The definition of a simple partnership under Swiss substantive law provided by Art. 530 CO is not relevant for the qualification of the foreign entity[251]. 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[252]. Entities that are not organized according to one of the forms of companies provided by the *numerus clausu*s of Swiss law are not necessarily qualified as a simple partnership of contractual nature under Art. 150 par. 2 PILA[253]. A foreign entity is deemed to be a simple partnership of contractual nature only if it does not qualify as an organized company or organized assets in the sense of Art. 150 par. 1 PILA[254].

There are a multitude of elements that have to be considered when assessing whether a simple partnership is to be qualified as a company or as a contract, and no single element is decisive on its own[255]. 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 order[256]. For the legislator, a key indicator that a foreign entity qualifies as a company is whether or not it has a "a strong enough organization"[257].The Swiss Federal Tribunal has refused to qualify foreign entities as companies because they were not organized and lacking an "institutionalized management"[258]. 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

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[249] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 13.
[250] VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150, no. 18.
[251] DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 8.
[252] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 10.
[253] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 10; DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 8.
[254] VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150, no. 18; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 11; DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 8.
[255] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 11; EBERHARD STEFAN/ VON PLANTA ANDREAS, BaKomm IPRG, Art. 150, no. 16-17; VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150, no. 23.
[256] EBERHARD STEFAN/ VON PLANTA ANDREAS, BaKomm IPRG, Art. 150, no. 16.
[257] CONSEIL FÉDÉRAL, Message LDIP, p. 425.
[258] ATF 142 III 466, ground 5.2; decision of the Swiss Federal Tribunal 4A_582/2008 of 27 February 2009, ground 3.1.

independent from its members, whether the entity subsists if one of the members leaves, and whether the entity has goals that are to be pursued over a long period of time[259].

5.2.4. Regulated DAOs under Art. 150 PILA

At the time of writing, two forms of regulated DAOs exist: the Maltese Innovative Technology Arrangement (ITA) and Vermont's Blockchain-based Limited Liability Company (BBLLC)[260]. It must be determined whether both of these forms of regulated DAOs are sufficiently organized in the sense of Art. 150 PILA, meaning that they have an organized internal structure and that the organization is recognizable from the exterior. As we do not have access to the bylaws of any ITA nor BBLLC, we will proceed to making an analysis based on the necessary legal requirements that must be considered when establishing such entities.

a)   Maltese ITA

In order to complete the certification of a Maltese ITA by the MDIA, i.e., the competent authority, the ITA must certify a purpose with reference to qualities, features, attributes, limitations, conditions, terms of services, and behaviors or aspects (Art. 7 par. 1 and Art. 8 par. 4 let. e ITAS). It thus appears that an ITA must have an organized internal structure with a goal-oriented order. This is the first condition prescribed by the established doctrine for an entity to be considered sufficiently organized under Art. 150 PILA[261].

Furthermore, an ITA must be run by a registered service provider who must register for a class or classes of services it is allowed to provide through an ITA (Art. 9 ITAS). The service provider must publish the Certificate of Registration granted to the ITA by the MDIA and provide his or her identification information as well as the powers he or she has in regards to the ITA (Art. 9 par. 5 and Art. 6 ITAS). It thus appears that the organization of an ITA is recognizable from the outside by third parties. The second condition prescribed by the established doctrine being also met[262], we consider that a Maltese ITA is sufficiently organized in the meaning of Art. 150 PILA and qualifies as a company.

Even if this distinction does not play a determining role, it remains to be seen whether a Maltese ITA should be qualified as an organized company or as organized assets. As we have seen above[263], we must first determine whether the company is predominantly composed of members or assets. The

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[259] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 11; KREN KOSTKIEWICZ JOLANTA, IPRG/LugÜ Kommentar, Art. 150, no. 6; DUTOIT BERNARD, Commentaire LDIP, Art. 150, no. 8; VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150 no. 22; EBERHARD STEFAN/ VON PLANTA ANDREAS, BaKomm IPRG, Art. 150, no. 17.

[260] See *supra* Chapter 4.2.

[261] See *supra* Chapter 5.2.1.

[262] See *supra* Chapter 5.2.1.

[263] See *supra* Chapter 5.2.2.

definition of an ITA is very broad and the kind of activity that an ITS provider can register is not limited in the ITAS bill, but is simply obliged to be accepted by the MDIA. This makes it difficult to determine whether ITAs under Maltese law are composed predominantly of members or assets. We must therefore consider other elements in order to make this distinction.

To be qualified as organized assets under Art. 150 PILA, a company must satisfy three additional conditions to the main criterion of organization: assets must be administered by an administrator (1), they must be autonomous from the administrator's assets (2), and they must have a proper goal (3)[264]. The ITAS bill requires the registration of an ITS provider in order to pursue a specific activity through an ITA and creates a distinctive link between the ITA and the ITS provider. The ITS provider has the powers of representation over the ITA and has control over its assets[265]. In this regard, the ITS provider could be considered the administrator of the ITA's assets in the same way a trustee is considered the administrator of a trust's assets[266], as similarities can be seen regarding the kind of power they both have over the assets they administer. Furthermore, even if the ITAS bill is not explicit on this point, the ITA Guidelines specify that the ITAS provider "has control of assets belonging to the legal organization"[267], which indicates a clear separation between the assets of the ITA and the ITS provider. Finally, for an ITA to be certified by the MDIA, it must have a registered legal purpose (Art. 8 par. 3 ITAS)[268]. It follows that the three above conditions are met in theory. As a consequence, the qualification of ITAs tends to point towards organized assets.

