

THIS IS A DRAFT VERSION. THE FINAL VERSION OF THIS CONTRIBUTION WILL BE INCLUDED AS A CHAPTER IN THE BOOK: ANDREA BONOMI AND MATTHIAS LEHMANN (EDS), BLOCKCHAIN AND PRIVATE INTERNATIONAL LAW (BRILL NIJHOFF 2022).

CHAPTER X

BLOCKCHAIN DISPUTE RESOLUTION FOR DECENTRALIZED AUTONOMOUS ORGANIZATIONS: THE RISE OF DECENTRALIZED AUTONOMOUS JUSTICE

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1. Introduction

For the past twenty years, the use of the Internet has facilitated international commercial relations between people who do not know each other and who are geographically distant. International civil litigation has increased exponentially with the development of e-commerce. Disputes associated with e-commerce have undermined the supremacy of state courts, which have proved unable to provide an appropriate response to small claim disputes arising in an international context. The length, cost and complexity of the procedure stemming from delicate questions as to jurisdiction and applicable law, as well as the risk associated with the international enforcement of the decision are deterrent factors that led e-commerce platforms to develop Online Dispute Resolution (ODR) mechanisms (ODRs).

Thanks in part to the removal of intermediaries, the transfer of cryptocurrencies and other crypto assets using blockchain technology has further facilitated international commercial relations. The emergence of smart contracts has revolutionised the way people enter into contractual relationships by dematerialising the parties' agreement. The decentralised and distributed characteristics of blockchain technology and the pseudonymity of crypto transactions has led to a new economy growing independently from nation states, the so-called "crypto economy". The use of this technology has brought an additional degree of complication in the application of Private International Law (PIL) rules by removing the illusion that online transactions can always be linked, in some way or another, to the territory of a state. Online transactions operated via a public blockchain are inherently transnational and require the application of connecting factors that are not always adapted.¹ Smart contracts even allow the creation of digital entities that are governed in an autonomous and decentralised manner by computer code. Those entities are central players in the crypto economy and are used to enter into commercial relations in the emerging Decentralized Finance (DeFi) ecosystem. The first Decentralized Autonomous Organization (DAO) was the source of a resounding dispute between parties with diverging interests, which had to be urgently resolved without any access to state justice or a dispute resolution mechanism. This case

¹ Florence Guillaume, "Blockchain: le pont du droit international privé entre l'espace numérique et l'espace physique", in Ilaria Pretelli (ed), *Conflict of Laws in the Maze of Digital Platforms* (Schulthess 2018), 163, 175.

revealed the risk of disputes in the blockchain environment as well as the legal uncertainty related to crypto transactions, which led to the emergence of Blockchain-based Dispute Resolution (BDR) mechanisms (BDRs) inspired by the private justice systems developed in e-commerce.

This chapter examines the resolution of disputes involving DAOs. The authors first analyse the concept of DAOs and their role in the crypto economy. The focus is on whether DAOs qualify as companies in the legal sense. What is at stake is the legal personality of DAOs and their capacity to conduct legal proceedings in state courts (2). The authors then consider how to determine jurisdiction for disputes involving DAOs. Two types of disputes will be discussed: disputes related to the governance of a DAO, and disputes arising from a contractual relationship between a DAO and a third party. This will highlight the difficulties in determining jurisdiction of state courts related to the impossibility to locate and the pseudonymity of actors of the crypto economy (3). The practical problems of resolving those kinds of disputes in a state court will lead the authors to consider the use of ODRs. Those dispute resolution mechanisms have proven their worth for online transactions, particularly in the field of e-commerce (4). It is not surprising that ODRs are inspiring the development of new dispute resolution mechanisms that integrate blockchain technology and are designed to take into account the particularities of the crypto environment (5). The main characteristics of existing BDR models which are adapted to the resolution of disputes involving DAOs will be described in order to show whether and how BDRs are likely to avoid a denial of justice by granting access to justice to DAOs (6). The authors then examine the fairness of BDR decisions in order to determine whether this type of decision is likely to provide effective access to justice for DAOs. The authors will then address the delicate issue of the scope of BDR decisions in state jurisdictions and their off-chain enforcement (7), before concluding with a few words on the legitimacy of BDRs (8).

2. Decentralized Autonomous Organization (DAO)

DAOs are new forms of entities that are being used to organise economic and social activities in the blockchain environment. As the concept of a DAO is still relatively unknown, a clear definition must be established before addressing the need for conflict resolution mechanisms adapted to those entities (2.1). The vast majority of DAOs are created outside the law, which exposes their members as well as the persons contracting with them to a high degree of legal uncertainty (2.2). Existing PIL rules can be used to clarify the legal scope of DAOs and provide legal certainty and predictability to a growing global ecosystem of financial services (2.3).²

2.1 Notion of DAO

Since the early days of Bitcoin, blockchain enthusiasts envisioned a new form of digital company for which management rules would be distributed across all the nodes of a blockchain network in order to be incorruptible. Cryptocurrencies would constitute the shares of this digital company and, as cryptocurrencies have market value, they would also serve as the assets of the company.³ This is how the idea of the “virtual corporation”⁴ came to light: a new form of company that would rely on the security, predictability and speed of computer code and would remove the need for human involvement as much

² This chapter includes analysis elements that have already been developed in Sven Riva, “Decentralized Autonomous Organizations (DAOs) in the Swiss Legal Order” (2019/2020) 21 Yearbook of Private International Law 601.

³ For a brief description of the origins of DAOs, see Riva (n 2), 607-610.

⁴ Vitalik Buterin, “Bootstrapping A Decentralized Autonomous Corporation: Part. I” (*Bitcoin Magazine*, 20 September 2013) <<https://bitcoinmagazine.com/technical/bootstrapping-a-decentralized-autonomous-corporation-part-i-1379644274>> accessed 5 November 2021.

as possible to minimise error and corruption within the company's affairs. The ultimate stage of the virtual corporation will be met when artificial intelligence will allow the company to run itself entirely autonomously.

However, the Bitcoin protocol did not allow for such complex rules to be coded, which pushed – *inter alia* – for the development of a new type of blockchain. Well-known blockchain entrepreneur Vitalik Buterin, co-developed in 2013 the Ethereum blockchain, which allowed cryptocurrency transactions to be subject to a set of rules through a mechanism called “smart contract”.⁵ This term was originally used by computer scientist and legal scholar Nick Szabo who, in 1994, defined a smart contract as “a computerized transaction protocol that executes the term of a contract”.⁶ Smart contracts programmed on the Ethereum blockchain allow the transfer of cryptocurrencies to be automated and conditioned to a set of programmed rules. The smart contract can also be programmed to gather information from an external source, called an “oracle”, to trigger the execution of the transfer of cryptocurrencies.⁷ The legal doctrine has widely analysed smart contracts to determine their legal scope.⁸ This frenzy results from the term “contract” in “smart contract”, which suggests that the computer code is a contract in the legal sense. However, the use of this term is misleading since a smart contract is not necessarily a contract in the legal sense. It depends on the characteristics of a particular smart contract and the definition of a contract in the applicable law. Some states have decided to explicitly give legal effect to certain smart contracts,⁹ while in other states their legal scope is still disputed.¹⁰

According to Buterin, DAOs are the logical extension of smart contracts as they are nothing else than “long-term smart contracts that contain the assets and encode the bylaws of an entire organization.”¹¹ What differentiates a DAO from a smart contract is that a DAO has some form of internal

⁵ Nick Szabo, “Smart Contracts” (1994) <<https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html>> accessed 5 November 2021.

⁶ Szabo (n 5).

⁷ An example would be a smart contract programmed to execute the transfer of 10 ETH if the price of ETH reaches a predefined level. To know the price of ETH, the smart contract would rely on an oracle, which in our example could be a designated exchange.

⁸ For Swiss literature, see Olivier Hari and Ulysse Dupasquier, “Blockchain And Distributed Ledger Technology (DLT): Academic Overview Of The Technical And Legal Framework And Challenges For Lawyers” (2018) 5 International Business Law Journal 423, 443-444; Blaise Carron and Valentin Botteron, “Le droit des obligations face aux ‘contrats intelligents’”, in Blaise Carron and Christoph Müller (eds), *3e Journée des droits de la consommation et de la distribution, Blockchain et Smart Contracts – Défis juridiques* (Helbing Lichtenhahn 2018), 1; Christoph Müller, “Die Smart Contracts aus Sicht des Schweizerischen Obligationenrechts” (2019) 5 Zeitschrift des Bernischen Juristenvereins 330; Andreas Furrer, “Die Einbettung von Smart Contracts in das schweizerische Privatrecht” (2018) 3 Anwaltsrevue 103; Mirjam Eggen, “Smart Contracts und allgemeine Geschäftsbedingung”, in Susan Emmenegger and others (eds), *Brücken bauen: Festschrift für Thomas Koller* (Stämpfli 2018), 155; Florian Möslein, “Smart Contracts im Zivil- und Handelsrecht” (2019) 183 Periodical for Overall Commercial and Business Law 254.

⁹ *E.g.*, Arizona House Bill 2417 of 29 March 2017; Section 5 of the Illinois Blockchain Technology Act House Bill 3575 of 23 August 2019; Section 34-29-103 of the Wyoming Bill SF 0125 of 1 July 2019 amending Article 9 of the Wyoming Uniform Commercial Code.

¹⁰ This is the case in Switzerland where some authors (see *e.g.*, Furrer (n 8), 106) argue that in some instances a smart contract can qualify as a contract in the legal sense, while others (see *e.g.*, Müller (n 8), 344) argue that smart contracts lack prerogatives required by law to qualify as contracts.

¹¹ Vitalik Buterin, “Ethereum White Paper – A Next Generation Smart Contract & Decentralized Application Platform” (*Blockchain Lab*, November 2013) <https://blockchainlab.com/pdf/Ethereum_white_paper-

organisation that defines the governance of the entity and establishes the procedure to manage its crypto assets, while smart contracts are simple rules that trigger the transfer of crypto assets when determined conditions are met.

A DAO can be defined as “the entity created by the deployment of an autonomous and self-executing software running on a distributed system that allows a network of participants to interact and manage resources on a transparent basis and in accordance with the rules defined by the software code.”¹² The participants of a DAO benefit from the pseudonymity of the blockchain environment¹³ and can only be identified by their public key, which is their wallet address. There is no link to their “real” identity except in circumstances where they are using regulated services that require Know Your Customer (KYC) identification. With pseudonymity, the only barrier for becoming a member of a DAO is usually economic, meaning that DAOs can potentially be joined by anyone from anywhere in the world.¹⁴ As such, a DAO must be considered as a community of unreliable members. In order for DAOs to function, their architecture must take this key characteristic into account.

The governance rules of DAOs are inscribed on smart contracts. They benefit from the immutability of the blockchain infrastructure¹⁵ and certain aspects of their governance are automated, “reducing operational costs and improving internal controls while simultaneously increasing the overall transparency of [the] organization”.¹⁶ When a member or a group of members wish to undertake an action through the DAO, they must submit a proposal to the community, which will either be accepted and executed, or refused. This allows unreliable members to collaborate in the pursuit of a common goal. Their participation is ensured through crypto-economic incentives that reward beneficial behavior. Those mechanisms are inspired from the ones that allow public blockchains such as Bitcoin and Ethereum to function as global networks.¹⁷ Furthermore, the smart contracts which contain a DAO’s governance rules are spread on all the computers of the blockchain network. No person, entity or government has the power to update or alter the code in a contrary manner to what is provided for in the governance rules. Consequently, DAOs that exist on a public blockchain such as Ethereum are assumed to be transnational, autonomous, and censorship resistant.¹⁸

The first widely known DAO was a form of venture capital fund called “The DAO” which was launched in 2016 on the Ethereum blockchain. Participants could submit projects to be funded and the

[a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf](#)> accessed 5 November 2021.

¹² Riva (n 2), 614.

¹³ See Primavera De Filippi and Aaron Wright, *Blockchain and the Law* (Harvard University Press 2018), 38-39.

¹⁴ One known exception is NEDAO, which is a DAO being developed as a community project for the people of the canton of Neuchâtel, Switzerland. To join NEDAO, members must have their public key certified with the residents’ office to prove that they reside in the canton of Neuchâtel. However, their pseudonymity is safeguarded as their public key is not linked to their identity. See <<https://nedao.ch>> accessed 5 November 2021.

¹⁵ See Kevin Werbach, “The Siren Song: Algorithmic Governance by Blockchain”, in Kevin Werbach (ed), *After the Digital Tornado – Networks, Algorithms, Humanity* (Cambridge University Press 2020), 215.

¹⁶ The LAO, “The LAO: A For-Profit, Limited Liability Autonomous Organization” (*Medium*, 3 September 2019) <<https://medium.com/openlawofficial/the-lao-a-for-profit-limited-liability-autonomous-organization-9eae89c9669c>> accessed 5 November 2021.

¹⁷ Bitcoin and Ethereum can be considered DAOs. Riva qualified those blockchains as “ground layer DAOs”, as opposed to “top layer DAOs” running on their infrastructure. See Riva (n 2), 616.

¹⁸ Riva (n 2), 620. See also Guillaume (n 1) who states that using a public blockchain is enough to confer an international scope upon a transaction.

decision-making process was distributed between the approximately 10,000 token holders of The DAO. With the equivalent of then USD 150 million invested in The DAO within a few weeks, this was the largest crowd funding project of its time. The founders of The DAO attempted “to set up a corporate-type organization without using a conventional corporate structure”.¹⁹ Agency relationships between investors and other actors found in a traditional firm were replaced by encoded governance rules. The code also provided minority shareholder protections by allowing small investors to exit The DAO and retrieve their investment under certain conditions. Unfortunately, a hacker found a bug in the minority shareholder protection mechanism and was able to drain The DAO from a large portion of its funds. This put an immediate stop to the project and outlined the risks associated with blockchain technology. As no state authority had jurisdiction over The DAO or the Ethereum blockchain, participants had no recourse to retrieve their investment. However, as a huge portion of existing ethers were invested in The DAO and the hack put the whole blockchain in jeopardy, key players pushed for the transactions triggered by the hacker to be reversed to protect the interests of the Ethereum community. A version of the Ethereum blockchain that did not contain the hacker’s transactions was released, resulting in a hard fork of the blockchain. This meant departing from the “code is law” doctrine²⁰ that drives the blockchain environment. Tempering with the state of the ledger prompted a lot of debate at the time and could probably not happen again. Even though The DAO project was not a success *per se*, it was a learning experiment for the blockchain community. It became evident that if the Ethereum blockchain is to be a trusted infrastructure, immutability is key, and the ledger should never again be tampered with. This case showed that if the blockchain ecosystem was to thrive as an economic powerhouse, the system had to provide adapted dispute resolution mechanisms to smart contract and DAO users.

Today, online platforms such as Aragon²¹ and DAOstack²² offer templates of DAOs that are preconfigured to undertake different types of projects such as a charity, a freelance network, or a venture fund. DAOs offer alternatives to existing corporate structures by enabling pseudonymous actors from all around the world to define and adhere to their own decentralised organisational structures to pursue economic and social activities.²³ Being much more adapted for financial business in the blockchain environment than traditional legal vehicles offered by states, DAOs have been extensively used in the fast-growing DeFi ecosystem valued at USD 100 billion.²⁴ With that much capital, DeFi “expands the use of blockchain from simple value transfer to more complex financial use cases.”²⁵ As such, new ways to

¹⁹ Wulf A. Kaal, “Blockchain-Based Corporate Governance” (2021) 4 *Stanford Journal of Blockchain Law & Policy* 0, 6.

²⁰ This doctrine was developed by Lawrence Lessig in his article “Code Is Law – On Liberty in Cyberspace” (*Harvard Magazine*, 1 January 2000) <<https://harvardmagazine.com/2000/01/code-is-law-html>> accessed 5 November 2021. He established the principle that code regulates behaviour on the Internet. This idea is very popular in the blockchain ecosystem, where it is generally accepted that the only rules that can regulate behavior within a system (such as a blockchain) 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.

²¹ <<https://aragon.org>> accessed 5 November 2021.

²² <<https://daostack.io>> accessed 5 November 2021.

²³ See Kaal (n 19), 2-3; Jonathan Rohr and Aaron Wright, “Blockchains, Private Ordering, and the Future of Governance”, in Philipp Hacker and others (eds), *Regulating Blockchain – Techno-Social and Legal Challenges* (Oxford University Press 2019), 43, 47-50.

²⁴ Brady Dale, “DeFi Is Now a \$100B Sector” (*Coindesk*, 29 April 2021) <<https://www.coindesk.com/defi-100-billion-dolla>> accessed 5 November 2021.

²⁵ Alyssa Hertig, “What is DeFi?” (*Coindesk*, 18 September 2020) <<https://www.coindesk.com/what-is-defi>> accessed 5 November 2021.

organise economic coordination are emerging from the blockchain environment. But DAOs also allow for other types of economic and social entities to exist in the blockchain environment. For example, Kleros and Aragon Court are DAOs that offer dispute resolution mechanisms to actors of the crypto economy, thus providing the blockchain environment with its own private justice.²⁶

2.2 Practical Implications of Recognising DAOs as Legal Entities

The key role that DAOs play in the ever-growing crypto economy and the development of DeFi has driven some states to introduce legislation that would allow DAOs to exist within their jurisdiction. By providing a legal framework for DAOs, some states are expecting to become the go-to place for crypto enthusiasts to pursue crypto-economic activity. Those legal frameworks could help states to regulate the crypto economy while benefiting from new sources of tax revenue.

DAOs that are created and incorporated under the laws of a state will hereafter be referred to as “regulated DAOs”. However, the vast majority of DAOs are still being created outside existing legal frameworks and are not incorporated within a state jurisdiction. Those DAOs will hereafter be referred to as “maverick DAOs”.²⁷

As DAOs are used as a means to combine resources in a common enterprise, relationships are automatically created among the members of a DAO. Regulated DAOs benefit from a legal framework that defines the nature of those relationships. For example, some legislation introduces a legal fiction, which grants DAOs a legal personality detached from their member’s personality as well as limited liability for the members so that they are not at risk if the DAO fails. However, maverick DAOs cannot automatically benefit from those legal constructs of corporate law. As with limited liability, “[l]egal personality cannot be created through private agreements or actions.”²⁸ Legal personality is a fiction of the law granted by state jurisdictions to some forms of companies that are constituted within their legal framework. Limited liability must also stem from the law and is granted to the members of some forms of companies. As most DAOs are constituted outside the law, their members do not benefit from a clear legal framework and the legal nature of their relationships is uncertain. This leaves members of maverick DAOs exposed to legal uncertainty with respect to their legal liability should there be a dispute of contractual, tortious, criminal, or administrative nature.

DAOs are destined to eventually enter into business relationships with third parties, for example by buying or selling services and crypto assets. The legal capacity of regulated DAOs is defined by the law, which ensures their activities have a legal scope. However, just as the legal nature of maverick DAOs is not certain, so is their legal existence. This begs the question of whether maverick DAOs can be parties to a contract. For a DAO to be able to validly enter into a contractual relationship, it must have legal capacity. If a DAO enters a legally binding commitment without having legal capacity, individual members of the DAO could find themselves personally bound by the resulting legal obligations. If individual members of the DAO could not be identified – because of their pseudonymity –, the contract could end up being qualified as legally void. As long as the contract is well executed, those questions can be set aside. However, they are of particular importance when a dispute arises between a DAO and its contracting party.

2.3 Legal Status of DAOs

²⁶ See *infra* chapters 5 and 6.

²⁷ According to the terminology adopted by Riva (n 2).

²⁸ Max Ganado, Joshua Ellul, Gordon Pace, Steven Tendon and Bryan Wilson, “Mapping the Future of Legal Personality” (MIT Computational Law Report, 20 November 2020), 10 <<https://law.mit.edu/pub/mappingthefutureoflegalpersonality/release/1>> accessed 5 November 2021.

To analyse the legal status of DAOs, we will first proceed with maverick DAOs and consider the lack of legal framework for those entities. We will determine the nature of the legal relationships that are created among the members of a maverick DAO, between the members and the DAO itself, and the possibility for these DAOs to enter into legal relationships with third parties (2.3.1). Then, we will examine the legislation of three states that allow DAOs to exist within a legal framework. For each of the categories of regulated DAOs, we will first address their legal nature to identify the legal regime to which they are subject. This will allow us to determine their legal capacity and the legal scope of the relationships among the members, between the members and the DAO, and with third parties (2.3.2).

2.3.1 Maverick DAOs

Trying to determine the legal nature of maverick DAOs is a legally challenging undertaking and the resulting answer could differ from one maverick DAO to another, and from one jurisdiction to another. Since DAOs function as organisational structures pursuing economic or social activities, the core question is whether a certain maverick DAO can be considered a company (or another form of organisation), in which case the relationships among the members of the DAO would be ruled by corporate law (and laws governing other forms of organisations), or if the DAO should be regarded as a simple partnership, in which case the relationships among the members of the DAO would be of a contractual nature.²⁹ But the key challenge is finding which law should determine whether or not a DAO should be qualified as a company and which legal rules should apply. As maverick DAOs do not stem from the laws of a particular jurisdiction, some authors have attempted to apply by analogy existing company law rules of their own jurisdiction to define the legal regime of maverick DAOs.³⁰

If we complete this exercise from the point of view of Swiss law, the first step to undertake when confronted with a maverick DAO is to determine whether it qualifies as one of the forms of companies provided in the law, mainly the Code of Obligations (CO)³¹ and the Civil Code (CC)³². A company (or partnership) is defined under Article 530 para. 1 CO as “a contractual relationship in which two or more persons agree to combine their efforts or resources in order to achieve a common goal”. When a partnership does not fulfill the distinctive criteria of other forms of partnerships (*i.e.*, other forms of companies), it is to be qualified as a simple partnership (Article 530 para. 2 CO). As Swiss corporate law does not provide for a “Swiss DAO”, it is safe to say that, to date, no DAO meets legal requirements of any

²⁹ For a full analysis of the application of simple partnership regimes of different states to DAOs, see António Garcia Rolo, “Challenges in the Legal Qualification of Decentralized Autonomous Organizations (DAOs): The Rise of the Crypto-Partnership?” (2019) 1 *Revista de Direito e Tecnologia* 33, 63-72.

³⁰ Matthias P.A. Müller, “Blockchain und Gesellschaftsrecht: ein Streifzug durch Möglichkeiten und Hürden: unter besonderer Berücksichtigung der Decentralized Autonomous Organization” (2019) *Expert Focus: Schweizerische Zeitschrift für Wirtschaftsprüfung, Steuern, Rechnungswesen und Wirtschaftsberatung* 485; Martin Hess and Patrick Spielmann, “Cryptocurrencies, Blockchain, Handelsplätze & Co. – Digitalisierte Werte unter Schweizer Recht”, in Thomas U. Reutter and Thomas Werlen (eds), *Kapitalmarkt – Recht und Transaktionen XII* (Schulthess 2017), 145; Alexander F. Wagner and Rolf H. Weber, “Corporate Governance auf der Blockchain” (2017) *Schweizerische Zeitschrift für Wirtschafts- und Finanzmarktrecht* 59, 67.

³¹ Federal Act of 30 March 1911 on the Amendment of the Swiss Civil Code (Part five: The Code of Obligations) (SR 220).

³² Swiss Civil Code of 10 December 1907 (SR 210).

form of company as regards to its structure (requirement of certain corporate bodies) and/or its publicity (requirement to be registered in the Swiss company register).³³

The question remains as to whether a DAO qualifies as a simple partnership (*société simple*), in which case it must be regarded as a multilateral contractual relationship and not a company.³⁴ As a DAO does not fall within one of the specific forms of companies under Swiss law, Swiss courts, confronted with a DAO, would probably have no choice but to qualify the organisation as a simple partnership. However, the pseudonymity of DAO members contradicts the personal structure of the simple partnership, which requires from the partners to be faithful and loyal to each other.³⁵ Furthermore, each partner of a simple partnership is jointly and severally liable for the debts contracted within the framework of the partnership. This legal regime is not fit for DAOs as it would not be conceivable to expect from the members of a maverick DAO to be liable beyond their original contribution when they buy governance tokens that grant them mere voting rights in the DAO's governance, especially when the DAO has thousands of pseudonymous members. In this context, the members of the DAO have a status that is much closer to that of the shareholders of a limited company (*société anonyme, SA*) than that of the members of a simple partnership. Hence, the core developers of those DAOs could be viewed as the executive board managing the DAO who need validation from the shareholders (*i.e.*, the members of the DAO) who vote to accept or refuse proposals.

It thus appears that Swiss substantive law does not have a legal regime adapted to maverick DAOs. Swiss law does not give those entities legal personality, nor does it provide their members with limited liability. Furthermore, the legal regime for simple partnerships is not adapted to govern the relationships among the members of maverick DAOs, between the members and the DAO itself, and between maverick DAOs and third parties. A legal solution for maverick DAOs should be found elsewhere than in the substantive law if one wishes to remedy this legal uncertainty.

When a legal situation has an international element, PIL provides rules that connect the legal situation with a particular state. Since maverick DAOs exist as inherently international entities, PIL rules could help connect DAOs to a foreign legal order which would determine their legal nature. Through the process of recognition of foreign companies, DAOs could potentially be granted legal existence in Switzerland by recognising them as foreign legal entities. Chapter 10 of the Private International Law Act (PILA)³⁶ is dedicated to the legal status of foreign companies in Switzerland. The first step in determining whether a foreign company legally exists in Switzerland is to determine whether it can be characterised as a company in the sense of Article 150 of the PILA. Both "organised associations of persons" and "organised assets" fall within this definition. "What can be characterised as a company is willingly very broad and includes all social combinations that have a social organisation or that are at least organised as a whole".³⁷ Then, to legally exist and be subject to Swiss law, a foreign company must be validly constituted according to its *lex societatis*, which is the law under which the company is organised

³³ Same opinion: Hess and Spielmann (n 30). See also Delphine Yerly and Charlotte Boulay, "Fintech, Bitcoins, Blockchains, Decentralized autonomous organizations (DAOs): the future is bright, the future is decentralized – Intervention by Olivier Hari: Cryptocurrencies and DAO" (*Jusletter IT Flash*, 26 January 2017), para. 15.

³⁴ François Chaix, "Art. 530 CO", in Pierre Tercier, Marc Amstutz and Rita Trigo Trindade (eds), *Code des obligations II – Commentaire romand* (2nd edn, Helbing Lichtenhahn 2017), para. 2.

³⁵ Hess and Spielmann (n 30), 191-192, and cited references.

³⁶ Swiss Private International Law Act of 18 December 1987 (SR 291).

³⁷ Swiss Federal Council, "Message concernant une loi fédérale sur le droit international privé (loi de DIP)", 10 November 1982, FF 1983 425. See Riva (n 2), 622.

(Article 154 para. 1 of the PILA).³⁸ If the company fails to meet the constitution requirements of that law, Article 154 para. 2 of the PILA provides for a subsidiary connection to another legal order and the *lex societatis* becomes the law of the state where the company is actually administered. A company failing to meet the constitution requirements of the law of one of the states designated by Article 154 of the PILA cannot be recognised in Switzerland and does not legally exist in Switzerland.³⁹

The founders and members of each maverick DAO can freely decide how to organise their entity by creating unique governance rules. Therefore, each maverick DAO must be individually analysed in order to determine whether it is sufficiently organised to qualify as a company within the meaning of Article 150 of the PILA. However, as seen above,⁴⁰ DAOs are economic and socially organised entities ruled by governance rules inscribed on a blockchain. Therefore, most DAOs are expected to be considered as sufficiently organised in the sense of Article 150 of the PILA.⁴¹ If this is the case for a particular maverick DAO which seeks legal existence in Switzerland, it remains to be determined whether it is validly constituted according to its *lex societatis*. To answer this question, the law under which the DAO is organised must be determined. However, maverick DAOs are not organised according to a national law. They cannot be validly constituted according to the law of a state as there is no such connection. Thus, the main factor which connects a company to the state whose law governs its organisation leads to a dead-end when it comes to a DAO.

The next step is then to move on the subsidiary connecting factor for the *lex societatis* and determine the place where the DAO is actually administered. The authors consider that, as a rule, it is not possible to link the administration of a maverick DAO to a physical place. The management of DAOs is mostly organised in a flat hierarchy and conducted on-chain via their governance rule. When participants coordinate off-chain, it is usually done via online platforms such as GitHub and Discord, so much so that the administration of maverick DAOs cannot be linked to a geographical place. The only “place” of administration of maverick DAOs is the Internet and the blockchain itself, where votes pertaining to the governance take place. Any other attempt to anchor a maverick DAO in the territory of a state can only lead to a random and unpredictable result. Exceptions to this rule are possible when a maverick DAO has a particular connection with a state jurisdiction. For example, when participation in the DAO is restricted to a geographical location,⁴² it can be concluded that the administration of the DAO is undertaken in this physical place. However, it is uncommon to restrict participation in a DAO on a geographical basis and exceptions are rare. Another reason to consider the administration of a DAO to be closely linked to a particular jurisdiction would be when the core developers of a DAO are part of an organised entity such as a foundation or an association. In this case, it could be argued that the management of the DAO is conducted at the seat of that entity. However, when a DAO uses the services of a third company for certain administrative tasks but the strategic decision making remains with the DAO, one cannot consider that

³⁸ See Florence Guillaume, “Article 154 PILA”, in Andreas Bucher (ed), *Commentaire romand. Loi sur le droit international privé – Convention de Lugano* (Helbing Lichtenhahn 2011), para. 1.

³⁹ Florence Guillaume, “Article 150 PILA”, in Andreas Bucher (ed), *Commentaire romand. Loi sur le droit international privé – Convention de Lugano* (Helbing Lichtenhahn 2011), para. 18.

⁴⁰ See *supra* chapter 2.1.

⁴¹ Riva (n 2), 625-627, analysed The DAO, Aragon Network, and dxDAO and came to the conclusion that all three DAOs were sufficiently organised to be considered companies in the sense of Art. 150 of the PILA.

⁴² This is the case of NEDAO (see *supra* n 14).

there is an actual administration within the meaning of Article 154 para. 2 of the PILA and that the DAO is anchored in the legal order at the seat of that company.⁴³

Both criteria offered by Article 154 of the PILA fail to connect maverick DAOs to a state jurisdiction and no *lex societatis* can be identified. As connecting factors fail to link maverick DAOs to a particular state jurisdiction, no law can determine their legal regime. The recognition process fails insofar as it is not possible to determine if maverick DAOs have been validly constituted according to a foreign law. As a result, it is impossible for those “lawless” companies to legally exist in Switzerland. This leaves participants of maverick DAOs in a legally uncertain position, as those DAOs exist and function as entities but lack the legal recognition from states as legally existing companies. This situation highlights the disconnect between the connecting factors provided by law and the reality of activities being undertaken by individuals in the blockchain environment.

But does it make sense to determine the legal nature of a maverick DAO through any substantive law in the first place? One core characteristic of maverick DAOs is that they are created outside any legal framework. A second is that thousands of pseudonymous members can easily join them from anywhere in the world. The only framework that governs the interactions between those members is an immutable code that is distributed on a global network of computers. As maverick DAOs are not registered in the company register of a state, they do not rely on this traditional infrastructure to fulfill publicity requirements as required by law for some forms of companies.⁴⁴ Instead, they rely on the publicity and transparency offered by blockchain technology. Furthermore, the internal organisation of maverick DAOs is not dictated by rules of corporate law. Instead, the governance of maverick DAOs is solely defined by their code, relying on the “code is law”⁴⁵ doctrine.

To the authors’ knowledge, there has yet to be a state that grants maverick DAOs legal existence within its jurisdiction even though “[i]t is in the interest of state jurisdictions, participants and third parties to allow maverick DAOs to exist as subjects of law”.⁴⁶ In Switzerland, a solution based on the concept of functional equivalence⁴⁷ has already been proposed.⁴⁸ The understanding of the words “state” and “law” under Article 154 of the PILA could be extended to allow the code of maverick DAOs to be considered as their law and the online space as the state from which that law stems. According to this theory, the *lex societatis* of maverick DAOs would be their code. This way, maverick DAOs could be recognised in Switzerland as foreign companies validly constituted according to their code, which would be a

⁴³ For example, the Swiss company DAO.link was created to operate as an agent for The DAO in the physical world. The agency relationship that existed between the two entities was not sufficient to consider that The DAO was actually administered in Switzerland within the meaning of Article 154 para. 2 of the PILA and that Swiss law was the *lex societatis* of The DAO.

⁴⁴ *E.g.*, the company limited by shares of Swiss law acquires legal personality only through entry in the Swiss company register (Art. 643 para. 1 CO).

⁴⁵ See *supra* n 20.

⁴⁶ Riva (n 2), 632.

⁴⁷ Some authors suggest that the principle of functional equivalence should be introduced in Switzerland to give smart contracts a legal scope without having to change provisions of substantive law. See Andreas Furrer and Luka Müller, “‘Functional equivalence’ of digital legal transactions – A fundamental principle for assessing the legal validity of legal institutions and legal transactions under Swiss law” (18 June 2018) <https://www.mme.ch/fileadmin/files/documents/MME_Compact/2018/180619_Funktionale_AEquivalenz.pdf> accessed 5 November 2021 [translation from Andreas Furrer and Luka Müller, “‘Funktionale Äquivalenz’ digitaler Rechtsgeschäfte – Ein tragendes Grundprinzip für die Beurteilung der Rechtsgültigkeit von Rechtsinstituten und Rechtsgeschäften im schweizerischen Recht” (*Jusletter*, 18 June 2018)].

⁴⁸ Riva (n 2), 635-637.

comprehensive way to give them legal existence in Switzerland without having to introduce new legislation.⁴⁹

At the international level, no international instrument (e.g., a model law) with the purpose of harmonising the legal regime of DAOs has been proposed by the International Institute for the Unification of Private Law (UNIDROIT), the United Nations Commission on International Trade Law (UNCITRAL), or any other international organisation. However, the international working group COALA (Coalition of Automated Legal Applications), composed of experts from the legal and technological fields, is seeking to unify the legal regime of DAOs at the international level by proposing the COALA Model Law for Decentralized Autonomous Organizations (DAOs),⁵⁰ which is currently in the consultation phase. The Model Law for DAOs intends to define a flexible legal framework adapted to the characteristics of DAOs, which could be adopted by states in their national law. Any DAO complying with a set of best practices defined in the Model Law would be granted legal existence and acquire legal personality in the states having adopted the Model Law.⁵¹

2.3.2 Regulated DAOs

The innovations blockchain technology has brought to corporate governance and the rapid growth of the crypto economy have pushed a few states to bet on the use of blockchain technology in companies and believe that corporate structures could benefit, in terms of organisation, from digital architecture. In those jurisdictions, companies can now rely on blockchain technology to streamline internal processes. Those entities, referred to as regulated DAOs in the authors' terminology, use the blockchain infrastructure for their internal organisational structure and, at the same time, they are regulated by the corporate law of a state. While their code rules their governance, their legal nature and legal capacity are defined by corporate law. However, very few states have introduced legislation that grants legal status to DAOs. In states that offer the possibility of creating a DAO in accordance with the law, DAO members can take advantage of the protections afforded by the legal personality of the DAO, particularly with regard to the limitation of their personal liability. DAO members who want their entity to benefit from legal personality in one of those states must meet specific requirements of the law when constituting a DAO, for example registering the DAO in the state's company register.

Three different jurisdictions, Malta, Vermont, and Wyoming have introduced the most prominent legislation allowing DAOs to be operated within a legal framework. Malta adopted three bills on blockchain and cryptocurrency on 4 July 2018.⁵² These bills set up a regulatory framework applicable to the blockchain environment and are collectively referred to as "The Digital Innovation Framework".⁵³ The Innovative Technology Arrangements and Services Act (ITAS) introduces the legal concept of the

⁴⁹ Riva (n 2), 636.

⁵⁰ The Model Law for DAOs is available at <<https://coala.global/reports/#1623963887316-6ce8de52-e0a0>> accessed 5 November 2021.

⁵¹ See Florence Guillaume and Sven Riva, "DAO, code et loi – Le régime technologique et juridique de la *decentralized autonomous organization*" (2021) 4 *Revue de droit international d'Assas* 206, available at <http://communication.u-paris2.fr/medias/RDIA_n4_2021.pdf> accessed 4 January 2022.

⁵² Welcome Center Malta, ICO & Crypto Regulation in Malta <<https://www.welcome-center-malta.com/blockchain-services-in-malta/ico-crypto-regulation-in-malta/>> accessed 5 November 2021.

⁵³ Malcolm Falzon and Alexia Valenzia, "Malta", in Josias Dewey (ed), *Global Legal Insight – Blockchain & Cryptocurrency Regulation* (Rory Smith 2018), 378. See also Rachel Wolfson, "Maltese Parliament Passes Laws That Set Regulatory Framework For Blockchain, Cryptocurrency And DLT" (*Forbes*, 5 July 2018) <<https://www.forbes.com/sites/rachelwolfson/2018/07/05/maltese-parliament-passes-laws-that-set-regulatory-framework-for-blockchain-cryptocurrency-and-dlt/#4e53149a49ed>> accessed 5 November 2021.

Innovative Technology Arrangement (ITA).⁵⁴ Smart contracts as well as DAOs can fall within the definition of an ITA.⁵⁵ Instead of granting ITAs legal personality, the Maltese legislator has created an agency relationship between an ITA and a person, who is referred to as the provider of Innovative Technology Services (ITS provider).⁵⁶ The ITS provider can be an individual or a legal entity with or without legal personality.⁵⁷ With this legal scheme, a DAO registered as an ITA does not acquire legal personality and does not have the capacity to sue or be sued. Even though a DAO registered as an ITA does not qualify as a legal entity, the DAO can rely on its agency relationship with the ITS provider to pursue activities in the mainstream economy. The ITS provider enters into contractual relationships on behalf of the DAO and is liable for the activities of the DAO since this person is identifiable by investors and authorities.⁵⁸

The U.S. state of Vermont introduced an act that was signed into law on 28 August 2018,⁵⁹ which adds a new form of company to its legal order: the Blockchain-based Limited Liability Company (BLLC).⁶⁰ A BLLC is a DAO incorporated as a Limited Liability Company (LLC) in Vermont's jurisdiction. This act allows a DAO to validly enter into contractual relationships and protects its "owners, managers and blockchain participants from unwarranted liability".⁶¹ General provisions related to LLCs apply to BLLCs, as they are a specific form of LLC. The key innovation of that law is that the governance of a BLLC can be fully or partially provided through blockchain technology, and votes regarding the operation and activities of a BLLC can be recorded on blockchain-based smart contracts. The state of Vermont has seen in 2019 its first BLLC incorporated as dOrg LLC,⁶² which is believed to be the "first legal entity that directly references blockchain code as its source of governance".⁶³ Hence, BLLCs are legal entities distinct from their members who are subject to a limited liability regime for the DAO's debts,⁶⁴ meaning that liabilities contracted by the DAO are not transferred to the members. The legal regime of BLLCs gives DAOs for

⁵⁴ Maltese Bill No C 689, Innovative Technology Arrangements and Services Act (2018) <<https://legislation.mt/eli/cap/592/eng/pdf>> accessed 5 November 2021.

⁵⁵ First schedule, Art. 2 and Art. 8 para. 2 ITAS.

⁵⁶ The preliminary report discussed the possibility of granting ITAs legal personality when they did not have an underlying ownership structure such as a corporation. However, the final bill does not deal with this issue. See Parliamentary Secretariat for Financial Services, Digital Economy and Innovation – Office of the Prime Minister, "Malta: A Leader in DLT Regulation" (2018), 18 <https://meae.gov.mt/en/Public_Consultations/OPM/Documents/PS%20FSDEI%20-%20DLT%20Regulation%20Document%20OUTPUT.PDF> accessed 5 November 2021.

⁵⁷ Art. 10 para. 5 ITAS.

⁵⁸ Paul Felice, "Presenting Innovative Technology Arrangements & Services Act" (*Finance Malta*, 18 July 2018).

⁵⁹ 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>> accessed 5 November 2021.

⁶⁰ Title 11, Chapter 25, Subchapter 12 of the Vermont Statutes Online: Blockchain-Based Limited Liability Companies <<https://legislature.vermont.gov/statutes/fullchapter/11/025>> accessed 5 November 2021.

⁶¹ Propy, "Vermont S.269 (Act 205) and Blockchain-Based Limited Liability Companies (BLLCs)" (*Hodl alert*, 31 August 2018) <<https://www.hodlalert.com/2018/08/31/vermont-s-269-act-205-and-blockchain-based-limited-liability-companies-bllcs/>> accessed 5 November 2021.

⁶² Oliver Goodenough and Catherine Burke, "dOrg Launches First Limited Liability DAO" (*Gravel & Shea*, June 2019) <https://www.gravel-shea.com/2019/06/dorg-launches-first-limited-liability-dao/?source=post_page-----> accessed 5 November 2021. See also Max Boddy, "DOrg LLC Purports to be First Legally Valid DAO Under US Law" (*Cointelegraph*, 12 June 2019) <<https://cointelegraph.com/news/dorg-llc-purports-to-be-first-legally-valid-dao-under-us-law>> accessed 5 November 2021.

⁶³ Goodenough and Burke (n 62).

⁶⁴ 11 V.S.A. § 4042.

the first time the power to sue and be sued, to carry on business activities, and to enter into contractual relationships in their own name.