However, in order for this qualification to stand, the assets of an ITA must be independent not only from the ITS provider's assets, but from the token holders' assets as well. The wording of the law does not permit to make such a determination. Therefore, each ITA needs to be individually analyzed in order to consider all elements, and in case of doubt, the qualification as an organized company must prevail[269].

b) Vermont's BBLLC

The analysis to determine whether a Vermont BBLLC qualifies as a company under Art. 150 PILA should be more straightforward than that of the Maltese ITA, as a BBLLC keeps at its core the corporate form

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[264] See *supra* Chapter 4.2.
[265] MALTA DIGITAL INNOVATION AUTHORITY, ITA Guidelines, p. 27.
[266] Before the introduction of Chapter 9a PILA, trusts were qualified as organized assets under Art. 150 par. 1 PILA. See GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 7.
[267] MALTA DIGITAL INNOVATION AUTHORITY, ITA Guidelines, p. 27.
[268] See also MALTA DIGITAL INNOVATION AUTHORITY, ITA Guidelines, p. 12.
[269] See *supra* Chapter 5.2.2.

of an LLC[270] and it is of common practice that LLCs organized under U.S. law are generally and automatically recognized as companies under the PILA[271]. Nonetheless, we will proceed with the analysis to determine whether an LLC electing to be a BBLLC[272] impacts its qualification.

The governance of a BBLLC can be provided, in whole or in part, through blockchain technology (11 V.S.A. § 4173, par. 1), and the operating agreement of a BBLLC must provide "a summary description of the mission or purpose of the BBLLC" (11 V.S.A. § 4173, par. 2, let. a). It thus appears that a BBLLC must have an organized internal structure with a goal-oriented order. The first condition prescribed by the established doctrine for an entity to be considered sufficiently organized under Art. 150 PILA is thus satisfied[273].

According to 11 V.S.A. § 4003, let. a, an LLC must have an operating agreement that "governs relations among the members, among the managers, and among the members, managers, and the limited liability company". The management functions are stated under 11 V.S.A. § 4003, let. c. Accordingly, the organization of an LLC, and consequently a BBLLC, is recognizable from the outside. The second condition prescribed by the established doctrine being also met[274], we consider that a BBLLC is sufficiently organized in the meaning of Art. 150 PILA and qualifies as a company.

Determining whether a BBLLC qualifies as an organized company or as organized assets is also fairly straightforward. The U.S. LLC has similar characteristics to the Swiss LLC as defined in Art. 772 ff CO, and the established doctrine lists the Swiss LLC as an example of an entity that falls under the concept of an organized company[275]. U.S. LLCs can thus undoubtedly be qualified as organized companies. What distinguishes a BBLLC from a regular LLC is mainly that the governance of a BBLLC may be provided through blockchain technology (11 V.S.A. § 4173, par. 1) and voting procedures within the BBLLC may be carried out through smart contracts on a blockchain (11 V.S.A. § 4173, par. 2, let. c)[276]. Furthermore, BBLLCs are generally ruled by the provisions of the Vermont Limited Liability Company

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[270] 11 V.S.A. § 4176 states that "[e]xcept to the extent inconsistent with the provisions of [subchapter 12], the provisions of the Vermont Limited Liability Company Act govern".

[271] See for example the decisions of the Swiss Federal Tribunal 4P.60/2000 of 3 October 2000 and 5A_193/2010 of 7 July 2010, where the issue of the rightful constitution of LLCs organized under U.S. law is not even raised.

[272] According to 11 V.S.A. § 4172, "[a] limited liability company […] may elect to be a blockchain-based limited liability company".

[273] See *supra* Chapter 5.2.1.

[274] See *supra* Chapter 5.2.1.

[275] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150, no. 4; VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150, no. 6.

[276] EPSTEIN JEREMY, World's First BBLLC, mentions that "dOrg's governance, including rules, compensations, and voting power are all secured and executed by a blockchain".

Act (11 V.S.A. § 4176). As a consequence, we consider that BBLLCs are to be qualified as organized companies in the sense of Art. 150 PILA.

5.2.5. Maverick DAOs under Art. 150 PILA

A maverick DAO can be any entity that falls under our definition of a DAO provided above[277] and that is not regulated under the law of a State. This leaves a very broad panel of possible entities, including the three above-mentioned entities that identify themselves as DAOs, namely The DAO, the Aragon Network, and the dxDAO[278]. As a consequence, a general assumption applicable to all maverick DAOs would be inadequate. It would be wrong to assume that all maverick DAOs are sufficiently organized to qualify as a company under Art. 150 PILA, just like it would be wrong to assume that none of them qualify. Therefore, when dealing with a maverick DAO, its structure must be analyzed in light of Art. 150 PILA, which we will precisely do for the three identified maverick DAOs.

a)   The DAO

The DAO was a blockchain-based entity that was designed to function in a similar way as 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 CISA 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 qualified as a collective investment scheme under the CISA[279]. Even if The DAO did not have all the required characteristics prescribed by the CISA, similarities were apparent enough that some authors[280] made this analysis before concluding that the qualification was not possible. Similarities with collective investment schemes included the internal organization of The DAO and the goal it was pursuing[281]. Furthermore, information regarding those elements were publicly available in The DAO's white paper[282]. In our view, this shows that The DAO had a distinctive goal-oriented order that was enough to satisfy the first condition to consider it sufficiently organized under Art. 150 PILA[283].

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[277] See *supra* Chapter 3.3.3.

[278] See *supra* Chapter 3.2.