The latest DAO law was passed in the U.S. state of Wyoming in April 2021 and came into effect on 1 July 2021.⁶⁵ It introduced the DAO as a new form of company into Wyoming law.⁶⁶ A Wyoming DAO is an LLC whose articles of organization point to a DAO's smart contract used to manage and operate the company.⁶⁷ By making DAOs subject to the Wyoming Limited Liability Company Act in addition to the Decentralized Autonomous Organization Supplement,⁶⁸ the state of Wyoming took a similar approach than the state of Vermont. The particularity with Wyoming's Act is that it introduces a distinction between member managed and algorithmically managed DAOs.⁶⁹ The possibility to be managed by a manager, which is found in regular LLCs, is replaced for DAOs by the possibility to be managed by an algorithm.⁷⁰ Replacing a manager by an algorithm⁷¹ is forward-thinking and a huge bet on technology. However, the exact meaning of the term "algorithm" is not defined in the law, and it is unclear whether a Wyoming DAO could be managed by an artificial intelligence⁷² or by another DAO. Both cases would raise legal questions. For example, if the law allows a DAO to be managed by an autonomous algorithm, does the algorithm have the power to contractually bind the DAO to third parties?⁷³ And while Wyoming DAO members benefit from limited liability on the same basis as other LLCs,⁷⁴ it is unclear how some aspects pertaining to the scope of the liability are affected by the DAO structure, in particular when the DAO is managed by an algorithm.⁷⁵ Furthermore, while DAO members are subject to the LLC legal framework at the state

⁶⁵ Wyoming Act No 73 (SF0038), Wyoming Decentralized Autonomous Organization Supplement <<https://legiscan.com/WY/text/SF0038/id/2359146>> accessed 5 November 2021.

⁶⁶ Title 17, Chapter 31 of the Wyoming Statutes (W.S.) <https://advance.lexis.com/container/?pdmfid=1000516&crd=c52c919b-2865-4717-ad13-b9447da211be&config=00JAAzZmQ5YjBjOC1hNDdjLTQxNGMtYmExZi0wYzZlYWlxMmM5YzckAFBvZENhdGFsb2cJAHazmy52H3XVa9c97KcS&ecomps=sw_k&prid=8c598384-2227-4609-b3cf-07948922d930> accessed 5 November 2021. The law also refers to DAOs as Limited liability Autonomous Organizations (LAOs).

⁶⁷ W.S. §17-31-106 (b).

⁶⁸ W.S. §17-31-103.

⁶⁹ W.S. §17-31-104 (e).

⁷⁰ See Shawn Bayern, "The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems" (2015) 19 Stanford Technology Law Review 93. This author argues that LLC laws of various U.S. states implicitly permit LLCs to exist without any members while being managed by an artificial intelligence. The state of Wyoming has taken the step of expressly introducing in its law the possibility for an LLC to be managed by an algorithm.

⁷¹ The legal nature of the agency relationship between an algorithmically managed Wyoming DAO and the members of the DAO is not defined in the law and remains unclear.

⁷² Some authors have already considered the possibility of a traditional company being run by an algorithm or artificial intelligence. The latter could either help the members of the company to make decisions or even replace the members in a corporate body. For example, an artificial intelligence could sit on the board of directors and be granted decision rights. See Florian Möslin, "Robots in the boardroom: artificial intelligence and corporate law", in Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence* (Edward Elgar 2018), 649; Shawn Bayern and others, "Company Law and Autonomous Systems: a Blueprint for Lawyers, Entrepreneurs, and Regulators" (2017) 9 Hastings Science and Technology Law Journal 135.

⁷³ This would lead to the emergence of "software-negotiated contracts" as described by Shawn Bayern, "Artificial intelligence and private law", in Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence* (Edward Elgar 2018), 144, 150-152.

⁷⁴ W.S. §17-29-304.

⁷⁵ Andrew Lom and Racheal Browndorf, "Wyoming to Recognize DAOs as LLCs" (*Regulation tomorrow*, 30 April 2021) <<https://www.regulationtomorrow.com/us/wyoming-to-recognize-daos-as-llcs/>> accessed 5 November 2021.

level, some Wyoming DAO token holders may be subject to federal securities law and other unexpected federal regulations.⁷⁶ Nonetheless, a DAO organised under Wyoming law has the capacity to sue and be sued in its own name, and the power to undertake business activities and to enter into contractual relationships.⁷⁷

Regulated DAOs do not differ much from any other corporate form. The legal path chosen by those three legislators has been to introduce in their substantive law a new corporate form which relies on blockchain technology. However, none of the existing DAO regulations integrate provisions addressing the legal status of maverick DAOs. There are no rules of PIL that allow for the recognition of a DAO created according to the provisions of the law of another state either. Quite the opposite, Wyoming's DAO law explicitly forbids the recognition of foreign DAOs, without defining what is meant by "foreign DAOs".⁷⁸ This legal provision seems odd as PIL should allow corporate entities to enter into cross-border commercial relationships by recognising the legal nature of foreign companies as defined by the law under which they are constituted. By forbidding foreign DAOs to be issued a certificate of authority without specifying which types of entities are actually covered, this legal provision introduces legal uncertainty as to whether a DAO organised for example as a Vermont BLLC and validly constituted according to that law could lawfully undertake business activities in the state of Wyoming. It is thus unclear if a Vermont BLLC would be considered a foreign DAO or a foreign LLC in that state.

Ironically, a validly constituted Vermont BLLC would most certainly be recognised and be allowed to undertake business activities in Switzerland. A regulated DAO would indeed qualify as a company as defined under Article 150 of the PILA, even though DAOs cannot be constituted under Swiss law. Such DAOs are organised under the law of a specific state and their *lex societatis* can therefore be identified. A regulated DAO would legally exist in Switzerland, without having to complete any particular formalities, provided it fulfils the publicity or registration requirements of the law of the state under which it is organised (Article 154 para. 1 of the PILA).⁷⁹

These three models of DAO legislation show that it is possible to give legal status to DAOs, under certain conditions, by allowing them to submit to a legal framework. This legislation defines the legal nature of the relationships among the members of a DAO and between the members and the DAO itself, and allows the economic and social activities of those DAOs to have a legal scope. They also determine the legal nature of the agency relationships between DAOs and their representatives, whether it is with their members, managers or agents. However, regulated DAOs remain actors of the crypto environment. By existing simultaneously in a state jurisdiction and on the blockchain, regulated DAOs are a hybrid-type of company. While a regulated DAO is one single entity under the law, there are actually two very distinctive parts to a regulated DAO: the corporate body (*e.g.*, the LLC) which gives legal substance to the entity, and the DAO (*i.e.*, the code) which structures the organisation of the entity. The two parts of the entity are linked by corporate law, but they are subject to very different sets of rules. The entity as a whole is subject to corporate law and is under the jurisdiction of the state where it is registered or incorporated, or under which law it is constituted or organised. There is a real link between that state and the entity through its corporate body. This link is materialised, in the three DAO laws in force, by the registration of the entity in a company register, and by requiring that the DAO be represented by at least one person who has some form of liability for the actions of the DAO. For its part, the DAO is governed by its code and can only be managed in accordance with its code. There is a real link with the blockchain, which is

⁷⁶ Lom and Browndorf (n 75). Vermont BLLC token holders could also be faced with this uncertainty as both forms of companies are subject to U.S. federal law.

⁷⁷ W.S. §17-29-105.

⁷⁸ W.S. §17-31-116.

⁷⁹ Riva (n 2), 629-630. See also *supra* chapter 2.3.1.

materialised by the registration of the DAO in the ledger. This characteristic of regulated DAOs – two distinct parts of a single entity – is not found in maverick DAOs. Indeed, maverick DAOs are not attached to the legal system of a particular state and therefore do not have a corporate body subject to corporate law. Only regulated DAOs have an existence that materialises both on- and off-chain. These features, which relate to the organisational structure of DAOs, must be considered in the event of a dispute involving a DAO.

3. Jurisdiction for Disputes Involving DAOs

As with other entities, DAOs are subject to disputes among their members, between the DAO and its members, and with third parties. Even if the architecture of smart contracts and the blockchain allow DAOs to be programmed in order to reduce the number of disputes within the entity and with third parties, not all disputes can be prevented from occurring. By functioning on public blockchains, DAOs are international entities by nature, whether they are governed by a national law or not. In order to determine in which state a DAO can sue or be sued, the rules of PIL must be applied.

PIL aims to provide the legal certainty necessary for the development of international relations between individuals. The localisation of the subject of the dispute and the parties themselves with connecting criteria is at the core of the method of PIL. The aim is to coordinate the legal orders by identifying the state with which the activity and the parties have the closest connections or, at least, sufficient connections.⁸⁰ A state will agree to provide the protection of its courts when the subject of the dispute or one of the parties has sufficient connections with its territory. Legal certainty is thus granted by the adoption of PIL rules which determine with certainty the courts that have jurisdiction over a dispute. The application of the rules of jurisdiction to disputes involving a DAO raises difficulties with regard to the use of connecting factors. To illustrate this issue, two types of disputes will be examined hereafter: those relating to the governance of DAOs, which are likely to fall under corporate law if a DAO qualifies as a company, and disputes between a DAO and a third party arising from a business relationship that is of a contractual nature. Other types of disputes will not be considered (*e.g.*, administrative disputes between a DAO and a state).

To this end, we will first establish that, although smart contracts aim to create a rigid framework where disputes are minimal, they fail to prevent all disputes from occurring (3.1). We will then differentiate disputes into two categories and analyse whether connecting factors of PIL allow the linking of those disputes to the courts of a state. We will first analyse disputes related to the governance of DAOs and try to locate them using connecting factors. Maverick DAOs and regulated DAOs will be analysed separately, as regulated DAOs are connected to a legal order (3.2). Then, we will analyse disputes of a contractual nature and seek to determine whether it is possible to localise the legal relationship at the place of the DAO, the other party, or the performance of the contract (3.3). With the difficulty to localise disputes involving DAOs using connecting factors of PIL, we will introduce universal jurisdiction as an alternative way to connect a dispute to a state jurisdiction (3.4). We will then consider the extent to which blockchain technology is an impediment to the enforcement of court decisions (3.5). This analysis will lead us to acknowledge that state courts do not have the proper tools to guarantee justice with disputes involving DAOs (3.6).

3.1 Smart Contract as a Non-foolproof Technology

DAOs rely on smart contracts to enter into contractual relationships with third parties. By having their commitments coded on a smart contract, DAOs and their contractual partners are guaranteed a perfect performance of all contractual obligations. As smart contracts are recorded in the ledger of a blockchain,

⁸⁰ Andreas Bucher, *La dimension sociale du droit international privé – Cours général* (ADI-Poche 2011), 48-65.

which is tamperproof, they are also immutable. A smart contract that has already been executed cannot be unilaterally deleted, and a smart contract that has not yet been executed cannot be unilaterally modified. Therefore, smart contracts have been advertised as being a fail-proof way to enter into contractual relationships, especially when contracting with unreliable third parties.⁸¹ The code automatically executes the terms of the contract when the programmed conditions are met. This leads to the perfect execution of the contract, potentially removing all needs for dispute resolution between the parties,⁸² greatly reducing transaction costs.⁸³ In sum, the execution of a contractual obligation in the blockchain environment is ensured by technology, making courts redundant, at least in theory.

However, as with any human-driven technology, smart contracts can also deliver unexpected results. Mistakes can occur in the process of converting the terms of the legal contract into the code of the smart contract.⁸⁴ Errors in the code or bugs, as well as unforeseen circumstances that were not programmed in the smart contract, can lead to unwanted outcomes in its execution. A conflict can also arise from differences in the interpretation of the smart contract's code, for example at the time of verification by an external source (so-called "oracle") of factual elements whose occurrence in the physical world triggers the performance of the smart contract. A party to a smart contract can also feel aggrieved when the smart contract executes as planned, but the result contravenes principles of fairness and justice. In sum, the fact that smart contracts run automatically does not eliminate the risk of litigation.⁸⁵

DAOs also completely rely on the architecture of smart contracts for their operation and management. Their internal governance is encoded on smart contracts which contain the rules dictating the relationships among the members of the DAO and defining its governance structure. By relying on the code and removing human involvement in the execution process, smart contracts could be seen as the ultimate solution to improve corporate governance efficiency. Internal processes are automated and transparent, reducing monitoring costs and the costs of agent supervision.⁸⁶ However, what is encoded in the smart contract is not necessarily fair and legally just. Even when the code works as planned, disputes might appear among the members of a DAO. Such conflicts might occur when a minority shareholder feels that its rights were violated by majority shareholders. Furthermore, DAOs are also prone to bugs in the smart contracts defining their governance structure and operations. The more complex a DAO structure

⁸¹ Wulf A. Kaal and Craig Calcaterra, "Crypto Transaction Dispute Resolution" (2017-2018) 73 *The Business Lawyer* 109, 110; Rikka Koulu and Kalle Markkanen, "Conflict Management for Regulation-Averse Blockchains?", in Rosa Maria Ballardini, Petri Kuoppamäki and Olli Pitkänen (eds), *Regulating industrial Internet through IPR, Data Protection and Competition Law* (Wolters Kluwer 2019), 382.

⁸² See Kevin Werbach and Nicolas Cornell, "Contracts ex Machina" (2017) 67 *Duke Law Journal* 313, 352-363.

⁸³ See De Filippi and Wright (n 13), 80-81.

⁸⁴ Legal contracts are contracts that are legally binding upon the parties. See *infra* chapter 3.3.

⁸⁵ Same opinion: Orna Rabinovich-Einy and Ethan Katsh, "Blockchain and the Inevitability of Disputes: The Role for Online Dispute Resolution" (2019) 2 *Journal of Dispute Resolution* 47; Amy J. Schmitz and Colin Rule, "Online Dispute Resolution for Smart Contracts" (2019) *Journal of Dispute Resolution* 103, 104; Pietro Ortolani, "The impact of blockchain technologies and smart contracts on dispute resolution: arbitration and court litigation at the crossroads" (2019) 24 *Uniform Law Review* 430, 438; Darcy W.E. Allen, Aaron M. Lane and Marta Poblet, "The Governance of Blockchain Dispute Resolution" (2019) 25 *Harvard Negotiation Law Review* 75, 81-82; James Metzger, "The Current Landscape of Blockchain-Based Crowdsourced Arbitration" (2019) 19 *Macquarie Law Journal* 81; Kaal and Calcaterra (n 81), 142; Kevin Werbach, "Trust, But Verify: Why the Blockchain Needs the Law" (2018) 33 *Berkeley Technology Law Journal* 487; Koulu and Markkanen (n 81), 381; Marc Clément, "Smart Contracts and the Courts", in Larry A. DiMatteo, Michel Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020), 271.

⁸⁶ Kaal (n 19), 11.

is, the more at risk it is to encounter such problems. The example of The DAO showcases how a flaw in the code can lead to a DAO's downfall.⁸⁷

Now that we have established that smart contracts cannot prevent all disputes from occurring, and that DAOs can be prone to internal conflicts (between a DAO and its members or among its members) as well as external conflicts (between a DAO and third parties), it remains to be determined whether those disputes can be resolved by state courts. The key issue is to establish whether existing connecting factors are able to link disputes involving DAOs to a state and whether the PIL rules of that state grant jurisdiction to its courts over those disputes. If this is not the case, actors of the blockchain ecosystem could find themselves in situations of denial of justice.

3.2 Connecting Disputes Related to the Governance of DAOs

Corporate law deals with disputes related to the governance of companies. Those disputes include proceedings on the validity of the constitution, the nullity or the dissolution of the company, or the validity of the decisions of its organs. As they pertain to the company's internal structure, those disputes have close links with the place of incorporation and, to some extent, also to the place of administration of the company. The first criterion anchors the company to the state under which it is constituted or organised. The registered office of the company is usually situated in this country. The second criterion anchors the company in the state in which it is managed. Those places correspond, in principle, to the place of the seat(s) of the company.

Taking the Swiss legal order as an example, Swiss PIL links disputes of corporate law to the Swiss courts of the seat of the company (Article 151 para. 1 of the PILA). The seat of a company is deemed to be located at the place designated in the bylaws or articles of incorporation (statutory seat, registered office), or at the place where the company is administered in fact (administrative seat) (Article 21 para. 2 of the PILA). When the action is aimed towards a specific individual, for example a shareholder, a member of the company, or any other liable person according to corporate law, close connections also exist with the domicile or habitual residence of that person and there is a forum at that place (Article 151 para. 2 of the PILA). We will base our analysis on the rules of Swiss PIL which grant jurisdiction to Swiss courts in corporate law matters in order to link disputes pertaining to the governance of DAOs to a legal order. Such rules can be found in the PILA and the Convention on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters of 30 October 2007 (the "Lugano Convention")⁸⁸. This will allow us to determine whether Swiss courts offer their protection for those kinds of disputes. We will examine this issue first in relation to maverick DAOs (3.2.1) and then in relation to regulated DAOs (3.2.2).

3.2.1 Maverick DAOs

The following observations apply to maverick DAOs that qualify as companies within the meaning of PIL.⁸⁹ In this case, a dispute over the governance of the DAO can be characterised as a corporate law matter and

⁸⁷ See *supra* chapter 2.1.

⁸⁸ SR 0.275.12; [2007] OJ L 339/3.

⁸⁹ In Switzerland, this means that the concerned DAO qualifies as a company in the sense of Art. 150 of the PILA. See *supra* chapter 2.3.1.

is therefore prone to falling under the jurisdiction of the Swiss courts of the seat of the DAO (Article 151 para. 1 of the PILA).⁹⁰

However, maverick DAOs do not have a seat: there is neither a place of incorporation nor any place of administration that could point to a state. Maverick DAOs cannot be linked to a state jurisdiction because they are not constituted or organised under the law of a state and their members are pseudonymous.⁹¹ Those DAOs are simply launched on a blockchain and profit from the blockchain's infrastructure to register their "bylaws" (*i.e.*, their code) and to become a publicly visible entity. It is very unlikely that a maverick DAO would designate a seat in its code. Thus, the criterion of the statutory seat or registered office fails to link maverick DAOs to a state. Likewise, there is no physical place of administration of maverick DAOs and the criterion of the administrative seat fails to create any link with a state. As they are comprised of a community of pseudonymous members who jointly manage the operations of the entity through online platforms, the criterion of the administrative seat can only point to the Internet or the blockchain itself.

In some exceptional cases, membership to a maverick DAO can be geographically limited. When it can be determined with certainty that a majority of the members of a maverick DAO reside in one state, the place of administration of the maverick DAO may be anchored in that state.⁹² For example, the members of NEDAO must be residents of the canton of Neuchâtel, Switzerland.⁹³ In case of a dispute of corporate law matter involving NEDAO, Swiss courts – and more precisely the courts of Neuchâtel – could have jurisdiction over the case based on the criterion of the place of administration. However, Swiss courts would have to determine whether NEDAO can be a party to the proceedings. This is very unlikely, as no law grants NEDAO legal capacity, *i.e.*, the capacity to sue or be sued. Likewise, when the core developers of a DAO are part of an organised entity such as a foundation or an association, the courts of the seat of that entity could have jurisdiction over the dispute since it can be considered that the DAO is administered in fact at this place.⁹⁴

With the exception of such special cases, if we consider that disputes related to the governance of a DAO are matters of corporate law, connecting factors of Swiss PIL fail to link those disputes to Switzerland. The same conclusion can be reached for other state jurisdictions, as even though the connecting criteria for determining the jurisdiction of their courts are not necessarily identical to those in Switzerland, they are very similar. It is therefore likely that they will also fail to establish a sufficient link with maverick DAOs to give jurisdiction to their courts. This situation leads to a negative conflict of jurisdiction, meaning that no state has jurisdiction over issues pertaining to the governance of a maverick DAO. And even if a maverick DAO could be located in a particular state, it is unlikely that it could be a party to the proceedings as it would probably not have the right to sue or be sued. This leaves members of maverick DAOs with no legal recourse when their rights are infringed. Weaker members such as minority shareholders are at particular risk of denial of justice.

Furthermore, when a particular member of a maverick DAO is liable for damages sustained by the DAO, which is a matter falling within the scope of corporate law, the courts of the place of domicile or

⁹⁰ It should be noted that if the seat of the DAO is in Switzerland, Art. 22 para. 2 of the Lugano Convention applies exclusively to establish the jurisdiction of the Swiss courts for actions falling within its scope. In this case, Art. 151 para. 1 of the PILA is used to determine the local jurisdiction of the Swiss courts.

⁹¹ See *supra* chapter 2.3.1.

⁹² See *supra* chapter 2.3.1.

⁹³ See *supra* n 14.

⁹⁴ See *supra* chapter 2.3.1.

habitual residence of that member may have jurisdiction over the matter (Article 151 para. 2 of the PILA).⁹⁵ However, the members of maverick DAOs are pseudonymous and it is virtually impossible to identify them to determine the place of their domicile or habitual residence. In this case, the DAO that suffered the damage and the other members would have no place to engage legal proceedings.

From the authors' point of view, all connecting criteria of PIL fail to link disputes of corporate law involving maverick DAOs to a state in order to find a forum for actions related to the governance of those DAOs. This is not a surprise as maverick DAOs are constituted outside any legal framework. They do not have a *lex societatis* governed by the rules of law, the only place where they are registered is on the blockchain, their management happens exclusively on the blockchain, and their activities are mainly carried out in the environment of the blockchain. Their members also challenge existing connecting criteria thanks to the pseudonymity they enjoy from operating on the blockchain. This shows that existing rules of PIL are ineffective in this transnational environment where individuals benefit from pseudonymity.