[279] As a reminder, in order to be considered sufficiently organized under Art. 150 PILA, a company does not need to fit the qualification of a form of company under Swiss substantive law. It is therefore unnecessary to determine whether The DAO had the necessary characteristics to be qualified as an investment scheme. See *supra* Chapter 5.2.1.

[280] Hari Olivier, Cryptocurrencies and DAO: What protection for the investors?, p. 5; Hess Martin/ Spielmann Patrick, Digitalisierte Werte, p. 192-193.

[281] See Hari Olivier, Protection for Investors, p. 5-6, for who The DAO had many similarities with collective investment schemes.

[282] Jentzsch Christoph, The DAO White Paper.

[283] See *supra* Chapter 5.2.1.

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Token holders of The DAO could be seen as shareholders as they were granted voting rights proportional to their investment. Even though no one individual could represent The DAO externally, The DAO could only release some of its funds if a majority of the token holders agreed to it. There was a collective functioning that was clearly apparent to third parties. Therefore, the second condition prescribed by the established doctrine was also met[284], so that The DAO was sufficiently organized in the meaning of Art. 150 PILA to qualify as a company.

In order to determine whether The DAO was an organized company or organized assets, one fundamental element to consider is whether The DAO was predominantly composed of members or of assets. The token holders predominantly formed The DAO and they were seeking a return on investment. Also, the investments they held in The DAO were not independent from their assets. Therefore, The DAO qualified as an organized company 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[285]. The most voted option is the winning ruling of the dispute. Jurors are incentivized to pick "the right solution" through a majority mechanism to which their remuneration depends. This mechanism is publicly disclosed in the DAO's white paper[286]. The Aragon Network thus has an internal structure with an organized economic flow and an organized governance flow[287]. This shows that the Aragon Network has a distinctive goal-oriented order, which is enough to satisfy the first condition to consider it sufficiently organized under Art. 150 PILA[288].

The governance of the Aragon Network is operated by the DAO's token holders, similarly to shareholders of a company. Furthermore, the Aragon Network is easily distinguishable as an entity to third parties that submit a dispute and to jurors who vote on an outcome. Therefore, the Aragon Network is sufficiently organized both internally and externally to qualify as a company under Art. 150 PILA.

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[284] See *supra* Chapter 5.2.1.
[285] ARAGON NETWORK, Aragon White Paper.
[286] ARAGON NETWORK, Aragon White Paper.
[287] CUENDE LUIS, Introducing the Aragon Network.
[288] See *supra* Chapter 5.2.1.

The token holders of the Aragon Network predominantly form the company. The DAO's assets are only a means to make it function. Therefore, the Aragon Network qualifies as an organized company under Art. 150 PILA.

<p style="text-align:center;">c) dxDAO</p>

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" through a staking mechanism that occurred 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 earned. The full description of this mechanism was initially available in the dxDAO's white paper, even though the document was not able to be accessed at the time of writing[289]. The dxDAO clearly has an internal organization and its existence serves a goal, meaning that it satisfies the first necessary condition required to consider it sufficiently organized under Art. 150 PILA[290].

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 qualify as a company under Art. 150 PILA.

The participants holding Reputation in the dxDAO predominantly form the company. The DAO's assets are only a means to make it function. Therefore, the dxDAO qualifies as an organized company under Art. 150 PILA.

5.3. Finding the *lex societatis* of DAOs under Art. 154 PILA

5.3.1. General conditions for a validly constituted company

Once an entity is deemed sufficiently organized to qualify as a company under Art. 150 PILA, it remains to be determined whether the company has been validly constituted according to Art. 154 PILA so that it can be recognized in Switzerland and be considered a subject of law.

A company must be validly constituted according to the law of a State in order to exist in law[291]. Art. 154 PILA establishes connecting factors that determine the law of which State is decisive, i.e., which law governs the company. This law, also called the *lex societatis*, determines the company's legal

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[289] See the dxDAO's DAOstack page, https://dxdao.daostack.io (last accessed on 09.10.19).
[290] See *supra* Chapter 5.2.1.
[291] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 1.

structure, its internal organization, and the registration requirements into a company register[292]. In this respect, the legal existence of a company depends on the validity of its constitution according to the *lex societatis*[293].

Art. 154 PILA provides a cascading system in order to determine 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[294]. Alternatively, the law of the State where the company is actually administered is applicable (Art. 154 par. 2 PILA). This, however, should not be considered as a reference in regards to the theory of the seat of administration[295]. The majority view[296] holds that this alternative option is applicable in two scenarios. The first scenario is when the company is not validly constituted according to the law under which it is organized. The second scenario is when it is not possible for third parties to identify the country of incorporation because the company is not subject to formalities of publicity and registration.

However, in the view of one author[297] that we agree with, it is not necessary that third parties can identify the law according to which a company is organized. Therefore, a company is validly constituted according to Art. 154 par. 1 PILA when it meets the formal requirements of publicity and registration of the law according to which it is organized, and when such requirements do not exist, when it is rightfully organized according to that same law[298]. As a consequence, the connecting factor to the law of the State where the company is governed[299] is only applicable when the company does not meet the constitution requirements of the law according to which it is organized[300], that is when the company does not meet the formal requirements of publicity and registration of the law according to which it is organized, and when such requirements do not exist, when the company is not rightfully organized according to that same law[301].

When the alternative solution of Art. 154 par. 2 PILA is applicable, the State where "the company is actually administered"[302] must be determined. It appears that this wording refers to the administrative

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[292] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 1.

[293] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 1.