When dealing with maverick DAOs, connecting criteria are unsuitable for linking a dispute to the territory of a state using the seat of the DAO or the domicile or habitual residence of its members. It follows that disputes related to the governance of maverick DAOs is beyond the reach of state justice. This shows how blockchain technology is defying the purpose of PIL, which is to link legal situations to a state.⁹⁶ This unfortunate situation could only be improved if connecting criteria could take into consideration the specificity of the crypto environment.

3.2.2 Regulated DAOs

We will now examine whether the rules of PIL allow regulated DAOs to be linked to a state when they are involved in a dispute related to their governance. The analysis is different from that of maverick DAOs since regulated DAOs are a hybrid-type of company which exist simultaneously in a state jurisdiction and on the blockchain.⁹⁷ The authors assume that regulated DAOs that are validly constituted according to their *lex societatis* qualify as companies within the meaning of PIL.⁹⁸ As such, a dispute over the governance of a regulated DAO can be characterised as a corporate law matter.

Regulated DAOs have commonalities with maverick DAOs by carrying out their activities mainly on the blockchain. However, their situation is fundamentally different from that of maverick DAOs in that they do have a *lex societatis* governed by the rules of law. Regulated DAOs are not only registered in the ledger of a blockchain, but also in a register held by a state. Existing DAO laws require that regulated DAOs be connected to their state of incorporation, whether by requiring the registration of the DAO in a company register, by connecting the DAO to a registered company, or by requiring that the DAO be represented by at least one registered person. Additionally, it can be assumed that maverick DAOs are validly constituted or organised under the law of the state which provides them with a legal framework. This allows the criterion of the incorporation to establish a link between a regulated DAO and a specific state. This way, even if the activities of a regulated DAO are carried out exclusively on the blockchain and

⁹⁵ The international jurisdiction of Swiss courts is actually determined by Art. 2 para. 1 of the Lugano Convention when the defendant is domiciled in Switzerland. In this case, Art. 151 para. 2 of the PILA is used to determine the local jurisdiction of the Swiss courts.

⁹⁶ This is also the case for the Internet. Many years of case law have been necessary to adapt the interpretation of connecting criteria in order to be able to locate legal situations emerging from the Internet. See Dan Jerker B. Svantesson, *Solving the internet jurisdiction puzzle* (Oxford University Press 2017), 91-112, who outlines a history of Internet jurisdiction.

⁹⁷ See *supra* chapter 2.3.2.

⁹⁸ See *supra* chapter 2.3.2.

its members are pseudonymous, there is always a link between the DAO and a state jurisdiction. Regulated DAOs can be considered as having a seat at the place of their statutory seat or registered office. Therefore, the courts of the states having adopted DAO legislation – such as Malta, Vermont, and Wyoming – may have jurisdiction over disputes related to the governance of DAOs that are registered or incorporated in their jurisdiction, or that are constituted or organised under their law.

As regards the administration of regulated DAOs, it could be argued that (at least) some of them are managed exclusively on the blockchain, just as their maverick counterparts. Such regulated DAOs do not have an administrative seat. However, it cannot be totally excluded that some regulated DAOs may also be in part managed off-chain, either on online platforms or in person. In the latter case, the place of administration could create a link between the DAO and a specific state. Swiss courts could thus have jurisdiction for disputes related to the governance of a regulated DAO if the place where it is administered in fact is located in Switzerland. However, this situation is very unlikely, because the jurisdiction of Swiss courts could be exercised in this case only if the DAO had no statutory seat or registered office.⁹⁹ But other states may offer the protection of their courts when a regulated DAO is administered on their territory.

In the states where a regulated DAO must have a registered manager or agent, the domicile or place of residence of the manager or agent (or the place of its establishment) creates an additional link with a state jurisdiction. Under most laws with such a requirement, the registered representative of a company must reside in the company's state of incorporation as it serves as a link between the state and the company. In this case, the domicile or place of residence of the registered representative blends with the place of the statutory seat or registered office. It can be concluded that the links with that place are particularly strong. When a regulated DAO must have a registered representative, it can be expected that the jurisdictional rules of the state where the representative is located will grant jurisdiction to its courts for all disputes related to the governance of the DAO, especially if the representative is domiciled in the DAO's state of incorporation.

In some instances, members of a company are liable for damages suffered by the company or other members. In that case, a link with the domicile or place of residence of the liable member exists and the courts of that state may have jurisdiction over the dispute. Contrary to maverick DAOs whose members are usually all pseudonymous, it is very likely that at least some members of regulated DAOs are registered in a state company register, making their personal information known and circumventing pseudonymity of the blockchain. This allows connecting factors of PIL to point to a known jurisdiction. Therefore, proceedings can easily be opened against a registered liable member. However, if the dispute is with a member who is not registered, that member potentially still benefits from the pseudonymity of the blockchain, which prevents the establishment of a link with a specific state based on personal jurisdiction. The only available forum would then be at the place of the statutory seat or registered office of the DAO, and eventually at the place of its administrative seat. But with an unknown defendant, the scope of the proceedings would be very limited.

Some laws may allow for a regulated DAO to be managed by an algorithm. This is potentially the case in the U.S. state of Wyoming.¹⁰⁰ If an algorithm were to be liable for damages of corporate law nature,¹⁰¹ one may wonder whether the algorithm could be located in a particular state and, if so, whether

⁹⁹ See Art. 151 para. 1 and Art. 21 para. 2 of the PILA.

¹⁰⁰ See *supra* chapter 2.3.2.

¹⁰¹ To the authors' knowledge, there is no law to date recognising the capacity of an algorithm, an artificial intelligence, or a robot to sue or to be sued in its own name. However, this issue has already been addressed by several legal scholars. See *e.g.*, Woodrow Barfield and Ugo Pagallo, *Law and Artificial Intelligence* (Edward Elgar

locating the algorithm would give sufficient links with a state to grant jurisdiction to its courts. The criterion of the domicile or habitual residence is the one which is usually used to establish jurisdiction for an action against a manager of a company.¹⁰² The application of this connecting factor to a managing algorithm would of course fail to give a convincing result. However, in the case of an algorithm, other connecting factors such as the place of the server(s) could prove to be adapted.¹⁰³ If it is possible to establish that the algorithm is located in a different place than the statutory seat or registered office of the DAO, it remains to be determined whether the connection is sufficiently strong to grant jurisdiction to the courts of that place for damages of corporate law. This issue can be dealt with differently from one state to another since each state is free to determine when it offers the protection of its courts. From the authors' point of view, the state of the place of incorporation of the DAO should probably grant jurisdiction to its courts if it is possible to hold an algorithm liable for damages under its legislation.

As we have seen above, while some connecting factors of PIL fail to link disputes of corporate law involving regulated DAOs to a state, the criterion of the place of incorporation seems to be appropriate to locate such disputes in the state of the *lex societatis*. This systematic fall back on the place of the statutory seat or registered office of the DAO shows that PIL has difficulties locating conflicts related to the governance of regulated DAOs. In some cases, the structure of the blockchain even prevents the identification of the defendant. In those instances, linking the dispute to the courts of a state is proven to be superfluous. This situation leads to a serious risk of denial of justice for individuals taking part in a regulated DAO and for regulated DAOs themselves.

In theory, jurisdiction of the courts of the state where the DAO is registered or incorporated, or under which law it is constituted or organised, seems to be natural. However, in practice, things are more complicated than it seems at first glance. Jurisdiction of the courts of the state of the statutory seat or registered office of a regulated DAO should cover all disputes related to the governance of the DAO. Given the hybrid nature of regulated DAOs, some of those disputes will be governed by the rules of corporate law and others by the rules of code. The entity as a whole is indeed subject to corporate law, but the DAO part is also governed by the code on the blockchain.¹⁰⁴ This feature actually brings a great limitation to the scope of the jurisdiction of state courts. While the corporate body (*e.g.*, the LLC) falls under the jurisdiction of state authorities, the DAO as such is not directly under the jurisdiction of state authorities. In general, a payment in cryptocurrencies or other actions to be performed on-chain can only be triggered when the majority of the DAO's members agree to it. No one can force a DAO to act in a certain way if it is contrary to its code. As the community of members is pseudonymous and each member can potentially be physically outside the personal jurisdiction of the state of incorporation of the DAO, there is a risk that the DAO will not comply with a request or decision made by the authorities of that state. A friction can therefore exist between what the DAO must do legally, and what state authorities can actually enforce upon the DAO. This can potentially put a huge burden of liability on the registered manager(s) or agent(s), or the registered member(s) of the regulated DAO.

2020), 60-76; Roger Michalski, "How to Sue a Robot" (2018) 5 Utah Law Review 1021; Robert van den Hoven van Genderen, "Legal personhood in the age of artificially intelligent robots", in Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence* (Edward Elgar 2018), 213.

¹⁰² See *e.g.*, Art. 151 para. 2 of the PILA.

¹⁰³ The connecting factor of the location of the server carrying a website has already been used in the field of tort law. See *e.g.*, Dan Jerker B. Svantesson, *Private International Law and the Internet* (3rd edn, Wolters Kluwer 2016), 468-469. However, this criterion would not work when the algorithm is "located" on a public blockchain, because such a blockchain is inherently transnational.

¹⁰⁴ See *supra* chapter 2.3.2.

It can be concluded at this point that while it may appear relatively simple, at first glance, to create a connection between a regulated DAO and a state, there is nevertheless a serious risk of denial of justice for disputes related to the governance of regulated DAOs. This risk is all the greater because, even if it is possible to obtain a decision from a state court, state authorities will often be powerless when the use of force is necessary to enforce the decision. However, the state of incorporation may exercise a direct coercive power on a regulated DAO which does not comply with requests or decisions made by its authorities by revoking its legal status. The main difference between a regulated DAO and other forms of company is that a regulated DAO that would lose its legal status would simply convert into a maverick DAO. Even if it drops its corporate body, an ex-regulated DAO can keep operating as an economic or social entity and pursue its activities in the blockchain environment.

3.3 Connecting Disputes of a Contractual Nature Involving DAOs

DAOs are entities that are best suited for doing business in the blockchain environment. The majority of their activity is carried out on the blockchain through smart contracts, of which two types can be distinguished.¹⁰⁵ The first are smart contracts that are linked to an underlying legal contract where the smart contract serves to perform one or more contractual provisions, or where the smart contract is a reproduction of the legal contract which is legally binding upon the parties. The second are smart contracts that are the legal contract themselves and no link exists with an underlying contract. We will hereafter only consider the second type of smart contracts.

Assuming that a relationship between a DAO and a third party defined by a smart contract can be qualified as a contractual relationship in the legal sense,¹⁰⁶ it is possible to use connecting criteria provided for by the rules of PIL to connect the contractual relationship to a state jurisdiction. The connecting factors used in contractual matters refer either to the location of the parties or to the location of the contractual relationship itself. For example, under Swiss PIL, Swiss courts have jurisdiction to hear disputes arising from a contract primarily when the defendant has its domicile or, failing that, its habitual residence in Switzerland (Article 112 para. 1 of the PILA). In the case of a company, the seat is deemed to be the domicile (Article 21 para. 1 of the PILA), which is located at the place designated in the bylaws or articles of incorporation (*i.e.*, the statutory seat or registered office), or failing that, at the place where the company is administered in fact (*i.e.*, the administrative seat) (Article 21 para. 2 of the PILA). There are other fora in contractual matters, such as the forum at the place of performance of the contract. The Swiss courts have jurisdiction when the characteristic obligation of the contract is to be performed in Switzerland (Article 113 of the PILA). Similar criteria are found in the Lugano Convention, which applies in contractual matters when the defendant is domiciled in Switzerland or another contracting state to the Lugano Convention (Article 2 para. 1 and Article 5 para. 1 of the Lugano Convention). We will hereafter consider how the connecting criteria of Swiss PIL granting jurisdiction to Swiss courts in contractual matters can be applied to disputes between a DAO and a contracting party by analysing the means to locate the DAO (3.3.1), the other party (3.3.2), and the performance of the contract (3.3.3).

3.3.1 Location of the DAO

¹⁰⁵ See Florence Guillaume, “L’effet disruptif des smart contracts et des DAOs sur le droit international privé”, in Alexandre Richa and Damiano Canapa (eds), *Droit et économie numérique* (Stämpfli 2021), 35, 44 ; Blaise Carron and Valentin Botteron, “How smart can a contract be?”, in Daniel Kraus, Thierry Obrist and Olivier Hari (eds), *Blockchains, Smart Contracts, Decentralised Autonomous Organizations and the Law* (Edward Elgar 2019), 101, 111-114.

¹⁰⁶ See *supra* n 8.

The first rule of jurisdiction to be considered in contractual matters is the forum of the domicile of the defendant (Article 112 para. 1 of the PILA).¹⁰⁷ When the defendant in a dispute over the execution of a smart contract is a DAO, the rules on determining the seat of the DAO, as illustrated in the last chapter, apply in the same way to connect the dispute to the domicile of the defendant.¹⁰⁸ However, it is not possible to establish the domicile of a maverick DAO in a state for the purpose of determining a forum. It is very unlikely that a maverick DAO would designate in its code a statutory seat or registered office in a state jurisdiction. Maverick DAOs do not have an administrative seat either: they are mostly governed on the blockchain, and sometime on online platforms. One exception is when membership in a maverick DAO is geographically restricted to a state – for example to the residents of the canton of Neuchâtel –, in which case the maverick DAO could be anchored in that state. The reason is that the members administrating the DAO would be *de facto* residents of that state.¹⁰⁹ From the authors' point of view, this can be considered as a sufficient link to admit the existence of a *de facto* seat of the maverick DAO in that state. However, even if a dispute of a contractual nature involving a maverick DAO can be linked to a state, it is unlikely that the DAO would be a party to the proceedings, as no law grants maverick DAOs the capacity to sue and be sued in their own name. In addition, there is a significant risk, as the law stands, that a state court would consider that a maverick DAO does not have the power to enter into a contractual relationship and be entitled to rights and obligations of any kind in its own name.

For their part, regulated DAOs can be linked to a state using the criterion of the statutory seat or registered office. This criterion successfully locates the seat of a regulated DAO in the state where it is incorporated or registered. It may therefore be possible to sue a regulated DAO in the forum of its domicile in that state. As for the administrative seat, it would not systematically succeed at linking regulated DAOs to a state since they can be governed on-chain as well as off-chain in a physical location. When regulated DAOs are exclusively governed online, the criterion of the place of administration points to the Internet or the blockchain rather than to a state jurisdiction. However, when regulated DAOs are not managed online, it is possible to identify a place of administration in a specific state. The courts of the state where the DAO's administrative seat is located may have jurisdiction. In sum, by being registered in a state, regulated DAOs can generally always be located, even if they are exclusively administered online.

3.3.2 Location of the Other Party

When contracting on the blockchain, DAOs can be confronted to two different types of contracting parties: on-chain and off-chain actors. If a DAO bound under a smart contract suffers economical damage due to the non-execution or improper execution of the contract, locating the other party could open a forum at the domicile or habitual residence of the defendant, potentially giving jurisdiction to the courts of that state.¹¹⁰

On-chain actors are third parties acting on the blockchain, including individuals or DAOs, who can only be identified by their wallet address (*i.e.*, their public key).¹¹¹ As on-chain actors act pseudonymously in the blockchain environment, it may be impossible to locate their domicile or habitual residence, or their

¹⁰⁷ For the sake of simplicity, we will only refer to the PILA even though the international jurisdiction for disputes of contractual matters is actually determined by Art. 2 para. 1 of the Lugano Convention when the defendant is domiciled in Switzerland. In this case, Art. 112 para. 1 of the PILA is used to determine the local jurisdiction of the Swiss courts.

¹⁰⁸ See *supra* chapter 3.2.

¹⁰⁹ See *supra* chapter 2.3.1.

¹¹⁰ See *e.g.*, Art. 112 para. 1 of the PILA or Art. 2 para. 1 of the Lugano Convention.

¹¹¹ See Kaal and Calcaterra (n 81), 133, who are of the opinion that it is impossible to locate the parties to a smart contract transaction.

seat. It can therefore be very difficult if not impossible to subject them to the jurisdiction of a state court in case of a dispute. This is unfortunate as even if on-chain actors cannot be identified in the physical world, it is possible to determine the crypto assets stored in their wallet, such as cryptocurrencies, governance tokens of a DAO, or Non-Fungible Tokens (NFTs), which are assets that could potentially be used as compensation for the damage suffered by the DAO in its contractual relationship.

Off-chain actors are third parties acting on the blockchain who can be identified in the physical environment, for example through a KYC procedure. As they can be identified, the courts of their state of domicile or habitual residence may have personal jurisdiction over them in case of a dispute. If that state recognises the DAO's right to sue in its own name, the DAO, having suffered economic damage, could initiate proceedings against the off-chain actor to obtain reparation. In case of a regulated DAO, if the forum is not in its state of incorporation, the DAO's capacity to sue in its own name depends on its legal status in the state where the legal proceedings are initiated. It can be assumed that the regulated DAO would be granted the right to sue and be sued on the same basis as other foreign companies. The situation is much more uncertain in case of a maverick DAO, as no law grants those DAOs the right to be parties to proceedings in their own name. This puts members of maverick DAOs at a substantial disadvantage with regard to regulated DAOs in case of a dispute of a contractual nature.

3.3.3 Location of the Performance of the Contract

The forum at the place of performance of the contract may offer an interesting alternative to the forum of the defendant's domicile or seat. In order to determine the place of performance of the contract, the characteristic performance of the contract must usually be identified and located. Such is the case, for example, in Switzerland (Article 113 of the PILA). Under Swiss PIL, in contracts for the transfer of property, the characteristic performance is the transferor's obligation; in contracts to perform services (such as a mandate or a contract for work and services¹¹²), it is the service obligation; and in guarantee or suretyship agreements, it is the obligation of the guarantor or surety (Article 117 para. 3 of the PILA). Determining the characteristic performance can be difficult for certain types of contracts,¹¹³ such as swap contracts. Even though Article 113 of the PILA does not specifically consider this alternative,¹¹⁴ falling back on the principle of the closest connection could possibly offer an adequate solution to admit the jurisdiction of Swiss courts when no characteristic performance can be identified.¹¹⁵ However, locating the performance of the contract in the process of finding a forum is not done the same way in all jurisdictions. Some PIL rules determine the place of performance by referring to the place where the contentious performance must be executed,¹¹⁶ thus granting the courts of that state jurisdiction over the dispute. In any case, locating the performance of the contract can be difficult when it is performed on the Internet even when

¹¹² A contract for work and services (in French *contrat d'entreprise*) should not be confused with an employment contract. Under Swiss law, a contract for work and services (Art. 363 ff CO) is deemed to be concluded between parties of equal power, whereas an employment contract (Art. 319 ff CO) is deemed to be concluded between a stronger party (the employer) and a weaker party (the employee). Swiss PIL provides for specific connecting criteria for contracts with a weaker party such as an employment contract (Art. 115 of the PILA).

¹¹³ Andrea Bonomi, "Article 113 PILA", in Andreas Bucher (ed), *Commentaire romand. Loi sur le droit international privé – Convention de Lugano* (Helbing Lichtenhahn 2011), para. 16.

¹¹⁴ See Bonomi (n 113), para. 16.

¹¹⁵ However, this solution would be in contradiction with the jurisprudence of the Swiss Supreme Court (ATF 145 III 190). In Swiss PIL, the connection to the state with closest connections is indeed a fall-back rule in matters of applicable law (Art. 117 para. 1 of the PILA), but not in matters of jurisdiction (Art. 113 of the PILA).

¹¹⁶ See *e.g.*, Art. 5 para. 1 of the Lugano Convention. The jurisdiction of Swiss courts must be based on this provision when the defendant is domiciled in another contracting state to the Lugano Convention.

considering the principle of the closest connection.¹¹⁷ And with smart contracts, locating the performance of the contract in a state jurisdiction becomes virtually impossible as the performance takes place exclusively on the blockchain.¹¹⁸

To illustrate the impossibility to locate smart contracts in a state jurisdiction, let's take as an example a smart contract between a DAO and a third party that stipulates that if the course of the ether reaches USD 3,500, the DAO must transfer one ether to the third party who in turn must transfer 15,000 dogecoins to the DAO. Under Swiss law, this kind of smart contract would qualify as a swap contract and can only be located with the principle of the closest connection since it has no characteristic performance. As the smart contract is on the blockchain, and the object of the contract deals with the swap of cryptocurrencies which are on the blockchain, it can be concluded that the smart contract has its closest connection with the blockchain and not with a state jurisdiction. It must be concluded that there is no forum at the place of performance of such a smart contract in Switzerland, even if Article 113 of the PILA is interpreted in a broad sense that would grant jurisdiction to Swiss courts when the smart contract has its closest connection with that state.