[294] ATF 117 II 494, grounds 5-6. See also DUTOIT BERNARD, Commentaire LDIP, Art. 154, no. 5; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 14.

[295] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 20; EBERHARD STEFAN/ VON PLANTA ANDREAS, BaKomm IPRG, Art. 154, no. 12. *Contra*: DUTOIT BERNARD, Commentaire LDIP, Art. 154, no. 5.

[296] VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 154, no. 27; DUTOIT BERNARD, Commentaire LDIP, Art. 154, no. 5.

[297] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 15.

[298] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 15.

[299] This is the subsidiary solution under Art. 154 par. 2 PILA.

[300] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 16.

[301] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 17.

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

headquarters as defined in Art. 21 par. 2 PILA[303]. This is an objective criterion that requires determining the State with which the company has the closest connections in regard to its administration[304]. It corresponds to the State where the fundamental decisions are made and where the company's operational management is usually located[305]. 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 center where the accounts are kept, and the place where the company's clients reside[306]. If the operations of the company are being managed from a number of countries, the place where the head office is located, i.e., where the company's headquarters are, is decisive[307].

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 governed (when Art. 154 par. 2 PILA applies), the company is automatically recognized in Switzerland and exists as a subject of law[308]. However, if the company does not meet all applicable constitution requirements, it is not considered as validly constituted under Swiss private international law. Such a company does not exist in the Swiss legal order[309].

The Swiss legislator wrote Art. 154 PILA in such a way as to prevent this last situation from happening. Indeed, 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 that a company constituted under a foreign law would not have a legal existence in Switzerland[310]. Hence, the legislator designed a flexible system that prioritizes the interests of third parties who rely on the appearance that a company has a legal existence on the Swiss territory[311]. The principle of automatic recognition of foreign entities, i.e., the *favor recognitionis* principle, is thereby

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[303] VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 154, no. 27; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 19.
[304] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 19.
[305] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 19.
[306] EBERHARD STEFAN/ VON PLANTA ANDREAS, BaKomm IPRG, Art. 154, no. 14; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 19; KREN KOSTKIEWICZ JOLANTA, IPRG/LugÜ Kommentar, Art. 154, no. 14.
[307] VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 154, no. 26; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 19.
[308] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 44.
[309] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 18; VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150-156, no. 29; DUTOIT BERNARD, Commentaire LDIP, Art. 154, no. 5.
[310] CONSEIL FÉDÉRAL, Message LDIP, p. 428-429.
[311] CONSEIL FÉDÉRAL, Message LDIP, p. 428.

applicable[312], meaning that foreign entities are generally and automatically recognized in Switzerland[313].

5.3.2. Possible remedies to the connecting factors designating the *lex societatis*

The connecting factors specified in Art. 154 PILA that designate the *lex societatis* can be restricted by provisions found in the general part of the PILA, namely in Art. 15, 17, 18, and 19 PILA[314]. We will hereafter quickly outline the necessary conditions for the application of each one of those restrictions in relation to Art. 154 PILA.

a) Art. 15 PILA: exception clause

The exception clause under Art. 15 PILA serves as a rectification mechanism when, in a particular case, the connecting factor outlined in a conflict of laws rule does not designate the law of the State with which the legal relationship has the closest connection[315]. This mechanism is not applicable when a choice of law has been made (Art. 15 par. 2 PILA), because in such a case the connection with the chosen State is established subjectively on the basis of the common will of the parties. As a consequence, the exception clause cannot rectify the connection to a legal order made by applying Art. 154 par. 1 PILA, as the choice to organize a company according to the law of a particular State equates to a choice of law[316].

However, when the connection to the law of the State under which a company is organized has failed, Art. 154 par. 2 PILA provides an objective connecting factor to the law of the State where the company is actually administered[317]. If that State is not the one with which the company has the closest connection, Art. 15 PILA allows the connecting factor to be remedied in such a way that the criterion of the closest connection applies[318].

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[312] ATF 117 II 494, ground 6.b; see also VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150-156, no. 26; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 43.

[313] VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150-156, no. 9; GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 150-165, no. 9; GUILLAUME FLORENCE, Lex societatis, p. 65-68; KREN KOSTKIEWICZ JOLANTA, IPRG/LugÜ Kommentar, Art. 154, no. 15.

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

[315] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 25.

[316] ATF 117 II 494, ground 7; ATF 135 III 617, ground 4.2. See also GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 24-25; VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150-156, no. 30-31.

[317] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 26.

[318] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 26; VISCHER FRANK/ WEIBEL THOMAS, ZüKomm IPRG, Art. 150-156, no. 31.

b) Art. 17 PILA: public order

Art. 17 PILA, which refers to the so-called negative reserve of the Swiss public order, provides for another remedy to the connecting factors when a foreign law is designated. The application of foreign law should not under any circumstances be contrary to the Swiss public order. This provision prevents foreign law to be applied if this results in an intolerable blow to public morals and to the essence of Swiss law[319]. As a consequence, the application of the foreign law designated by Art. 154 par. 1 or 2 PILA can be excluded through Art. 17 PILA[320]. This restriction could be applied in order to preserve the interests of third parties when, for example, a company has willingly misled a contracting party into thinking that the company is governed by Swiss law, when it is actually governed by foreign law[321].

c) Art. 18 and 19 PILA: mandatory laws

Under Art. 18 PILA, which refers to the so-called positive aspect of the Swiss public order, the foreign law designated by a conflict of laws rule can also be set aside when Swiss imperative laws of immediate application must compulsorily apply[322]. These laws are known in French as "*lois d'application immédiate*" and are frequently referred to in the same way in English. As a general rule, only mandatory provisions that meet essential social, political, or economic interests must be considered[323].