Let's take as another example: a DAO publishing a smart contract calling for the development of an Information Technology (IT) solution by a software engineer. According to the offer, payment is done monthly in ethers until full accomplishment of the IT solution, and each payment is subjected to the achievement of determined monthly goals. We will assume that this smart contract amounts to a contract for work and services with payment instalments.¹¹⁹ The development of the IT solution would be considered as the characteristic performance of this smart contract, and the performance of the contract would thus be located at the place where the IT solution is being developed. If this place is in Switzerland, Swiss courts would have jurisdiction in case of a dispute (Article 113 of the PILA). However, as the development and delivery of the IT solution happen both online, locating the performance of the contract in a state jurisdiction could prove difficult, and even irrelevant in many instances. The fall-back solution could be to locate the contract at the usual place of work of the engineer, where the computer is connected to the Internet.¹²⁰ However, while this forum exists in Swiss PIL for employment contracts,¹²¹ it is not provided for in the case of contracts for work and services. Furthermore, the software engineer taking the offer could be a digital nomad who works from many different places, making any connection to a particular state jurisdiction irrelevant. Even more so if the software engineer is pseudonymous, in which case no connection to a state jurisdiction is possible. Here again, the closest connection of the contract is with the blockchain, as the smart contract itself is deployed on the blockchain, the work is done online, and the payment is executed on the blockchain with a cryptocurrency. The forum at the place of performance of the smart contract is therefore of no use in this case.

¹¹⁷ Bonomi (n 113), para. 28.

¹¹⁸ Guillaume (n 105), 56.

¹¹⁹ The characterisation of the contract depends on the law governing the contract. It is not uncommon for courts to reconsider the characterisation intended by the parties by recharacterising certain contractual relationships. For example, a contract for work and services (n 112) could be recharacterised as an employment contract when there is a relationship of economic dependence between the parties. See Florence Guillaume, "Le contrat de travail international: règles de droit international privé et plateformes numériques", in Jean-Philippe Dunand and Pascal Mahon (eds), *Les aspects internationaux du droit du travail* (Schulthess 2019), 193, 234.

¹²⁰ See Guillaume (n 119), 240.

¹²¹ The Swiss courts of the place where the employee habitually performs their work have jurisdiction over an employment contract (Art. 115 para. 1 of the PILA). The same rule can be found in the Lugano Convention (Art. 19 para. 2).

Even if objective connecting factors of PIL fail to connect smart contracts to a state jurisdiction, parties who want to address the risk of not having their contractual relationship linked to a state jurisdiction can agree in the smart contract on the place of performance. Indeed, party autonomy allows them to create a subjective link with a state jurisdiction. By determining the place of performance in the smart contract, the parties can influence the jurisdiction of the state courts. Depending on the rules of PIL of the chosen state, the courts of that state could have jurisdiction over disputes in contractual matters. For example, the courts of the contracting states of the Lugano Convention will admit their jurisdiction for disputes in contractual matters when the parties have fixed, in their contract, the place of performance of the obligation in question in their state.¹²² An agreement of the parties on the place of performance of the contractual obligations can thus have an effect on the jurisdiction of the state courts. In this way, the parties to the smart contract can create a connection with a jurisdiction that grants smart contracts a legal scope, which offers them a certain degree of legal certainty in case of a dispute. But other legal challenges could still prevent any of the parties from initiating legal proceedings in case of non-execution or improper execution of the contract, such as the DAO not having the capacity to sue or be sued in its own name in the chosen jurisdiction, or the impossibility to identify the other party because of its pseudonymity. In any case, it would not make sense for the parties to a smart contract to choose Switzerland as the place of performance of the contract because the legal scope of smart contracts and DAOs are still uncertain in that state.

3.4 Universal Jurisdiction as an Alternative to Connecting Factors

As we have seen above,¹²³ connecting factors of PIL fail to connect legal situations involving a DAO in many different instances, whether we try to locate the DAO, a member of the DAO, the smart contract, or a third contracting party. Pseudonymity within the blockchain environment prevents the localisation of individuals (DAO members or third contracting parties), smart contracts are executed exclusively on the blockchain, and maverick DAOs have no connection to state jurisdictions. Some reliable connections to a state jurisdiction could nevertheless be identified but they only work in specific cases: when the DAO has a seat, when it has a registered representative, or when the DAO has a contractual relationship with an off-chain actor. As this is not the case in the vast majority of legal situations involving a DAO, PIL rules usually lead to a dead-end. The lack of access to justice results in a situation of great legal uncertainty for DAOs, their members and the third contracting parties.

When no state can provide an effective forum, there is no alternative but to consider that state courts should exercise universal jurisdiction. Some states establish in their law a forum of necessity when no other state offers the jurisdiction of its courts, on the condition that there is a sufficient connection with the state of the forum.¹²⁴ Universal jurisdiction goes further in that the jurisdiction does not necessarily require the existence of geographical links with the state of the forum. It is worth briefly discussing the merits of introducing universal jurisdiction for disputes involving DAOs.

Universal jurisdiction does not attribute jurisdiction to a particular state but allows the courts of any state to admit their jurisdiction. It has a global scope that is appropriate for legal relationships that are global in scope and therefore do not have close connections with a particular state. Not only does a

¹²² Art. 5 para. 1 of the Lugano Convention. See Andrea Bonomi, "Article 5 LC", in Andreas Bucher (ed), *Commentaire romand. Loi sur le droit international privé – Convention de Lugano* (Helbing Lichtenhahn 2011), para. 64.

¹²³ See *supra* chapters 3.2 and 3.3.

¹²⁴ *E.g.*, in Switzerland, Art. 3 of the PILA: "When this Act does not provide for jurisdiction in Switzerland and proceedings in a foreign country are impossible or cannot reasonably be required, the Swiss judicial or administrative authorities at the place with which the case has sufficient connection have jurisdiction."

relationship involving a DAO require the use of the Internet, which is a tool whose scope is both universal and ubiquitous,¹²⁵ but the existence of both the DAO and its contractual obligations are materialised on the blockchain, which is a distributed global network of nodes.¹²⁶ Given the difficulty, if not the impossibility, of connecting legal situations involving a DAO to a state by means of objective connecting criteria, it might be appropriate to consider that this type of relationship has an intrinsically global scope when discussing the issue of dispute resolution. Admitting universal jurisdiction would allow for the bringing of a dispute involving a DAO to the courts of any state for resolution. Jurisdiction should, however, be exercised only if the *ratione materiae*, *personae* and *loci* components of jurisdiction converge to some extent, in the particular case, on the court in question, since it must be able to settle the dispute effectively and fairly.¹²⁷

The fact remains that universal jurisdiction allows the plaintiff, to a large degree, to choose freely before which state court to bring legal proceedings according to its own interests. Forum shopping causes legal uncertainty for the defendant who may be sued before any court and may be subject to any law. In this way, the plaintiff is favoured, being in a position to choose, to the detriment of the defendant, the forum and indirectly the law applicable to the claim.¹²⁸ In practice, it is very likely that the plaintiff would choose to act before the courts of the state in which it is domiciled, which would give the plaintiff a clear advantage in the proceedings. Thus, admitting universal jurisdiction has the disadvantage of leading to legal uncertainty because there is no means to know in advance where a lawsuit could be filed. This puts DAOs and any person involved with them at risk of being sued anywhere and to be subject to any law.

The admission, from a theoretical point of view, that a dispute involving a DAO may be submitted to the courts of any state by recognising the existence of universal jurisdiction does not mean that, in practice, the courts of any state will accept their jurisdiction and rule on the dispute. In the absence of an obligation resulting from an international convention, each state is free to decide the circumstances in which its courts have jurisdiction over a dispute which is international in scope. A state will only grant the protection of its courts if it considers having an interest in offering the plaintiff the possibility of obtaining compensation on its territory. A state's interest in offering the protection of its courts to a legal relationship that is carried out and validated only in the digital space of the blockchain is not obvious.

In disputes involving DAOs, universal jurisdiction would allow any DAO, DAO member, and third contracting party to initiate proceedings in the courts of their choice. This way, they are guaranteed access to justice. However, this does not address the issue of the legal capacity of maverick DAOs, nor the issue of the pseudonymity of the blockchain environment. In practice, the scope of the universal jurisdiction would be considerably reduced. Firstly, it would be possible to seize a court only in the states that recognise legal capacity for DAOs. Otherwise, the DAO would not have the capacity to sue or be sued in its own name in the state of the forum. Secondly, the legal proceedings could not be initiated if the defendant cannot be identified. Therefore, admitting universal jurisdiction does not guarantee that a dispute involving a DAO can be decided by a state court.

3.5 Enforcement of a Court Decision on the Blockchain

¹²⁵ Guillaume (n 1), 174-175.

¹²⁶ Florence Guillaume, "Aspects of Private International Law Related to Blockchain Transactions", in Daniel Kraus, Thierry Obrist and Olivier Hari (eds), *Blockchains, Smart Contracts, Decentralised Autonomous Organizations and the Law* (Edward Elgar 2019), 49, 59-60.

¹²⁷ Andreas Bucher, "La compétence universelle civile en matière de réparation pour crimes internationaux" (2015) 76 *Annuaire de l'Institut de droit international* 1, 89-90.

¹²⁸ The applicable law is frequently an incentive for the choice of the forum. See e.g., Svantesson (n 103), 487-488.

Challenges to seeking justice in case of a dispute involving DAOs do not end with finding a court with jurisdiction over the dispute. Even if a state court has jurisdiction and issues a decision, the aggrieved party may find it impossible to seek the enforcement of the decision on the blockchain when the losing party does not spontaneously comply.

Traditionally, the guarantee of enforcement of a court decision has been established by coercive force exerted by the states which maintain a monopoly over the use of force on their territory.¹²⁹ However, states have limited enforcement power: they have no right to enforce the decisions rendered by their courts abroad. When it comes to executing a decision on the blockchain, it is not the law, but the technology that prevents states from exercising their power of enforcement. The immutability that characterises blockchain technology does not allow any authority to modify the content of the blockchain. Hence, state authorities have no enforcement power over assets in the crypto space as blockchain technology is tamper-proof.

For instance, enforcement of court decisions related to the governance of a DAO is problematic. The rules dictating the governance of a DAO are inscribed on immutable smart contracts spread on a global network of computers. This results in censorship resistant entities that are created and exist autonomously from any central authority. Only the community of members acting within the parameters of the code can trigger an action from the entity. Crypto assets share the same immutable characteristics. One member does not have the power to dispose of the DAO's crypto assets if the code does not allow for it. No enforcement authority can force an action upon the DAO and the DAO's crypto assets cannot be frozen, seized, or confiscated. Therefore, no coercive measure can be enforced on a DAO. The DAO project outlined the risks of using DAOs and showed that by relying on a peer-to-peer decentralised infrastructure, DAOs fall outside the reach of state jurisdictions.¹³⁰ And with the pseudonymity that DAO members enjoy on the blockchain, enforcement authorities cannot force them to execute an action, on the blockchain or outside the blockchain. State authorities are left with no enforcement power, either on the organisation, its assets, or its members, at least for maverick DAOs.

The problem of enforcement of state court decisions is similar in the case of a decision concerning a contractual relationship between a DAO and a third party formalised by means of a smart contract. Since smart contracts are immutable,¹³¹ state authorities cannot exercise their enforcement power to adapt the execution of smart contracts, to stop them from executing all together, or to restore the initial situation if smart contracts have been improperly executed. For instance, if a state court orders the creation of a new smart contract to cancel the effects of the one that has been improperly executed, which is referred to as a "reverse transaction", such a decision cannot be enforced by force using state enforcement authorities. According to some authors, "[c]ourts cannot require a retroactive change in the blockchain because that is computationally near impossible."¹³² This would go against the immutability of the blockchain.¹³³ As no one has the power to update the code of smart contracts once they are launched on

¹²⁹ Pietro Ortolani, "The Judicialization of the Blockchain", in Philipp Hacker and others (eds), *Regulating Blockchain – Techno-Social and Legal Challenges* (2019 Oxford University Press), 289, 303, states that "[w]hile private parties are left free to opt out of state court litigation by submitting to arbitration, they are always required to apply for state-controlled enforcement procedures whenever they need to obtain the coercive execution of the final outcome."

¹³⁰ See *supra* chapter 2.1.

¹³¹ See *supra* chapter 3.1.

¹³² Kaal and Calcaterra (n 81), 137. See also Werbach and Cornell (n 82), 331-333.

¹³³ However, De Filippi and Wright (n 13), 208, noted that states could "exert pressure on the intermediaries in charge of developing, deploying, or maintaining the technology" and "[i]n the case of harm, they could demand that

the blockchain,¹³⁴ state enforcement authorities have no means to stop the execution or to freeze the crypto assets held by a particular smart contract, even if that smart contract falls within their jurisdiction. Such power could only belong to the community of a blockchain. The DAO case showed that in extreme situations the community can make the decision to change the status of the ledger.¹³⁵ However, it is highly unlikely that such a decision would be made to enforce a court decision on a mere contractual relationship involving a DAO.

The inability of states to exercise their enforcement power on the blockchain means that the enforcement of court decisions on the blockchain relies exclusively on the willingness of the parties. This leads to a significant risk of non-compliance with the decision of a state court because people know that coercive enforcement is not a realistic possibility.¹³⁶ Since states have no power to enforce court decisions on the blockchain, the efficiency of justice cannot be guaranteed. This observation has led some authors to say that “enforcement [on the blockchain] could be a lost cause”.¹³⁷

3.6 Need for an Alternative to State courts for Disputes Involving DAOs

The discussion above has shown that it is a challenge to offer the protection of state courts in a reliable way when the legal situation involves the use of blockchain technology. The uncertainties around the jurisdiction of state courts for disputes involving DAOs are not desirable. We have seen that most of the times state courts do not have jurisdiction over disputes involving DAOs as it is not possible to establish sufficient connections outside of the blockchain environment. It is of course possible to remedy this legal uncertainty by making a choice of court. For example, the parties to a smart contract could insert a choice of court clause in the code of the smart contract and thus agree to submit a possible dispute to the courts of a specific state. A choice of court agreement would mainly serve at providing a forum for disputes involving a maverick DAO or an on-chain actor as they cannot be linked to a state jurisdiction with objective connecting criteria and no court has personal jurisdiction over them. But this option is purely theoretical as no state recognises the legal scope of maverick DAOs,¹³⁸ and on-chain actors are pseudonymous.¹³⁹ As a result, even if a link with a state does exist, the courts that have jurisdiction may not be able to effectively administer justice. This may hinder the aggrieved party from seeking compensation for the damage. As a result, on top of an important legal uncertainty, there is a great risk of denial of justice in disputes involving DAOs.

This unsatisfactory situation calls for the search for alternatives to state justice for disputes involving DAOs. This leads us not to ask where to take legal action, but what is the most appropriate

miners censor certain transactions or even revert the blockchain back to its previous state to recover damages or remedy harm.” If a state cannot directly enforce its decisions on a blockchain, it can indeed enforce them indirectly through individuals or companies that have influence over its operation and are located in its territory.

¹³⁴ According to Christoph Müller, “Les ‘smart contracts’ en droit des obligations suisse” in Blaise Carron and Christoph Müller (eds), *3e Journée des droits de la consommation et de la distribution, Blockchain et Smart Contracts – Défis juridiques* (Helbing Lichtenhahn 2018), para. 93, the fact that the execution of smart contracts cannot be stopped or modified poses a number of legal issues. See also Sarah Templin, “Blocked-Chain: The Application of the Unauthorized Practice of Law to Smart Contracts” (2019) 32 *The Georgetown Journal of Legal Ethics* 957, 961.

¹³⁵ See *supra* chapter 2.1.

¹³⁶ See Henry H. Perritt, “Towards a Hybrid Regulatory Scheme for the Internet” (2001) *University of Chicago Legal Forum* 215, 258. However, it is true that the court decision could order a compensation (*e.g.*, the payment of damages) to circumvent the impossibility of being executed on the blockchain. See also Clément (n 85), 285-286.

¹³⁷ Rabinovich-Einy and Katsh (n 85), 73.

¹³⁸ See *supra* chapter 2.3.1.

¹³⁹ See *supra* chapter 3.3.2.

dispute resolution mechanism to settle this kind of disputes: one that takes advantage of blockchain technology and smart contracts. Indeed, actors of the blockchain environment have crypto assets stored in their wallets, such as cryptocurrencies, DAO governance tokens, or NFTs, and new dispute resolution mechanisms could be developed to take advantage of this situation by enforcing their decisions on those crypto assets.

These alternatives to state justice could take into account the immutability of the blockchain to set up means to have decisions enforced that do not require the exercise of coercive power. For example, damage to reputation may be decisive for voluntarily compliance with a decision. In relation to the famous Yahoo! case,¹⁴⁰ it was noted that “even in the absence of enforceability, factors such as market forces or moral beliefs, or a combination of them, may by themselves or in combination with legal measures compel legal compliance.”¹⁴¹ DAOs that want to have a lasting activity in the crypto environment must maintain a certain reputation. This is key to attracting investments and expanding activities. It can therefore be assumed that DAOs have an important incentive to spontaneously enforce a decision on a dispute involving them in order to preserve their reputation. One notorious example is The DAO case: the risk of damage to the reputation of the blockchain Ethereum proved to be a sufficient incentive to restore a state of justice even in the absence of a formal court decision.¹⁴² But the threat of damage to the reputation could only work against entities that need to maintain a good reputation. For a DAO with no reputation and whose members are hidden behind their pseudonymity, voluntary enforcement might be unattainable.

4. Lessons Learned from Online Dispute Resolution (ODR)

The difficulty to connect a legal situation to a state has already been a challenge in the field of international commercial relations, which is one of the reasons that led to the search for alternatives to state justice. Among the Alternative Dispute Resolution (ADR) mechanisms (ADRs)¹⁴³ offered by private justice, arbitration has long been the preferred option in cross-border business relationships (4.1). The advent of e-commerce has led to the development of other types of simpler, faster and cheaper dispute resolution models to absorb the huge number of small claim disputes. The implementation of Online Dispute Resolution (ODR) mechanisms (ODRs) helped to circumvent the issue of jurisdiction and applicable law in online transactions. This has resulted in the creation of a private justice system parallel to the state justice system which is, to a large extent, beyond the influence of national laws (4.2).

The pathway towards private justice seems just as relevant for disputes involving DAOs than for other types of online transactions. It is worth taking a brief look at the ADRs that have been put in place for online transactions, and in particular for e-commerce, because the experience gained with those private justice systems is the basis for the development of new ODRs for disputes involving DAOs.

4.1 Alternative Dispute Resolution in the Form of Arbitration

The most common form of ADR used to resolve disputes regarding international commercial relations is arbitration. Parties to a legal relationship decide, in an arbitration agreement, that, in case of a dispute, a third independent person will act as a judge and resolve a conflict by issuing a decision. A distinction must

¹⁴⁰ Tribunal de Grande Instance de Paris, 20 November 2000, *LICRA and UEJF v. Yahoo! Inc. and Yahoo! France*, and U.S. Court of Appeals for the Ninth Circuit, 24 November 2005, *Yahoo! Inc. v. LICRA and UEJF*, 433 F.3d 1199 (9th Cir. 2006).

¹⁴¹ Uta Kohl, *Jurisdiction and the Internet. Regulatory Competence over Online Activity* (Cambridge University Press 2007), 207.

¹⁴² See *supra* chapter 2.1.

¹⁴³ About ADRs, see *e.g.*, Michael Palmer and Simon Roberts, *Dispute Processes – ADR and the Primary Forms of Decision-making* (3rd edn, Cambridge University Press 2020).

be made between classic arbitration where the decision rendered is equal to a court judgment (4.1.1) and other forms of ADRs which also make use of the services of a neutral third party to render a decision for the parties but whose decisions cannot be considered as equal to court judgments (4.1.2).

4.1.1 Classic Arbitration

Arbitration has the main advantage of rendering decisions that are not only binding on the parties but also have a scope equivalent to that of a judicial decision when the procedure followed by the arbitrators is established or recognised by the states. Arbitral awards have in principle a *res judicata* effect and are considered as such equal to judgments rendered by state courts. The exact legal scope of an arbitral award depends on the law of the state in which it is rendered. It is the national law that confers enforceability and the *res judicata* effect on the arbitral award.¹⁴⁴ In some states, the arbitral award has a *res judicata* effect as soon as it is rendered, in others, as soon as it is notified to the parties, and in others, as soon as it is declared enforceable following recognition and enforcement proceedings.¹⁴⁵ In Switzerland, for example, an arbitral award has “the effect of a legally-binding and enforceable judicial decision” as soon as “notice of the award has been given to the parties”.¹⁴⁶ This means that the award is enforceable and acquires a *res judicata* effect from its notification to the parties. The arbitral award can thus be enforced immediately in Switzerland.¹⁴⁷

Arbitration is in principle linked to a state by the seat of arbitration.¹⁴⁸ An arbitration whose seat is in Switzerland renders a Swiss arbitral award. Being final, a Swiss arbitral award is enforceable by Swiss authorities in the same manner as a judgment rendered by a Swiss court.¹⁴⁹ The seat of arbitration is in principle designated by the parties or the arbitration institution chosen by them. It may also be determined by the arbitrators themselves, in particular in the case of *ad hoc* arbitration.¹⁵⁰

Arbitral awards not only have effect in the state of the seat of arbitration but may also have legal effect in other states. However, enforcement of an arbitral award in a state other than the one in which it was rendered is usually possible only if the award is enforceable in the state of the seat of arbitration. Additionally, the conditions for recognition and enforcement provided for in the rules of PIL of the state where enforcement is requested (the “requested state”) must also be fulfilled, just like the recognition and enforcement of foreign judgments.

The Convention on the Recognition and Enforcement of Foreign Arbitral Awards of 10 June 1958 (the “New York Convention”)¹⁵¹ is applicable if enforcement is sought in a contracting state. In this case, the New York Convention provides a set of harmonised rules for the recognition and enforcement of arbitral awards, facilitating this process. The recognition and enforcement of an arbitral award are only

¹⁴⁴ See *e.g.*, Gabrielle Kaufmann-Kohler and Antonio Rigozzi, *International Arbitration – Law and practice in Switzerland* (Oxford Academic 2015), para. 1.18.

¹⁴⁵ See *e.g.*, Mauro Rubino-Sammartano, *Arbitrage international*, vol. 2 (Bruylant 2019), para. 28.275-28.295; Jean-François Poudret and Sébastien Besson, *Comparative Law of International Arbitration* (2nd edn, Sweet & Maxwell 2007), para. 475.

¹⁴⁶ See Art. 387 Swiss Civil Procedure Code (SR 272). The same rule applies when the arbitration is international (Art. 190 para. 1 of the PILA).

¹⁴⁷ See *e.g.*, Kaufmann-Kohler and Rigozzi (n 144), para. 7.187; Bernhard Berger and Franz Kellerhals, *International and Domestic Arbitration in Switzerland* (3rd edn, Stämpfli 2015), para. 1633-1636, and para. 2006-2026.

¹⁴⁸ See *e.g.*, Berger and Kellerhals (n 147), para. 743; Poudret and Besson (n 145), para. 134-135.

¹⁴⁹ See *e.g.*, Kaufmann-Kohler and Rigozzi (n 144), para. 1.18; Berger and Kellerhals (n 147), para. 1629.

¹⁵⁰ See *e.g.*, Kaufmann-Kohler and Rigozzi (n 144), para. 2.17-2.22; Berger and Kellerhals (n 147), para. 746-766.

¹⁵¹ SR 0.277.12.

granted under this convention if fundamental procedural rights of the parties have been respected in the procedure leading to the arbitral award. The scope of the awards that fall under the New York Convention is not precise and raises questions of interpretation. They are defined as “not only awards made by arbitrators appointed for each case but also those made by permanent arbitral bodies to which the parties have submitted”.¹⁵² An arbitral award may be recognised and enforced as soon as it has become “binding on the parties”.¹⁵³ Legal scholars consider that the New York Convention is in principle only likely to apply to awards which definitively establish the rights and obligations of the parties and whose solution on the merits cannot be called into question at a later trial.¹⁵⁴ This allows an arbitral award that falls within the scope of the New York Convention to be easily enforced in the numerous countries that are parties to the Convention if the losing party does not voluntarily enforce the award.

4.1.2 Non-binding Arbitration

Some forms of ADR are often referred to as “arbitration”, even though they fundamentally differ from arbitration in that the outcome is usually not enforceable by state authorities and does not have a *res judicata* effect. The reason is that while those ADRs offer a decision rendered by a third party, in the same way as arbitration, the procedure is not governed by the rules of arbitration and is less stringent. Compared to arbitration, they are deemed to have the advantage of offering a faster and more cost-effective way to resolving disputes. But fundamental procedural rights of the parties are not necessarily respected. We will hereafter refer to those ADRs, which are binding on the parties as a contractual obligation but do not produce decisions equal to judgments rendered by state courts, as “non-binding arbitration”¹⁵⁵ to distinguish them from classic arbitration.¹⁵⁶

Decisions made in the context of non-binding arbitration proceedings do not have the effect of legally binding and enforceable judicial decisions. They are not enforceable by state authorities in the same manner as judgments rendered by state courts, nor do they fall within the scope of the New York Convention. The execution of the outcome of non-binding arbitration depends entirely on the willingness of the losing party. However, the non-execution of the decision would equate to the non-execution of a contractual obligation. In the absence of voluntary compliance, the decision can thus be enforced by state authorities if the party seeking execution obtains a judgment which orders the other party to execute the performance due. When it comes to an international business relationship, questions of PIL resurface at the time of the “enforcement” of the outcome of non-binding arbitration and complicate the judicial procedure. To obtain a court decision ordering the execution of the performance due, it is indeed necessary to determine the forum and the applicable law. This generates disproportionate costs that are likely to discourage the successful party from seeking a judicial decision. There is thus a significant risk

¹⁵² Art. 1 para. 2 of the New York Convention.

¹⁵³ Art. V para. 1 sub-para. e of the New York Convention.

¹⁵⁴ Andreas Bucher, “Article 194 PILA”, in Andreas Bucher (ed), *Commentaire romand. Loi sur le droit international privé – Convention de Lugano* (Helbing Lichtenhahn 2011), para. 20. See also e.g., Kaufmann-Kohler and Rigozzi (n 144), para. 8.240-8.244.

¹⁵⁵ This term was introduced by Thomas Schultz, “Online Arbitration: Binding or Non-Binding?” (*ADROnline Monthly*, November 2002), 3.

¹⁵⁶ About non-binding arbitration, see also Thomas J. Stipanowich, “The Arbitration Penumbra: Arbitration Law and the Rapidly Changing Landscape of Dispute Resolution” (2007) 8 Nevada Law Journal 427, 448-455; Steven C. Bennett, “Non-binding Arbitration: An Introduction” (2006) 61 Dispute Resolution Journal 1; Gabrielle Kaufmann-Kohler and Thomas Schultz, *Online Dispute Resolution – Challenges for Contemporary Justice* (Kluwer Law International 2004), 153-168.

that the decision is not spontaneously executed by the losing party who is well aware of the difficulties related to the execution of the outcome of non-binding arbitration with the assistance of state authorities.

However, the losing party may be willing to execute the outcome of non-binding arbitration when it considers that the decision was rendered by a truly impartial expert in fair proceedings in which fundamental procedural rights, including the right to be heard, have been respected.¹⁵⁷ If the execution of the decision is done spontaneously, it is not necessary to rely on the assistance of state authorities to obtain satisfaction. In this case, the settlement of the dispute by non-binding arbitration has the advantage of circumventing the delicate issues of PIL, while obtaining a resolution of the dispute in a simple way.

4.2 ODR in the Field of E-commerce

ADR is commonly used in the field of e-commerce, where it provides a good substitute for state justice. Legal proceedings in state courts very often appear inadequate because they are too complex and costly in view of the value in dispute. Understandably, e-commerce platforms have carried out an online migration of ADR by developing ODR (4.2.1). As ODRs which use arbitration are usually non-binding arbitration proceedings, the effectiveness of the decisions rendered by ODR in e-commerce matters relies essentially on the voluntary compliance by the losing party (4.2.2).

4.2.1 Bringing Alternative Dispute Resolution Online

The international character of e-commerce transactions leads to complicated court proceedings with difficult PIL issues regarding the localisation of the legal relationship.¹⁵⁸ The legal situation of the parties to an e-commerce relationship is all the more complicated as there is no international instrument of worldwide scope that establishes rules of jurisdiction in the field of e-commerce. Until now, states have concentrated their efforts to harmonise the law on rules of substantive law without intervening in the jurisdiction of their courts to judge e-commerce disputes. The huge number of disputes could not, in any case, be absorbed by state courts. There is thus a risk that consumers find themselves not only in situations of significant legal uncertainty, but also unable to assert their rights in court. This is why the implementation of ADR has become the only way to resolve the exponential increase of cross-border small-claim disputes generated by this new mode of consumption.¹⁵⁹ Setting up ADRs conducted online quickly emerged as the best solution to provide an efficient, cost-effective, and flexible way to resolve disputes arising from e-commerce.¹⁶⁰

E-commerce platforms recognised the link between the growing adoption of e-commerce and the resolution of e-commerce disputes. They see ODR as a key measure to attract new customers since providing a conflict resolution mechanism which is adapted to the needs of users reduces the risks of contracting online and generates a higher level of trust in the system.¹⁶¹ In the words of Pablo Cortés, “the

¹⁵⁷ Schultz (n 155), 8.

¹⁵⁸ See *e.g.*, Colin Rule, Vikki Rogers and Louis F. Del Duca, “Designing a Global Consumer Online Dispute Resolution (ODR) System for Cross-Border Small Value - High Volume Claims – OAS Developments” (2010) 42 Uniform Commercial Code Law Journal 221, 225-228.

¹⁵⁹ See Ethan Katsh and Orna Rabinovich-Einy, *Digital Justice – Technology and the Internet of Disputes* (Oxford University Press 2017), 4-13.

¹⁶⁰ See Faye Fangfei Wang, *Internet Jurisdiction and Choice of Law – Legal Practices in the EU, US and China* (Cambridge University Press 2010), 143-144; Palmer and Roberts (n 143), 290-291.

¹⁶¹ See Faye Fangfei Wang, *Online Arbitration* (Routledge 2018), 6-7; Katsh and Rabinovich-Einy (n 159), 10; Thomas Schultz, “Does Online Dispute Resolution Need Governmental Intervention? The Case for Architectures of Control and Trust” (2004) 6 North Carolina Journal of Law & Technology, 71, 105; Colin Rule, “Quantifying the Economic

goal of ODR is not just to settle disputes but also to increase confidence in e-commerce¹⁶² and, thus, to stimulate trade.¹⁶³ By reducing the risk of denial of justice, ODR strengthens user trust in the business environment offered by the e-commerce platform.

Dispute resolution by means of classic arbitration conducted online is rarely considered for e-commerce disputes, as the law of several countries provides that disputes concerning consumer contracts cannot be settled by arbitration or only if specified conditions are met. This is the case, for example, in the European Union (EU), where the system of protection of consumers is based on “the idea [...] that the consumer is in a weaker position vis-à-vis the seller or supplier, as regards both his bargaining power and his level of knowledge, which leads to the consumer agreeing to terms drawn up in advance by the seller or supplier without being able to influence the content of those terms”.¹⁶⁴ It follows that an arbitration agreement is viewed as unfair if it has not been “individually negotiated” and “causes a significant imbalance in the parties’ rights and obligations arising under the contract, to the detriment of the consumer”, “contrary to the requirement of good faith”.¹⁶⁵ Unfair pre-dispute arbitration agreements in consumer contracts are not binding on consumers.¹⁶⁶ The same rule applies to pre-dispute ODR agreements, in particular where they are contained in contracts whose terms have not been individually negotiated.¹⁶⁷ The validity of pre-dispute arbitration agreements in the field of e-commerce and their effect on consumers raise significant difficulties in practice. As a result, states are unable to find a

Benefits of Effective Redress: Large E-Commerce Data Sets and the Cost-Benefit Case for Investing In Dispute Resolution” (2012) 34 University of Arkansas at Little Rock Law Review 767, 774-776.

¹⁶² Pablo Cortés, “Online Dispute Resolution for Consumers – Online Dispute Resolution Methods for Settling Business to Consumer Conflicts”, in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds), *Online Dispute Resolution: Theory and Practice* (eleven 2012), 139, 150.

¹⁶³ Pablo Cortés, “The New Landscape of Consumer Redress”, in Pablo Cortés (ed), *The New Regulatory Framework for Consumer Dispute Resolution* (Oxford University Press 2016), 17, 35.

¹⁶⁴ ECJ, 17.05.2018, C-147/16, *Karel de Grote – Hogeschool Katholieke Hogeschool Antwerpen VZW v. Susan Romy Jozef Kuljpers*, ECLI:EU:C:2018:320, para. 54.

¹⁶⁵ Art. 3 para. 1 of the Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts ([1993] OJ L 95/29). It should be noted that Directive 93/13/EEC has been amended twice. First, by Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council ([2011] OJ L 304/64). Second, by Directive (EU) 2019/2161 of 27 November 2019 amending Council Directive 93/13/EEC and Directives 98/6/EC, 2005/29/EC and 2011/83/EU of the European Parliament and of the Council as regards the better enforcement and modernisation of Union consumer protection rules ([2019] OJ L 328/7), which requires that EU countries introduce effective, proportionate and dissuasive sanctions to punish businesses that breach the rules on unfair contract terms. Directive (EU) 2019/2161 must be transposed into the national legislation of the EU countries before 28 November 2021.

¹⁶⁶ See Art. 6 of the Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts ([1993] OJ L 95/29), which provides that “unfair terms used in a contract concluded with a consumer [...] [shall] not be binding on the consumer.”

¹⁶⁷ European Commission, Guidance on the interpretation and application of Council Directive 93/13/EEC on unfair terms in consumer contracts (2019/C 323/04), [2019] OJ C 323/4, 62. See also recital 43 of the Directive 2013/11/EU of the European Parliament and of the Council of 21 May 2013 on alternative dispute resolution for consumer disputes and amending Regulation (EC) N 2006/2004 and Directive 2009/22/EC (Directive on Consumer ADR), [2013] OJ L 165/63, which states that “[a]n agreement between a consumer and a trader to submit complaints to an ADR entity should not be binding on the consumer if it was concluded before the dispute has materialized and if it has the effect of depriving the consumer of his right to bring an action before the courts for the settlement of the dispute.”

harmonised solution on this issue.¹⁶⁸ If we also consider that classic arbitration is often too expensive for small-claim disputes, this explains the reason why ODRs that are aimed at e-commerce disputes usually take the form of non-binding arbitration.

Therefore, when e-commerce platforms want to offer their users an ODR mechanism whereby they can obtain a decision rendered by a third party, they usually use non-binding arbitration. As the outcome of non-binding arbitration does not have the effect of a legally binding and enforceable judicial decision, and thus does not acquire *res judicata* effect, e-commerce platforms that subject their users to this type of ODR can guarantee a simple, fast, and cost-efficient way to resolve disputes, while still allowing their users to resort to state courts for subsequent dispute resolution if they are not satisfied with the outcome of the non-binding procedure. If users were subject to classic arbitration, the *res judicata* effect of the arbitral award would prevent them from bringing an action before the courts for the settlement of the dispute, which would be contrary to many consumer protection laws.

4.2.2 Enforcement of an Online Arbitral Award

When an ODR mechanism provides classic arbitration conducted online and renders arbitral awards within the meaning of the New York Convention, recognition and enforcement of the arbitral award may be executed pursuant to that instrument. However, this situation rarely arises for decisions rendered by an ODR mechanism in e-commerce matters. Some contracting states of the New York Convention – such as the EU Member States – have expressly excluded arbitral awards in consumer disputes from the scope of application of the convention. In those states, it results from the law that a consumer cannot validly enter into an arbitration agreement, or only if certain conditions are met. The enforcement of an arbitral award against a consumer could therefore be problematic, or even impossible. In any case, the recognition and enforcement of the arbitral award could not benefit from the favourable regime established by the New York Convention.

In the field of e-commerce, in most cases where a decision is rendered online by a third party, the decision results from a non-binding arbitration procedure. As such, the decision is not enforceable by state authorities in the same manner as a judgment rendered by a state court, nor does it fall within the scope of the New York Convention.¹⁶⁹ The execution of the decision rests fundamentally on the willingness of the losing party, which raises an important issue. In this context of mass commercial relations based on one-shot transactions, which is specific to e-commerce, there is indeed a significant risk that the losing party does not comply spontaneously. This is a central issue because the possibility of obtaining execution by force is essential for the effective resolution of the dispute. This is not only a question of the proper functioning of the ODR mechanism, but also of confidence in the ability of the system to effectively resolve disputes.

¹⁶⁸ The fact that UNCITRAL had to give up adopting Rules on ODR providing rules and guidelines in the field of ODR for e-commerce transactions, including consumer contracts, is revealing in this respect. See UNCITRAL, “Report of Working Group III (Online Dispute Resolution) on the work of its twenty-sixth session (Vienna, 5-9 November 2012)”, 19 November 2018, A/CN.9/762. Regarding the procedure which eventually led to the adoption of the Technical Notes, see e.g., Riikka Koulu, *Law, Technology and Dispute Resolution – Privatisation of Coercion* (Routledge 2019), 125-129; Zbynek Loebel, *Designing Online Courts – The Future of Justice Is Open to All* (Wolters Kluwer 2019), 10-11; Pablo Cortés, “The Consumer Arbitration Conundrum – A Matter of Statutory Interpretation or Time for Reform?”, in Pablo Cortés (ed), *The New Regulatory Framework for Consumer Dispute Resolution* (Oxford University Press 2016), 65, 73-75.

¹⁶⁹ See *supra* chapter 4.1.2.

In order to address the risk of non-compliance to the decision, e-commerce platforms seek to implement mechanisms that favour voluntary compliance with the outcome of the ODR proceedings. Those mechanisms are intended to compensate for the fact that ODR platforms do not have the power to enforce the ODR outcome outside of their ecosystem and that it would be too complicated – and probably too expensive – to request the assistance of the state authorities to enforce the decision with traditional means. For example, the losing party may have incentives to abide by the decision when its market access or its reputation is at stake in the ecosystem in which the legal relationship between the parties is embedded.¹⁷⁰ Sellers risk losing customers if they are given poor ratings because they refuse to enforce decisions made by the ODR system of the e-commerce platform. Social and economic incentives, such as trustmarks, accreditation and reputation management systems, exclusion from the marketplace, blacklists, or even penalties for delay in performance,¹⁷¹ have proved to be efficient incentives for voluntary compliance to non-enforceable decisions.¹⁷² Such incentives are based not only on the willingness of the parties to comply with their agreement over the fact that decisions are binding, but also on the threat of a direct sanction on their property or rights, their ability to engage in business relations, their reputation, or even their belonging to a community (*i.e.*, an e-commerce platform). The power to deny access to a marketplace (*e.g.*, by banishing a user from an e-commerce platform) has not only a social impact, but also an economic impact. Voluntary compliance may therefore result from the pressure of the business and social environment. When the ODR platform controls the reputation of the users of the e-commerce platform, it may award or withdraw reputation points following the ODR outcome or based on voluntary compliance with the ODR outcome. Even though it is not a direct enforcement of the decision, the threat of ostracism puts social and economic pressure on community members to voluntarily comply with decisions rendered in the course of an online non-binding arbitration procedure.

However, reputation management systems and mechanisms of control of access to the market are clearly insufficient on their own to generate users' trust in the business environment offered by an e-commerce platform.¹⁷³ Such tools favouring voluntary compliance with the ODR outcome appeared to be insufficient to build an architecture of confidence, that is to say "an architecture that allows mutual trust between parties or mutual reliance on a third party"¹⁷⁴ in the case of a dispute, to boost business transactions. It must be inferred that e-commerce platforms can only provide the necessary trust in the market if they can offer users an ODR mechanism that guarantees the execution of the result without entirely relying on the willingness of the losing party to voluntarily comply. In other words, the dispute resolution mechanism used by an e-commerce platform must enable aggrieved users to obtain effective redress, failing which they may leave the platform in favour of another.¹⁷⁵

¹⁷⁰ Colin Rule and Harpreet Singh, "ODR and Online Reputation Systems – Maintaining Trust and Accuracy Through Effective Redress", in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds), *Online Dispute Resolution: Theory and Practice* (eleven 2012), 163-184; Kaufmann-Kohler and Schultz (n 156), 225-227; Katsh and Rabinovich-Einy (n 159), 66.

¹⁷¹ See UNCITRAL, "Online dispute resolution for cross-border electronic commerce transactions: issues for consideration in the conception of a global ODR framework", 28 September 2011, A/CN.9/WG.III/WP.110, para 49.

¹⁷² See *e.g.*, Kaufmann-Kohler and Schultz (n 156), 228-233; Vikki Rogers, "Knitting the Security Blanket for New Market Opportunities – Establishing a Global Online Dispute Resolution System for Cross-Border Online Transactions for the Sale of Goods", in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds), *Online Dispute Resolution: Theory and Practice* (eleven 2012), 95, 102-104; Perritt (n 136), 237-240.

¹⁷³ Katsh and Rabinovich-Einy (n 159), 70-72.

¹⁷⁴ Schultz (n 161), 78.

¹⁷⁵ Koulu (n 168), 90.

The example of e-commerce shows that it is necessary to create a kind of self-enforcement mechanism implemented by the ODR platform that issues the decision in order to build a comprehensive private justice system.¹⁷⁶ Self-enforcement of the outcome of a dispute subject to ODR is, however, only possible if the ODR provider (*i.e.*, the company who administers and coordinates the ODR platform), or the e-commerce platform to which the ODR mechanism is linked, has the power to enforce its decisions. This presupposes that it has some power of control over a valuable resource.¹⁷⁷ For example, eBay has succeeded in setting up such a system by teaming up with payment service providers to keep control over the payments.¹⁷⁸ When a buyer wishes to be refunded, the seller is encouraged to negotiate a solution, whether privately on eBay's platform or with the help of an independent ODR provider.¹⁷⁹ If the negotiations are unsuccessful and the payment was executed with select payment methods – credit card, PayPal, Apple Pay, Google Pay, or a voucher – the buyer can access eBay's internal dispute resolution mechanism called eBay Money Back Guarantee. After reviewing the buyer's claim, eBay can decide to pay him or her back and enforce its decision thanks to credit card chargebacks, sometimes without even consulting with the seller.