For example, the Swiss Federal Tribunal has ruled that the prohibition of abuse of rights, which stems from Art. 2 par. 2 CC, is part of the positive aspect of the Swiss public order as defined in Art 18 PILA[324]. One specific case where Art. 18 PILA could have been applied in relation to Art. 154 PILA would have been if the *lex societatis* did not provide for a responsibility based on the principle of transparence ("*Durchgriff*" in German). However, the Swiss Federal Tribunal ruled that this principle, which allows for the corporate veil to be lifted, is not covered by the principle prohibiting the abuse of rights under Art. 2 par. 2 CC and therefore cannot be relied on by way of Art. 18 PILA[325].

Similarly, Art. 19 PILA could be applied as a remedy to the connecting factor of Art. 154 PILA when a foreign provision of company law could be qualified as a law of immediate application[326]. In such a case, the foreign law can be taken into consideration by a Swiss court in order to give it some legal

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[319] ATF 135 III 614, ground 4.2.
[320] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 27.
[321] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 29.
[322] ATF 135 III 614, ground 4.2. However, GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 30, considers that Art. 18 PILA cannot completely set aside a foreign law designated by Art. 154 PILA, but it allows Swiss imperative laws of immediate application to be considered alongside the foreign law.
[323] ATF 128 III 201, ground 1b.
[324] ATF 128 III 201, ground 1b.
[325] ATF 128 III 346, ground 3.1.3 and 3.1.4; see GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 32.
[326] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 33.

effect in Switzerland. However, considering its very limited scope, Art. 19 PILA can be only very rarely applied[327].

5.3.3. Regulated DAOs under Art. 154 PILA

As we have seen above[328], Regulated DAOs under Maltese and Vermont law can be qualified as companies under Art. 150 PILA. We will hereafter analyze under what conditions those DAOs can be considered as validly constituted under Art. 154 PILA so that they can be recognized and legally exist in Switzerland.

a) Maltese ITA

Pursuant to Art. 154 par. 1 PILA, the *lex societatis* of an ITA organized under the ITAS bill is Maltese law. Accordingly, if an ITA meets all the constitution requirements outlined in the ITAS bill, the company is automatically recognized in Switzerland and exists as a subject of law[329].

According to part III of the ITAS bill, an ITA must be certified by the authority to be validly constituted. In order to receive the proper certification, an ITA must "meet the generic and specific requirements as stated in [Art. 8 par. 3 and 4] of the ITAS Act respectively, including the fit and properness of the Applicant, Administrator and Qualifying Shareholders"[330]. Then, it is only after a system auditor[331] has confirmed that the ITA's system works properly that the MDIA can grant the certification. A register of all certified ITAs is held by the authority (Art. 6 par. 1 ITAS) and is publicly available on the MDIA's website (Art. 6 par. 4 ITAS). As a result, a DAO organized as a Maltese ITA can exist in Switzerland as a subject of law if it is granted a certification from the MDIA and is listed in its online register.

What remains to be determined is whether, in the case of an ITA pursuing business in Switzerland, the connecting factor to Maltese law should be remedied by one of the provisions of the general part of the PILA[332]. As we do not have an actual case to analyze, we will limit ourselves to a subjective assessment of the law.

If an ITA is validly constituted according to the ITAS bill, then the exception clause of Art. 15 PILA could not be used because the connecting factor stems from a choice of law from the founders of the ITA. Also, the public order clause of Art. 17 PILA should be only rarely applicable, as ITAs are subjected to

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[327] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 33.
[328] See *supra* Chapter 5.2.4.
[329] See *supra* Chapter 5.3.1.
[330] MALTA DIGITAL INNOVATION AUTHORITY, ITA Guidelines, p. 7.
[331] Approved systems auditors include PwC, KPMG, BDO Technology Advisory Limited, and STIS Group Ltd. See https://mdia.gov.mt/systems-auditor/ (last accessed on 09.10.19).
[332] See *supra* Chapter 5.3.2.

various Maltese legislations, depending on their area of activity, just like other Maltese companies. Applicable laws include but are not limited to laws "relating to a) the prevention of money laundering and the financing of terrorism; b) the protection of personal data; c) the respect of the rights of consumers; and d) other mandatory laws, depending on the purpose and functionalities of the ITA"[333]. This means that constituting a company in the form of an ITA could not be used to evade from common protections for investors or creditors and other third parties. Finally, the possible application of Swiss or foreign mandatory laws through Art. 18 or 19 PILA respectively, could only be assessed in a concrete individual case.

b)   Vermont's BBLLC

Pursuant to Art. 154 par. 1 PILA, the *lex societatis* of a BBLLC organized under V.S.A., Title 11, Chapter 25 (Limited Liability Companies) is Vermont law. Accordingly, if a BBLLC meets all the constitution requirements outlined in Vermont law, the company is automatically recognized in Switzerland and exists as a subject of law[334].

The articles of organization of an LLC must be filed by the Secretary of State, which serves as "inclusive proof that the organizers satisfied all conditions precedent to the creation of the organization" (11 V.S.A. § 4022, let. c). A person can request the Secretary of State to provide a certificate of existence for an LLC (V.S.A. § 4028, let. a). In addition to the constitution requirements applicable to LLCs in general, the operating agreement of a BBLLC must a) provide a summary description of the mission or purpose of the BBLLC; b) specify whether the blockchain on which the BBLLC is based is fully or partially decentralized and whether it is fully or partially public or private; c) adopt voting procedures, which may include smart contracts carried out on blockchain technology; d) adopt protocols to respond to system security breaches or other unauthorized actions; e) provide how a person becomes a member of the BBLLC with an interest, and; f) specify the rights and obligations of each group of participants within the BBLLC, including which participants are entitled to the rights and obligations of members and managers (V.S.A. § 4073). As a result, a DAO organized as a BBLLC under Vermont law can exist in Switzerland as a subject of law if it has been properly filed by the Secretary of State.

As for possible remedies to the connecting factor designating Vermont law as the *lex societatis* of a BBLLC, the situation is fairly similar to the above developments dedicated to the Maltese ITA[335]. If a BBLLC is validly constituted under V.S.A., Title 11, Chapter 25, then the exception clause of Art. 15 PILA could not be used because the connecting factor stems from a choice of law from the founders of the

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[333]   MALTA DIGITAL INNOVATION AUTHORITY, ITA Guidelines, p. 18.
[334]   See *supra* Chapter 5.3.1.
[335]   See *supra* Chapter 5.3.3.

BBLLC. Also, the public order clause of Art. 17 PILA should be only rarely applicable, as BBLLCs are governed by general provisions applicable to LLCs (V.S.A. § 4176)[336], meaning that constituting a company in the form of a BBLLC could not be used to evade from common protections for investors or creditors and other third parties. Finally, the possible application of Swiss or foreign mandatory laws through Art. 18 or 19 PILA respectively, could only be assessed in a concrete individual case.

5.3.4. Maverick DAOs under Art. 154 PILA

The wording of Art. 154 par. 1 PILA refers to the *lex societatis* as the law of the State under which a company is organized: "le droit de l'Etat en vertu duquel elles sont organisées" in the French version, "dem Recht des Staates, nach dessen Vorschriften sie organisiert sind" in the German version, and "dal diritto dello Stato giusta il quale sono organizzate" in the Italian version. We can point out that all three official versions of the PILA refer to the law of a State. However, maverick DAOs are, by definition, not organized by the law of a State, as they exist on the Internet independently from any jurisdiction[337]. Accordingly, a literal or strict interpretation of Art. 154 par. 1 PILA should bring us to consider that maverick DAOs cannot be considered as validly constituted under the law of a State.

It must then be determined whether the *lex societatis* can be found through 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[338], this is an objective criterion, for which the State with which the company has the closest connection in regards to its administration must be determined[339]. The indicators will be hereafter analyzed for each of the three selected maverick DAOs, that is The DAO, the Aragon Network, and the dxDAO[340].

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 participant 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, each decision made by The DAO and all communications took place over the Internet. Similarly, there was no administrative center

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[336] No ruling of Swiss Federal Tribunal could be found for a case requiring the connecting factor to the *lex societatis* of an LLC to be remedied through Art. 17 PILA.
[337] See *supra* Chapter 4.3.
[338] See *supra* Chapter 5.3.1.
[339] GUILLAUME FLORENCE, CoRo LDIP/CL, Art. 154, no. 19.
[340] See *supra* Chapter 3.2.

in a State jurisdiction, as all decisions were made by vote over the Internet. No link existed between The DAO and a specific State jurisdiction. The "place" where The DAO was 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 Aragon Governance Proposal (AGP)[341]. One stage of the procedure currently requires the proposal to be approved by the Aragon Association board of 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, only this proposal filtration power is given to the Aragon Association. As a result, its board of directors cannot be considered as the Aragon Network's directors. The final decisions are made by the community of ANT holders. They are anonymous and potentially reside all around 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 like the administrative center of the DAO can be considered as being on the Internet. Even if a weak link with Swiss jurisdiction does exist, the "place" where the Aragon Network is 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 cut. Decisions over the dxDAO's processes and its assets are solely made by Reputation Holders, which are anonymous participants who potentially reside all around the world. Also, there is no hierarchy between 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 over the Internet. Even if a very weak link with Gibraltar's jurisdiction does exist, the "place" where the Aragon Network is administered as understood in Art. 154 par. 2 PILA is online.

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[341] The detailed procedure can be viewed at https://github.com/aragon/AGPs/blob/master/AGPs/AGP-1.md (last accessed on 09.10.19).

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5.4. Expanding the notion of State under Art. 154 PILA

5.4.1. Emergence of an online jurisdiction

As seen above[342], 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 in a State jurisdiction. With a traditional interpretation of what constitutes a "State", maverick DAOs have no legal existence in the Swiss legal order[343]. This situation is unsatisfactory from a legal point of view as it leaves a legal uncertainty for maverick DAOs, their participants, and possible third parties that interact with them[344].

The possibility that a company is not recognized as validly constituted under Art. 154 PILA has been traditionally admitted by the Swiss legislator for companies that refuse to comply with registration and publicity requirements under the law they choose to organize or under the law they are administered. However, such circumstances are considered as 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[345]. The situation with regard to maverick DAOs is unforeseen, as they are a new type of company[346] that the Swiss jurisdiction has yet to grasp. Founders of maverick DAOs do not choose to elude constitution requirements outlined in a law. Instead, they use new technology that is available to them to form whole new types of organized assets that are unregulated in State jurisdictions. The Maltese ITA and Vermont's BBLLCs are forms of companies that, while integrating the use of blockchain technology to some degree, still operate on a 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 and qualify maverick DAOs under substantive law in order to grant them legal existence. This exercise has been attempted by Swiss authors[347] who tried to force The DAO into forms of companies known under Swiss substantive law.

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[342] See *supra* Chapter 5.3.4.