Even if the combination of control over the payment method and the ODR mechanism produces an effective private enforcement mechanism, eBay's ODR mechanism is not self-reliant and the decisions it renders are not independent. On the one hand, the platform must resort to the services of an intermediary (such as PayPal) to execute its decisions and, on the other hand, the procedure is conducted entirely by eBay rather than by an independent third party with no financial interests. This can be problematic as eBay may serve corporate interests instead of justice, possibly to the detriment of some users. In short, eBay's model of conflict resolution is expedient and may be biased.

While eBay has implemented a form of private justice system, it is rare that an e-commerce platform or an ODR provider has the means to directly enforce the ODR outcome. Yet, it is recognised today that the ability to self-enforce online non-binding arbitration decisions is a key characteristic for ODR to be a real alternative to state justice.¹⁸⁰

5. Implementation of Blockchain Dispute Resolution (BDR)

We have seen that, for the time being, state courts cannot guarantee access to justice in a reliable manner for disputes involving DAOs. Connecting factors have a difficult time locating matters of corporate law that concern the governance of DAOs and contractual relationships on the blockchain to which DAOs are parties. Universal jurisdiction could offer a solution if states agree to offer the protection of their courts to disputes with little or no link to their legal order. Similarly, a choice of court agreement could allow the parties to subject their contractual relations to a state jurisdiction. However, there remains the difficulty to locate the defendant when the parties involved benefit from pseudonymity in the blockchain environment and, in any case, the vast majority of DAOs do not have the capacity to be a party to the proceedings. Furthermore, even if a dispute involving a DAO can be brought before a state court,

¹⁷⁶ About the notion of self-enforcement in the meaning of enforcement by private authorities, see Schultz (n 156), 4. See also Pietro Ortolani, "Self-Enforcing Online Dispute Resolution: Lessons from Bitcoin" (2016) 36 Oxford Journal of Legal Studies 595.

¹⁷⁷ Schultz (n 155), 8; Perritt (n 136), 215.

¹⁷⁸ See *e.g.*, Koulu (n 168), 76-78; LoebI (n 168), 4-7; Thomas Schultz, "eBay: un système juridique en formation?" (2005) 22 Revue du droit des technologies et de l'information 27.

¹⁷⁹ *E.g.*, consumers domiciled in the European Union may submit a claim on the EU's ODR platform <<https://ec.europa.eu/consumers/odr/>>.

¹⁸⁰ Same opinion: LoebI (n 168), 36-37 and 66; Cortés (n 162), 150.

enforcement on the blockchain of the judgment is challenging when the losing party does not voluntarily comply. State enforcement authorities do not have the power to force a smart contract to execute in a certain way, nor can they freeze or seize crypto assets from a DAO or an on-chain actor.

While these issues are critical in state courts, they are much less so if the dispute is resolved through an ODR mechanism because those systems of private justice can be configured in a much more flexible manner than traditional state justice. As with disputes related to online transactions, such as e-commerce disputes, the resolution of disputes involving DAOs can be entrusted to an ODR mechanism. New types of ODRs have been imported on the blockchain to use this technology for resolving disputes of blockchain actors (5.1). Technology plays a central role in those kinds of ODRs and can be viewed as an integral party to the dispute resolution process (5.2). Blockchain-based dispute resolution mechanisms can be designed in a way which addresses the risk of non-compliance that is structurally inherent¹⁸¹ in any private justice system. The use of blockchain technology avoids the main drawback of most ODR systems, which is the lack of coercive means of enforcement. Smart contracts bring a significant innovation with respect to automatic execution of transactions. These can be exploited to set up dispute resolution mechanisms that allow for the self-enforcement of the decision to be carried out directly and automatically through the system (5.3). A private justice system incorporating a direct and automatic decision enforcement mechanism may seem expedient at first sight, but the authority to judge is based on the agreement of the disputing parties who have chosen this particular mode of dispute resolution (5.4).

5.1 From ODR to BDR

ADRs give access to a wide variety of opt-in private justice mechanisms that can be voluntarily chosen by the parties to a contract when they have a conflict, either at the time of the conclusion of the contract, or after the conflict has occurred. Where the parties choose to resolve their dispute privately through an ADR mechanism, the state loses its power to dispense justice. However, the state keeps a certain control over the delivery of justice at other stages of the dispute resolution process. Traditional ADRs such as arbitration cannot directly enforce their decisions and rely on state enforcement authorities when voluntary compliance is not met. In this case, the dispute resolution process falls under the supervision of the state judiciary in the enforcement procedure. Through its monopoly over the use of force, which is manifested by its power of enforcement, the state keeps control over justice in its territory even when the parties to a contract opt for private justice provided by an ADR mechanism.

ODR has been specifically introduced to cater for the needs of online users, especially in e-commerce. Some online platforms (*e.g.*, eBay) have found a way to acquire a certain degree of independence by directly executing their decisions with technology (*e.g.*, through credit card chargebacks) when the parties have contracted online using digital tools. This is possible when there is a close interface between the marketplace, the payment method and the ODR service.¹⁸² In this regard, the ODR justice system challenges the monopoly of states over the use of force by directly enforcing its decisions through the use of technology. However, the state does not lose all control over the delivery of justice as the parties can initiate legal proceedings to review the private resolution of the dispute, in which case the competent state court may reach a different decision. As a result, even though the litigation is initially resolved privately and goes under the radar of the state, state control remains because the parties can still have recourse to state justice if they find the result of the private proceedings to be unjust or unfair.

¹⁸¹ Ortolani (n 129), 303.

¹⁸² See Jia Wang and Lei Chen, “Regulating Smart Contracts and Digital Platforms – A Chinese Perspective”, in Larry A. DiMatteo, Michel Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020), 183, 192-193.

New generation ODRs have been designed to meet the specific needs of contractual relationships arising in the digital environment of the blockchain. Developers have created decentralised dispute resolution mechanisms on the blockchain that are adapted to the immutability of smart contracts and the pseudonymity of on-chain actors. The authors refer to those blockchain-based ODRs as “Blockchain Dispute Resolution” (BDR) mechanisms (BDRs). BDRs are the only dispute resolution mechanisms that can effectively resolve disputes on the blockchain because they use that very infrastructure to function. As they operate in the blockchain environment, the parties to a contractual relationship on the blockchain can give a BDR mechanism the power to review the execution of their smart contract when a dispute occurs, in which case the result of the BDR mechanism is directly and automatically enforced. BDRs are therefore independent in their operation; that is, they do not need any state authority to dispense justice and execute their decisions, as this is done through technology. BDRs are also self-reliant because the execution of a decision is done automatically by the smart contract, without having to rely on a third party (e.g., a credit card company), as the smart contract has direct power over the subject matter of the contract. But the characteristic that sets BDRs apart from all other types of ODRs is their autonomy. BDRs are decentralised entities that are operated and maintained by communities of participants who are organised in DAO structures. They are not linked to a state jurisdiction and thus benefit from the autonomy provided by the blockchain infrastructure. The decision-making process and the execution of decisions completely escape state oversight as no state can control a BDR mechanism and impose actions that go against its code or the will of its community. For example, state authorities cannot order a BDR mechanism to freeze crypto assets by means of a provisional or conservatory measure. As state authorities have no oversight power over BDRs and cannot enforce decisions on the blockchain either, the blockchain environment not only infringes the power of the state to dispense justice, but also the power of the state to review decisions.

5.2 Technology in the Dispute Resolution Process

Technology plays a central role when a dispute is resolved through an ODR mechanism. This has been made clear by UNCITRAL which defined ODR as a “mechanism for resolving disputes through the use of electronic communications and other information and communication technology”.¹⁸³ ODR can be technology-assisted dispute resolution as well as technology-facilitated dispute resolution or technology-based dispute resolution mechanisms.¹⁸⁴ In the first generation of ODRs, information technology was used basically for communicating data (e.g., emails used for communications). The dispute resolution process has been transferred entirely online in the second generation of ODRs where technological tools have been given an important place, notably by integrating software that employs algorithms and artificial intelligence into decision making.¹⁸⁵ Those are the models which are currently used to resolve e-commerce disputes.

¹⁸³ UNCITRAL, *Technical Notes on Online Dispute Resolution* (United Nations 2017), para. 24, available at <https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/v1700382_english_technical_notes_on_odr.pdf> accessed 5 November 2021.

¹⁸⁴ Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey, “Introduction”, in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds), *Online Dispute Resolution: Theory and Practice* (eleven 2012), 1, 3. See also Loebel (n 168), 3-4.

¹⁸⁵ See Adesina Temitayo Bello, “Online Dispute Resolution Algorithm: The Artificial Intelligence Model as a Pinnacle” (2018) 84 *Arbitration – The International Journal of Arbitration, Mediation and Dispute Management* 159. See also Arno R. Lodder and John Zeleznikow, “Artificial Intelligence and Online Dispute Resolution”, in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds), *Online Dispute Resolution: Theory and Practice* (eleven 2012), 61, 73-75; Aura Esther Vilalta, “ODR and E-Commerce”, in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds),

The central role of technology in the dispute resolution process of ODRs has been highlighted by the metaphor of the “fourth party”.¹⁸⁶ Technology assists both disputing parties as well as the third party involved in the dispute resolution process (e.g., the arbitrator) to find a consensus or to make a decision.¹⁸⁷ Technology can even take the place of the third party. For example, technology replaces the mediator in the case of automated negotiation decision-making.¹⁸⁸ Arno Lodder stated that “[b]asically, technology in ODR can be applied for the following purposes: supporting the communication, supporting the exchange of documents and information, supporting decisions, and making decisions”.¹⁸⁹ This author has gone further by also acknowledging the role of the ODR provider. He called the ODR provider the “fifth party” of ODR,¹⁹⁰ while noting that “[t]he fifth party is present only if either the technology was developed for supporting the resolution of disputes, or the provider aims to deliver tools that help the parties in solving the conflict.”¹⁹¹

BDRs are a third generation of ODR that are characterised by the use of blockchain technology. They carry out the whole dispute resolution process in the digital environment of a blockchain and rely on smart contracts from the initiation of the dispute resolution procedure to the actual resolution of the dispute and, finally, the enforcement of the outcome. A smart contract is used by the disputants to submit their dispute to the BDR mechanism and other smart contracts are used to resolve the dispute within the BDR mechanism and ultimately execute the decision. Blockchain technology plays such a key role in the dispute resolution process that it must truly be considered as playing the role of a fourth party. The fourth party goes beyond the metaphor in ODR to become a reality in BDR. We can deduce that the fourth and fifth parties are one and the same in a BDR mechanism.

5.3 On-chain Enforceability of BDR

The dispute resolution process of a BDR mechanism is conducted entirely on the blockchain and is configured in such a way that it can be performed using smart contracts. Given these properties, the use of a BDR mechanism does not require the parties to disclose their real identity and pseudonymity can be upheld. All operations on the blockchain are linked to a public key which points to the owner’s crypto wallet, whether it is signing a smart contract, joining a DAO or transferring cryptocurrencies and other crypto assets. Since the public key serves as identification in the blockchain environment, a BDR mechanism can enforce any decision upon the parties without their identity being disclosed.

Any decision must be enforceable according to the properties of the smart contract. In general, disputes are settled in a binary way by choosing between two options. For example, if the contentious smart contract is a governance proposal in a DAO, the decision stemming from the BDR mechanism must either stop the proposal or let it go through. Or, if the contentious smart contract is a payment in

Online Dispute Resolution: Theory and Practice (eleven 2012), 113, 116-118, for a distinction between automated and assisted negotiation, online mediation, online conciliation, and online arbitration.

¹⁸⁶ Ethan Katsh and Janet Rifkin, *Online Dispute Resolution: Resolving Conflicts in Cyberspace* (Jossey-Bass 2001), 93-116. See also Katsh and Rabinovich-Einy (n 159), 11.

¹⁸⁷ Ethan Katsh, “Online Dispute Resolution: Moving Beyond Convenience and Communication”, in James R. Silkenat, Jeffrey M. Aresty and Jacqueline Klosek (eds), *The ABA Guide to International Business Negotiations – A comparison of Cross-Cultural Issues and Successful Approaches* (3rd edn, ABA Book Publishing 2009), 235, 238.

¹⁸⁸ E.g., the blind-bidding system of dispute resolution which is used by Cybersettle. See Arno R. Lodder and John Zeleznikow, *Enhanced Dispute Resolution Through the Use of Information Technology* (Cambridge University Press 2010), 82-84.

¹⁸⁹ Arno R. Lodder, “The Third Party and Beyond. An Analysis of the Different Parties, in particular The Fifth, Involved in Online Dispute Resolution” (2006) 15 *Information & Communications Technology Law* 143, 152.

¹⁹⁰ Lodder (n 189).

¹⁹¹ Lodder and Zeleznikow (n 188), 81.

cryptocurrencies for the delivery of a service, the decision stemming from the BDR mechanism must either let (part of) the payment go through or cancel the payment all together. As a result, existing BDRs do not deal with all types of disputes and are limited to cases where the disputing parties are in a position to agree on two options to resolve their dispute. However, this binary situation is not common in everyday disputes. The resolution of a dispute usually involves a succession of small decisions according to a reasoning process that can hardly be reproduced in a binary way. But it cannot be excluded that more complex BDRs will be developed to allow more complex decisions to be taken and executed. One could imagine, for example, that the decision-making process is composed of a series of smart contracts triggered according to the decision taken at the previous level. For the time being, the BDRs are still limited to conflict resolution mechanisms configured in a binary way to clearly determine which disputing party is right and which is wrong.

One of the advantages of smart contracts is that any action on the blockchain (*e.g.*, the transfer of cryptocurrencies and other crypto assets) can be conditioned to a set of predefined rules. It is possible to take advantage of this property of smart contracts to make decisions that are self-executable. Here, the effectiveness of the dispute resolution process does not rely on the willingness of the parties to comply with the decision. There is therefore no need to use mechanisms that incentivise parties to voluntarily comply, which is the case in most ODRs.¹⁹² Hence, an essential feature of BDRs is their ability to directly and automatically enforce their decisions on the blockchain itself by using smart contracts, which allows the parties to obtain the enforcement of decisions without having to rely on the assistance of coercive state authorities. This makes BDRs independent and self-reliant dispute resolution mechanisms, which is a major improvement over ODRs that do not use this technology.¹⁹³ In other words, blockchain technology brings the certainty of enforcement of the ruling.¹⁹⁴

However, the power of enforcement of BDRs is delimited by the constraints of the technology. The decisions arising from a BDR mechanism must be enforceable through a smart contract on the valuable resources that have been submitted in its technological environment. The scope of the power of enforcement of a BDR mechanism is limited to cryptocurrencies or other crypto assets that have been placed by the parties within its power by means of a smart contract. For example, a smart contract that submits to the jurisdiction of a BDR mechanism can be programmed in such a way that cryptocurrencies are transferred automatically from one account to another when pre-set conditions are satisfied (*e.g.*, “if A is right, then 10 ETH are transferred to A’s account”). Until the smart contract executes itself, the cryptocurrencies (10 ETH) are placed by the parties within the jurisdiction of the BDR mechanism. This statutory deposit is an essential element of the procedure before BDRs and it does not necessarily have to take the form of a deposit of valuable resources. The “statutory deposit” may also consist in the fact that the parties give the BDR mechanism the power to perform a particular action on the blockchain. For example, when the dispute is about some action related to the governance of a DAO, such as a proposal to implement a fork, a smart contract can temporarily block the proposal and then let it go through (or not) in accordance with the BDR mechanism’s decision. If the BDR mechanism is not able to stop the transfer of the disputed assets or the execution of the disputed proposal, its power to rule on the dispute is hampered by the fact that the system will not be able to directly and automatically enforce its decision. When the decision rules on elements that are outside of the BDR mechanism’s technical reach, for

¹⁹² Some ODRs such as eBay’s Money Back Guarantee keep control over the payment in order to have the means to enforce a decision in case of a conflict (see *supra* chapter 4.2.2). However, those ODRs rely on third parties (*e.g.*, payment service providers) that may charge additional fees to the losing party, which amounts to a double penalty.

¹⁹³ See *supra* chapter 5.1.

¹⁹⁴ Federico Ast and Bruno Deffains, “When Online Dispute Resolution Meets Blockchain: The Birth of Decentralized Justice” (2021) 4.2 *Stanford Journal of Blockchain Law & Policy* 241, 244.

example by ordering the transfer of off-chain assets, the execution of the decision cannot be guaranteed. Therefore, BDRs are best suited for decisions that are to be enforced exclusively on-chain.

The main difference between BDRs and ODRs that do not use blockchain technology lies in the fact that BDRs are part of an economic system in which there are valuable resources. A BDR mechanism can be granted “jurisdiction” (*i.e.*, power) over some cryptocurrencies or other crypto assets that are part of the blockchain environment in which it is implemented, the same way that assets on the territory of a state are under the jurisdiction of the judicial authorities of that state. The BDR mechanism exercises its power of jurisdiction autonomously as no state can interfere with the crypto assets under its jurisdiction. It is also independent and self-reliant in the enforcement of its decisions as the BDR mechanism has the power to directly and automatically transfer the subject matter of the dispute (*i.e.*, valuable resources that are in its power) to the winning party at virtually no cost and without the involvement of a third party or coercive state authorities. By producing decisions that can be automatically self-enforced by the system, BDRs represent the culmination of a private justice system.

5.4 Jurisdiction based on Consent

As with other forms of ODR, the jurisdictional competence of a BDR mechanism necessarily stems from the will of the parties to place their relationship within its jurisdiction. There must be an agreement on the choice of a BDR mechanism which is to have jurisdiction to settle any disputes that have arisen or may arise in connection with a particular relationship. The choice of BDR cannot be established unilaterally: it must result from the consent of each of the disputing parties, the same way as the choice of a state court must result from a choice of court agreement or an arbitration agreement.

The “choice of court clause”, or rather “opt-in clause”, containing the agreement of the parties to subject any dispute to a BDR mechanism’s jurisdiction, must be encoded in one of the smart contracts governing the relationship between the parties.¹⁹⁵ The parties may also agree to entrust a dispute that has already arisen to the jurisdiction of a BDR mechanism by generating a specific smart contract. For example, the parties may create a smart contract that elects the BDR mechanism to decide between programmed possible outcomes. In both cases, the smart contract enables the activation of an external dispute resolution mechanism.

The dispute resolution mechanism can also be directly integrated into the smart contract.¹⁹⁶ In this situation, the dispute resolution mechanism is internal to the smart contract. For example, a smart contract may be linked to a multi-signature wallet which allows the intervention of a third party to release the cryptocurrencies deposited in the wallet.¹⁹⁷ If a dispute occurs, the third party has the power to decide where the cryptocurrencies stored in the wallet shall be transferred. This type of dispute resolution mechanism will not be further analysed as it falls outside the scope of BDRs as defined above,¹⁹⁸ which are decentralised and autonomous mechanisms external to the smart contract.

In the case of disputes related to the governance of a DAO, when the code of the DAO incorporates an opt-in clause submitting any dispute among the members or between the DAO and its

¹⁹⁵ As a reminder, we only consider smart contracts that are the legal contract themselves. See *supra* chapter 3.3.

¹⁹⁶ *E.g.*, a draft bill on smart contracts of the State of Wyoming of 2019 (19LSO-0049) had a provision (40-28-102) under which “(a) A smart contract [...] shall, as a condition of enforceability in this state, be accompanied by a resolution plan agreed upon by the parties to the contract. [...] The requirements of this section may be executed through the code or programming language of a smart contract or may accompany the contract through any readily accessible means agreed upon by the parties to the contract. (b) [...]” This bill has not yet entered into force.

¹⁹⁷ See Ortolani (n 85), 434-435.

¹⁹⁸ See *supra* chapter 5.1.

members to a BDR mechanism, this clause is to be regarded as an agreement to which all members have assented. The opt-in clause shall be considered as binding on all members of the DAO, who can be deemed to have implicitly accepted the jurisdiction of the BDR mechanism at the time they acquired governance tokens of the DAO, along with the other provisions specified in the DAO's code. This rule is generally accepted in the case of a choice of court clause¹⁹⁹ or an arbitration clause²⁰⁰ in the bylaws or articles of association of a company. In any case, the members are bound by the opt-in clause through the DAO's code, and there is no technical way they can get around it in case of a dispute. In the authors' view, the principle that all members of a DAO have agreed that a dispute arising among them or between them and the DAO is to be decided by a BDR mechanism is all the easier to accept because the DAO's code (in which the opt-in clause is included) is freely accessible online on the blockchain's ledger.

With regard to contractual relations between a DAO and third parties, the opt-in clause can be encoded in the smart contract governing the relationship between the parties. The question arises as to whether the choice of BDR can also result directly from the code of the DAO. To what extent can such an opt-in clause be considered as binding on third parties when they have not acquired governance tokens of the DAO? From a corporate law point of view, it is *a priori* impossible to presume that third parties have assented to a choice of court or arbitration clause in the bylaws or articles of association of the company. It is regular business for third parties to enter into commercial relations with companies without knowing the content of their bylaws or articles of association. In such cases, third parties are not bound by a choice of court or arbitration clause that could be found in the bylaws or articles of association. This analogy with corporate law has its limits given that, unlike the bylaws or articles of association of a company, the rules of management and governance of DAOs are systematically freely accessible on-chain and can be consulted at any time by anyone. Therefore, it could be assumed that any third party entering in business relations with a DAO is deemed to be aware of the rules in the DAO's code and in particular the existence of an opt-in clause referring to BDR since the software code is public and can be freely consulted on the blockchain. In this case, we should come to the conclusion that an implied consent for the BDR mechanism's jurisdiction exists when it is programmed in the DAO's code. This analysis is reinforced by the fact that if the code of the DAO submits to the jurisdiction of the BDR mechanism for all its smart contracts with third parties, here also there is no technical way for the parties to get around it in case of a dispute, as the smart contract will self-execute.