[343] See *supra* Chapter 5.3.1.

[344] The legal uncertainty exists in a broad way for any individual interacting with blockchain systems. See for example HARI OLIVIER, The protection of the owners of cryptocurrencies, p. 207 ff, who discusses in particular the protection of bitcoin owners.

[345] GUILLAUME FLORENCE, Lex societatis, p. 193-194.

[346] As seen *supra* Chapter 5.2.5, maverick DAOs can be considered as companies under the PILA.

[347] See for example HESS MARTIN/ SPIELMANN PATRICK, Digitalisierte Werte, p. 191-193, who tried to qualify The DAO as a simple company (Art. 530 ff CO), as a collective investment scheme (Art. 7 SICA and Art. 5 CISO), 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. See also HARI OLIVIER, Protection for Investors, p. 5, who has doubts as to whether

However, the authors had no choice but to note that, while The DAO resembled many aspects of some forms of companies, it did not fit the constitutive criteria of any form of Swiss companies.

Thus, applying Swiss substantive law to maverick DAOs is not the proper solution to integrate them into the Swiss legal system. Not only it could 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 considered sufficiently organized under Art. 150 PILA to be considered a company. This can only be done by departing from the traditional interpretation of what constitutes 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 that composes it. This translates into the recognition of an online jurisdiction that is independent from any Sate jurisdiction and that is ruled by its code.

5.4.2. Rational 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 where "corporations and communities regulate themselves and constitute their own jurisdictional order"[348]. This jurisdictional order can be referred to as an online jurisdiction. Founders of maverick DAOs and their participants are precisely organizing themselves with this vision of self-governance. 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 to operate and the protections that come with it. They are solely relying on the technology itself and on the principle of "code is law"[349]. Founders of maverick DAOs and their participants subject themselves to the rules governing the DAO the same way they would subject themselves to the rules of 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 legitimate their existence.

The DAO, in the eventuality where Swiss law was applicable, could have been legally qualified as a collective investment scheme.

[348] KOHL UTA, The Net and the Nation State, p. 192.

[349] The idea of "code is law" comes from LESSIG LAWRENCE, Code Is Law. It establishes the principle that code regulates behavior on the Internet. This idea is very popular in the blockchain ecosystem, where it is generally accepted that the only rules that can regulate behavior within a system (such as a DAO) are the ones set in the code. Any participant to a blockchain system agrees to the rules of the code and any behavior allowed by the code is right.

The founders of a maverick DAO chose the code of the DAO as the law governing their company[350], just like the founders of a Swiss LLC chose Art. 772 ff CO as the law governing theirs. By analogy to 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 autonomy 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 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 setting, 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 simply existing, maverick DAOs would be, by definition, validly constituted according to their *lex societatis*, i.e., according to their code, and would thus be granted legal existence in Switzerland. 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.

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 kept existing outside of the law. Indeed, if a maverick DAO is considered as a validly constituted company under Art. 154 PILA and is granted legal existence in Switzerland, the mechanisms outlined above[351] that allow to remedy the connecting factor to the DAO's code as the *lex societatis* would be applicable. This would guarantee, for example, the preservation of the Swiss public order through Art. 17 PILA. In this way, a maverick DAO misleading a contracting party into thinking it is governed by Swiss law could be subjected 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[352]. In this way, if the participants of the DAO used their company to act in a manner that abuses 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 CC.

In order for the legal theory as developed above to be valid, we must find a way to integrate the concept of online jurisdiction in the notion of State under Art. 154 PILA. While simply proposing an extensive interpretation of the reference to a State in this conflict of laws rule could be an option,

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[350] Here, a DAO can be referred to as a company since we have concluded that they are sufficiently organized under Art. 150 PILA.

[351] See *supra* Chapter 5.3.2.

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

another reasoning based on stronger legal means might exist. For example, Swiss authors[353] are already arguing that some legal challenges arising from the use of new technologies could be addressed with the integration of a new principle in the Swiss legal order: the principle of functional equivalence. This principle could be the key to substantiating our legal theory, as the following section will demonstrate.

5.4.3. Functional equivalence as the enabler of the online jurisdiction concept

With the development of smart contracts, many authors have written about the recognition of their legally-binding effect[354]. Some authors are pushing for the principle of functional equivalence to be introduced into the Swiss legal order to circumvent legal challenges arising from smart contracts, without having to introduce new legislation[355]. This principle "was established for the first time in air freight transport"[356] 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[357], on Electronic Signature[358], and on Electronic Transferable Records[359].

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"[360]. Accordingly, where the law provides for a register, blockchain technology would be recognized as an equivalent without the need to change the law[361]. Likewise, an ownership transfer operated on a blockchain ledger would also be recognized[362].

One possible approach to an extensive interpretation of the notions of "State" under Art. 154 PILA in order to integrate the concept of an online jurisdiction, is by applying the principle of functional equivalence in a similar way to what is being developed for smart contracts. This would lead to an

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[353] See in general FURRER ANDREAS/ MÜLLER LUKA, Functional equivalence of digital legal transactions. See also MÜLLER CHRISTOPH, Les "Smart Contracts" en droit Suisse, no. 80-87.
[354] See *supra* Chapter 2.2.3.
[355] FURRER ANDREAS/ MÜLLER LUKA, Functional equivalence of digital legal transactions, no. 8-13. See also MÜLLER CHRISTOPH, Les "Smart Contracts" en droit Suisse, no. 80-87.
[356] FURRER ANDREAS/ MÜLLER LUKA, Functional equivalence of digital legal transactions, no. 14.
[357] UNCITRAL, Model Law on E-commerce, p. 20-21.
[358] UNCITRAL, Model Law on E-Signatures, no. 154.
[359] UNCITRAL, Model Law on E-Transferable Records, Art. 8-11.
[360] FURRER ANDREAS/ MÜLLER LUKA, Functional equivalence of digital legal transactions, no. 9.
[361] FURRER ANDREAS/ MÜLLER LUKA, Functional equivalence of digital legal transactions, no. 11.
[362] FURRER ANDREAS/ MÜLLER LUKA, Functional equivalence of digital legal transactions, no. 11.

interpretation of the notion of a State under Art. 154 PILA in accordance with the aim of the legal provision, rather than the constitutional law definition of a State. Pursuant to its teleological interpretation, Art. 154 PILA serves indeed as a means to provide a company a legal framework to organize and as a legitimizer for its existence as a legal entity. As we have seen above[363], 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 to organize and to grant it legal personality to exist, but rather, it simply exists online according to its code as an entity independent from 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.

In this chapter, we have demonstrated that the principle of functional equivalence could be used as the enabler of our online jurisdiction concept. By recognizing that a maverick DAO's code can serve as its *lex societatis* and that the code is legitimized by the online jurisdiction, we are able to grant legal existence in Switzerland to maverick DAOs that qualify as companies under Art. 150 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 Swiss legal order. It also provides third parties assurance that, when they contract with a maverick DAO, the underlying legal relations are legally binding in Switzerland. Finally, it provides Swiss courts the legal instruments to guarantee the preservation of the Swiss public order and the application of mandatory provisions of Swiss law.

6. Conclusion

In this research paper, after precisely defining what a DAO is, by first analyzing the underlying technology, i.e., blockchain technology, then by taking inspiration from both IT and legal authors and by examining existing entities that identify as DAOs, we were able to distinguish two large categories of DAOs. We first recognized that some States have already introduced legislation to create blockchain-based companies, which we referred to as regulated DAOs. Then, we acknowledged the existence of blockchain-based entities that exist outside of any legal order, which we referred to as maverick DAOs.

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[363] See *supra* Chapter 5.4.2.

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 DAOs in order to guarantee legal certainty for all actors interacting with them, that is, participants and contracting parties. We have acknowledged that DAOs are already interacting with the Swiss legal order even though such entities do not exist under Swiss law. As a result, the legal scope of those interactions is currently unclear. We determined that the preferred pathway to improve the legal certainty is to use existing legal tools in the Swiss legal order, namely provisions of Swiss private international law.

Pursuant to our analysis, it appears that the recognition in Switzerland of regulated DAOs, that is, the Maltese ITA and Vermont's BBLLC, does not raise any particular legal issue. Both types of regulated DAOs can be recognized in the Swiss legal order through chapter 10 of the PILA in the same way as traditional companies. It appears from the Maltese and Vermont's legislations that regulated DAOs are sufficiently organized under Art. 150 PILA to qualify as companies in private international law. For this reason, if a regulated DAO is validly constituted according to the law under which it is organized, it can be recognized in the Swiss legal order in accordance with Art. 154 par. 1 PILA.

However, we have found that the recognition of maverick DAOs in the Swiss legal order is not as 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 analyzed in order to determine whether it is sufficiently organized under Art. 150 PILA to qualify 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, all qualify as companies under Art. 150 PILA. At the same time, we have found that the next stage of the legal reasoning for the 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 according to 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 and participants of maverick DAOs voluntarily choose to operate outside of existing legal frameworks offered by States. For this reason, it is of 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 comprehended as the online jurisdiction when dealing with maverick DAOs. This legal construct allows maverick DAOs that are considered sufficiently organized under Art. 150 PILA to be recognized, and consequently, to be granted legal existence in Switzerland according to Art. 154 PILA.

In our opinion, the aforesaid legal construct can be legitimized with the interpretation of Art. 154 PILA through the lens of the principle of functional equivalence. The integration of this principle in the Swiss legal order is already being suggested by legal authors to allow the 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 through 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, allows for an efficient way to grant maverick DAOs legal existence in the Swiss legal order.

The recognition of maverick DAOs is of paramount importance to ensure their participants and their contracting parties legal security in the Swiss legal order. It would also grant Swiss courts the proper legal tools to guarantee the preservation of the Swiss public order. Furthermore, our innovative legal construct could set an example on the international scene, demonstrating how to properly handle blockchain-based entities that are not linked to a legal order, which we refer to as maverick DAOs. This is an achievement that no other legal order has reached to date, not even the newly-introduced Maltese bill and Vermont's law.

Nevertheless, Switzerland could benefit from legislation that would introduce a new form of company into Swiss substantive law: the Swiss DAO. Learning from the Maltese ITA and Vermont's BBLLC, the Swiss legislator could devise a new form of company that would take advantage of the properties that blockchain technology has to offer[364], while benefiting from the security that the Swiss legal jurisdiction could accord. This would provide all actors seeking to benefit from advantages offered by blockchain technology for their company with a legal framework in Switzerland. Legal security would be enhanced, as a Swiss DAO would not only be a legitimate entity under Swiss law, but it would most certainly be recognized in other legal orders the same way as any other Swiss company. Finally, a Swiss DAO would reinforce Switzerland's position as a central actor in the blockchain economy, possibly attracting large investments from abroad.

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[364] WAGNER ALEXANDER F./ WEBER ROLF H., Corporate Governance auf der Blockchain, p. 63-67, outline some of the ways in which blockchain technology could optimize the corporate environment.

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