By requiring that anyone who deals in some way with a DAO should be aware of the technicalities in the DAO's code such as for example opt-in clauses, one assumes that any third party is able to read the software code, which is not something everyone can do. For this reason, it is the opinion of the authors that DAOs which have an automatic opt-in clause submitting any dispute to BDR should inform, in a comprehensive way, potential DAO token buyers and third parties entering into commercial transactions with the DAO that any dispute which may arise in their relationship with the DAO will be resolved by the BDR mechanism, in accordance with the DAO's code. This information should be included, for example, in the DAO's white paper, which should be published on a public platform and be publicly available. In this manner, it can be assumed that anyone who has a relationship with the DAO knows, or ought to know, that it is bound by the opt-in clause which is part of the membership into the DAO or part of the contractual agreement with the DAO. Failing that, the DAO should at least inform potential members or contracting parties in natural language of the existence of such a dispute resolution clause in its code. It

¹⁹⁹ See *e.g.*, Trevor Hartley, *Choice-of-court Agreements under the European and International Instruments* (Oxford University Press 2013), 152-154.

²⁰⁰ See *e.g.*, Kaufmann-Kohler and Rigozzi (n 144), para. 3.88-3.90. See also the new Art. 178 para. 4 of the PILA, under which the provisions related to international arbitration "apply by analogy to an arbitration clause [...] in articles of association."

is of particular importance that DAOs be fully transparent with the content of their code as third parties that do not have special knowledge in computer coding could end up being bound in a relationship with a DAO without fully understanding the scope of that relationship. And the characteristics of smart contracts would prevent them from simply withdrawing from that relationship. DAOs that do not respect basic principles of transparency could be indirectly sanctioned by losing their reputation. In any case, a BDR mechanism should refuse to exercise its jurisdiction when a contracting party to a smart contract demonstrates that it was not properly informed about the existence of such a dispute resolution clause in the DAO's code. Consent should not be disregarded even in the technologically driven environment of the blockchain. As justice providers, BDRs have the responsibility to prevent abusive conduct when possible.

6. Resolving Disputes Involving DAOs by Means of BDR

With the development of the crypto economy through DeFi and other types of Decentralized Applications (dApps), it is of paramount importance that DAOs and other actors of the crypto environment be offered access to justice, as state courts are often powerless when faced with blockchain technology. BDRs are in principle the only way DAOs, their members and their contracting parties can access justice in case of a dispute. As many DAOs do not have legal capacity and cannot sue or be sued before state courts, BDRs represent their primary access to justice. However, the exceptional case of a dispute between a regulated DAO and an off-chain actor must be reserved. This type of case can be settled by state courts, at least in states where the DAO has the capacity to sue and be sued in the same way as other forms of companies. Only the enforcement of the decision on cryptocurrencies, other crypto assets, or on the DAO's governance could be problematic.²⁰¹

BDRs allow on-chain and off-chain actors to resolve their disputes with platforms that are adapted to the crypto environment. Most BDRs²⁰² are specifically configured to allow DAOs to take part in proceedings. Those BDRs incorporate decision-making processes which are based on crypto-economic mechanisms that lead to decisions by consensus (6.1). The first operational BDR was specifically developed to resolve disputes of a contractual nature for relationships created on the blockchain with smart contracts. As a result, on-chain actors who may be pseudonymous or exist only in the digital environment, but possess cryptocurrencies or other crypto assets, have the opportunity to access justice when contracting on the blockchain, while off-chain actors venturing in the crypto economy are offered a way to securely contract with on-chain actors and access justice in case of a dispute (6.2). Additionally, like any organised entities, DAOs are also prone to conflicts pertaining to their governance. A second BDR mechanism has been launched to specifically allow DAO members to have proposals with regard to the governance of the DAO submitted by their peers to be assessed by a jury in order to determine whether litigious proposals are in line with the DAO's goals and values, and to block them from being voted on if necessary (6.3).

6.1 Decision-making Process in BDRs

²⁰¹ See *supra* chapter 3.5.

²⁰² For an overview of recent BDR projects, see *e.g.*, Yann Aouidef, Federico Ast and Bruno Deffains, "Decentralized Justice: A Comparative Analysis of Blockchain Online Dispute Resolution Projects" (2021) 4 *Frontiers in Blockchain* <<https://www.frontiersin.org/articles/10.3389/fbloc.2021.564551/full>> accessed 5 November 2021; Michael Buchwald, "Smart contract dispute resolution: the inescapable flaws of blockchain-based arbitration" (2020) 168 *University of Pennsylvania Law Review* 1369, 1384-1393; Rabinovich-Einy and Katsh (n 85), 59-71; Metzger (n 85), 88-100; Allen, Lane and Poblet (n 85).

Kleros²⁰³ and Aragon Court²⁰⁴ are two BDRs that are currently operational for resolving disputes on the blockchain and are accessible to DAOs. Kleros was launched on the Ethereum blockchain in July 2018 and is, as such, the first BDR platform in operation.²⁰⁵ Aragon Court was launched in November 2019, also on the Ethereum blockchain, with a mechanism inspired by the one of Kleros.²⁰⁶ Those two BDRs share the common particularity of relying on crowdsourcing in their dispute resolution process. The characteristic feature of crowdsourcing is that the dispute is resolved by a jury composed of people who are not necessarily legally qualified, but who can take a stand on a dispute based on personal experience and technical qualifications. The emergence of crowdsourcing in the resolution of disputes has already been observed ten years ago by van den Herik and Dimov in ODRs developed for e-commerce.²⁰⁷ These authors highlighted the fact that some ODRs use the wisdom of the crowd to resolve a dispute, the crowd being composed of (some of) the members of the online community.²⁰⁸ Using a jury of peers is considered an appropriate way to obtain a decision that reflects the opinion of a whole community.

This model has been adopted by Kleros and Aragon Court and implemented in a way that takes full advantage of blockchain technology. Jurors of those two BDRs are selected to judge a case at random from a pool of jurors who have bought their position by acquiring native tokens (*i.e.*, tokens from the platform). Jurors must stake some native tokens in order to show their interest with the case. The chances of being chosen as a juror increase with the amount of tokens a juror has staked. The decision-making process is designed so that jurors have an economic incentive to make a decision by consensus. In order to incentivise the vote for the “right” solution, Kleros and Aragon Court have the particularity of placing an economic risk on the jurors who voted for the unsuccessful resolution of the dispute. Jurors are remunerated only if they voted with the majority. Each of the majority jurors receives a portion of the fees that have been paid by the parties (called “arbitration fees”) and a portion of the stakes of the minority jurors. Jurors have therefore a double economic incentive to vote consistently with what they predict the majority vote will be, as they cannot only win money but also lose money if they vote with the minority of jurors.

²⁰³ About Kleros, see Clément Lesaege, William George and Federico Ast, “Kleros Yellow paper” (March 2020), <<https://kleros.io/yellowpaper.pdf>> accessed 5 November 2021.

²⁰⁴ About Aragon and Aragon Court, see “Aragon White paper” (*GitHub*, 18 July 2019) <<https://github.com/aragon/whitepaper>> accessed 5 November 2021.

²⁰⁵ More than 900 disputes have already been resolved by Kleros at the time of writing, with more than 800 registered jurors.

²⁰⁶ Aouidef, Ast and Deffains (n 202), 3.

²⁰⁷ Jaap van den Herik and Daniel Dimov, “Towards Crowdsourced Online Dispute Resolution”, in S. Kierkegaard and P. Kierkegaard (eds), *Law Across Nations: Governance, Policy and Statutes* (International Association of IT Lawyers 2011), 244-257, available at <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1933392> accessed 5 November 2021. These authors called an ODR mechanism using crowdsourcing as a part of the dispute resolution process “Crowdsourced Online Dispute Resolution (CODR)”. Other authors use the term “mob justice”: Schmitz and Rule (n 85), 117; or “peer-to-peer arbitration”: Michael Abramowicz, “Cryptocurrency-Based Law” (2016) 58 *Arizona Law Review* 359, 405.

²⁰⁸ Using the wisdom of the crowd to decide disputes has already been incorporated into ODRs in e-commerce. Already in 2008, eBay set up the eBay Users’ Community Court in India to resolve disputes over buyer ratings (this ODR mechanism is no longer in operation). See Colin Rule and Chittu Nagarajan, “The Wisdom of Crowds: The eBay Community Court and the Future of Online Dispute Resolution”, *ACResolution* (Winter 2010), available at <<http://colinrule.com/writing/acr2010.pdf>> accessed 5 November 2021.

Kleros developers have explicitly referred to economic theories such as game theory when designing their dispute resolution mechanism.²⁰⁹ The main economic mechanism used currently is the Schelling Point (or focal point).²¹⁰ The Schelling Point is, in game theory, a solution to which the participants in a game who cannot communicate with each other will tend to adopt because they think that this solution presents a characteristic which will make the other participants choose it too. Under this theory, “if everyone expects everyone else to vote truthfully, then their incentive is to also vote truthfully in order to comply with the majority, and that’s the reason why one can expect others to vote truthfully in the first place”.²¹¹ Jurors of Kleros seek the “consensual truth about the dispute” (*i.e.*, the Schelling Point) in order to vote with the majority and get a remuneration.²¹² Just as Kleros, Aragon Court is designed as a consensus reaching mechanism relying on economic theories, such as game theory and the Schelling Point model. The designers of these BDRs clearly assume that the dispute resolution process is built primarily on economic incentive mechanisms that motivate jurors to anticipate what the decision of the majority of jurors will be and vote in favour of this decision.²¹³ This dispute resolution process is not surprising considering that blockchain technology is founded on consensus mechanisms allowing the shift of trust onto the architecture of the computer system itself.²¹⁴ Furthermore, the whole architecture of public blockchains is based on crypto-economic incentives, which encourage participants to co-operate and create the value that will ensure the success of the blockchain by giving them financial rewards. The dispute resolution processes of Kleros and Aragon Court seem therefore adapted to the particularities of the crypto environment and are likely to be accepted by on-chain actors.

Economic profit is directly linked to good reputation, as the more tokens jurors stake, the more the system assumes that they have the ability to judge with the majority and earn more tokens. The stakes of the jurors are an indication not only of their reputation, but also of their competence. In accordance with the principles of game theory applied in the dispute resolution mechanism, jurors’ competence is essentially measured by their ability to anticipate the decision that will be made by the majority of jurors. This capacity is economically encouraged by the system because the BDR mechanism has an interest in making consensus decisions. As the reputation of each juror increases, the reputation of the BDR mechanism also increases as consensus is more easily reached.²¹⁵ The more the reputation of the BDR mechanism increases, the more the value of the platform’s native tokens increases and the more the jurors will benefit economically from earning native tokens.²¹⁶ It is therefore not surprising that the behaviour of the jurors receives more attention from the designers of BDRs such as Kleros and Aragon Court than the behaviour of litigants.

²⁰⁹ About the game theory mechanisms used in such BDR, see Clément Lesaege, Federico Ast and William George, “Kleros – Short paper v. 1.0.7” (September 2019) <<https://kleros.io/whitepaper.pdf>> accessed 5 November 2021.

²¹⁰ Thomas C. Schelling, *The Strategy of Conflict* (2nd edn, Harvard University Press 1980), 57.

²¹¹ Aouidef, Ast and Deffains (n 202), 4.

²¹² Ast and Deffains (n 194), 249-251.

²¹³ See *e.g.*, Facu Spagnuolo, “Crypto-economics considerations” (*GitHub*, 21 November 2019) <<https://github.com/aragon/aragon-court/tree/v1.0.0/docs/3-cryptoeconomic-considerations>> accessed 5 November 2021.

²¹⁴ See *e.g.*, Riva (n 2), 603-605; De Filippi and Wright (n 13), 42-43.

²¹⁵ See Jack Gane, “Juror Pre-activation Guide” (*Aragon Org Blog*, 7 January 2020) <<https://aragon.org/blog/juror-pre-activation-guide>> accessed 5 November 2021. The link between participant reputation-staking and DAO valuation was highlighted by Kaal (n 19), 38-40.

²¹⁶ However, the more consensus there is between the jurors, the less each majority juror earns from the stakes of the minority jurors and the arbitration fees.

This reputational model diverges from that of traditional dispute resolution mechanisms. Many ODR providers have tried to address the risk of non-execution of their decisions by implementing social and economic incentives that favour voluntary compliance by the losing party as, contrary to BDRs, automatic execution is rarely available in ODRs.²¹⁷ Reputational risk has proven to be an effective means of addressing the lack of enforceability of the outcome of ODRs. However, in BDRs, reputational risk is found in the decision-making process, not in the enforcement of the decision. There is thus a transfer of reputational risk from the losing party (in ODRs) to the “losing” jurors (in BDRs). While jurors who rule in the majority gain a good reputation, this is not the case for those who have been outvoted. A minority juror therefore suffers both economically and in terms of reputation. In certain BDRs, the reputation of jurors is already factored into the selection process of potential jurors.²¹⁸

However, this does not mean that the reputation of the disputing parties is not likely to be tainted in proceedings submitted to BDR. For example, if the proposal containing the action being planned by a DAO is successfully challenged by one of its members in Aragon Court, the DAO suffers reputational damage because the jurors have recognised that it was planning a bad action. The reputation of the parties to a dispute is always, to some extent, subject to damage when the existence of the dispute is known, as will generally be the case in a dispute involving a DAO.

6.2 Disputes of a Contractual Nature

When a dispute related to the execution of a smart contract arises, the resolution of the dispute is entrusted to the BDR mechanism chosen by the parties in the smart contract. The third party appointed by the BDR mechanism, who is in charge of rendering a decision, must analyse the smart contract, the reason why it was not executed or improperly executed, and decide on the basis of its assessment of the facts and the evidence provided by the parties which party is right.

Kleros may be chosen by the parties to a smart contract to settle disputes arising from the non-execution or improper execution of the smart contract. When developing their smart contract, the parties must define and implement the dispute parameters which determine how and when a dispute resolution procedure can be initiated. Once a dispute occurs, the parties must determine the two options available for jurors to vote on (*e.g.*, [1] “A is right”, [2] “B is right”) and the behaviour of the smart contract after the resolution of the dispute for each possible option (*e.g.*, [1] “if A is right, then 10 ETH are transferred to A’s wallet”, [2] “if B is right, then 10 ETH are released”). When the dispute concerns the transfer of cryptocurrencies or other crypto assets, those assets must be placed by the parties within the power of the BDR mechanism. This is usually automatically done by the smart contract that defines their contractual relationship through a clause that works in a similar way as an escrow arrangement. When this is not the case, the parties must accept to transfer the disputed cryptocurrencies or crypto assets within the power of the BDR mechanism with a subsequent smart contract. This second option might be harder to achieve as it implies that both parties voluntarily subject themselves and the disputed assets to the power of the BDR mechanism after the dispute. Once the jurors are presented with the two options, they vote in favour of one of the options to resolve the case after having assessed the arguments and evidence submitted by

²¹⁷ See *supra* chapter 4.2.2.

²¹⁸ The arbitration fees in Aragon Court are proportional to the amount of reputation of the jurors; see Aragon White paper (n 204). OpenBazaar already uses a model to select “moderators” based on their reputation; see OpenBazaar, “Verified moderators” (*Medium*, 11 January 2018) <<https://medium.com/openbazaarproject/verified-moderators-c83ea2f2c7f3>> accessed 5 November 2021. The project Jur, which has not been launched yet, allows for jurors to be peer-reviewed, which leads to a ranking of jurors according to their reputation; see Jur, “Whitepaper” (version of July 2019) <<https://jur.io/wp-content/uploads/2019/05/jur-whitepaper-v.2.0.2.pdf>> accessed 5 November 2021. See already Kaal and Calcaterra (n 81), 150.

each of the parties. They vote *ex aequo et bono* on the basis of their technical knowledge and personal experience. The votes are not visible to the other jurors or to the parties so as to prevent one juror from being influenced by the vote of another. Parties can appeal an indefinite number of times, each new appeal instance having twice the previous number of jurors plus one and the arbitration fees increasing at each instance. When there are no more appeals, the decision is final and is directly and automatically enforced through the computer system.

The fact that the parties to the dispute are pseudonymous on-chain actors does not prevent the resolution of the dispute.²¹⁹ With Kleros, the parties must not be identified to either take part in the proceedings or enforce the decision. They must only sign the smart contract – which has a clause that grants the BDR mechanism jurisdiction over their contractual relationship – with their public key. This requirement is within the means of any DAO or person with a crypto wallet. As for the dispute resolution procedure and the enforcement of the decision, they are automatically initiated by the smart contract and Kleros.

Surprisingly, Kleros is not limited to disputes involving on-chain actors. This BDR is also positioned as an alternative to traditional ODRs whose methods are too slow or too expensive.²²⁰ Kleros offers its services to solve disputes arising between two off-chain actors in relation with the execution of a traditional contract when the parties seek a “fast, inexpensive, transparent, reliable [...] dispute resolution mechanism that renders ultimate judgments”.²²¹ For example, a dispute between a cruise company and a couple who had booked an all-inclusive river cruise has been solved by Kleros.²²² In this case, the jurors had to decide between awarding the couple 70% of the price of the cruise, which was the behaviour they sought in case they won, or awarding the couple a small payback and a voucher for a future cruise, which was the behaviour the cruise sought in case it won.

It should not be forgotten that the ability of BDRs to resolve disputes and to enforce the outcome is limited by technology. At this point, disputes that come to Kleros must be resolvable in a binary way so as to permit the automatic self-enforcement of the decision using a smart contract. In the river cruise case, the jurors had to choose between the offer submitted by each party to settle the dispute, and it is unclear whether the parties had placed cryptocurrencies within the power of the BDR mechanism in order for the decision to be automatically enforced, or if the decision had to be executed off-chain by the cruise company. In the latter case, the system’s automatic enforcement mechanism would not have been used and the parties would have missed out on the main benefit of resolving a dispute through BDR.²²³ The couple would have primarily relied on the voluntary execution of the decision by the cruise company, with a motivation based mainly on reputation. And if the risk of damage to the reputation would have not been enough to push the cruise company to comply with the decision, the couple would have had to seek the assistance of state authorities to obtain the enforcement of Kleros’s decision by force. However, it is more than uncertain whether a decision from Kleros can be recognised and enforced in a state jurisdiction.²²⁴

6.3 Disputes Related to the Governance of DAOs

²¹⁹ See *supra* chapter 5.3.

²²⁰ Aouidef, Ast and Deffains (n 202), 4.

²²¹ In the words of Lesaege, George and Ast (n 203), 1. About the use of Kleros to resolve traditional off-chain disputes, see Dmitry Narozhny, *Due Process in Kleros Consumer Dispute Resolution* (Kleros 2019) <<https://ipfs.kleros.io/ipfs/QmdH7vuFVATLqdsVWXBbq38fUX2jRp7tbiQ1MvBr8SDxBc>> accessed 5 November 2021.

²²² Case 541: <<https://resolve.kleros.io/cases/541>>.

²²³ See *supra* chapter 5.3.

²²⁴ See *infra* chapter 7.3.

Disputes related to the governance of a DAO usually concern decisions regarding the management and operations of the entity, such as allocation of resources, entry and exit of members, issuance of tokens, launch of a crowdfunding campaign, or ethical issues related to the governance. If a DAO and its members are bound to a BDR mechanism through an opt-in clause in the DAO's code, disputes related to the governance of the DAO are ruled by that BDR mechanism.²²⁵ As outlined in the Aragon White paper, "[e]ach Aragon organization [*i.e.*, DAO] exists as a set of smart contracts that define the organization's stakeholders and their associated rights and privileges. However, some rights and privileges require subjective constraints that cannot be encoded in a smart contract directly."²²⁶ It is to solve disputes arising in connection with this type of matter that the Aragon Court was launched.

Aragon Court uses crowdsourcing as a part of the dispute resolution process and follows a procedure that has several similarities with that of Kleros, even if the two procedures are not fully identical. In Aragon Court, the jurors are asked to either block a proposal from being voted on by the community, or to let it go through. The jurors get access to a description of the claim and evidence provided by each party to determine whether the proposal is in line with the DAO's bylaws, goals or ethical values. The final ruling is automatically executed by definitively blocking the disputed proposal or letting it be voted on, and by distributing the rewards and penalties to the jurors.

To illustrate Aragon Court's procedure, let's take as an example the case where a group of members in a DAO submit a proposal to the DAO regarding the launch of a crowdfunding campaign. A DAO member who believes that the action being proposed is not in line with the DAO's goals or values and fears that the proposal will gather enough votes to pass, may block the proposal from being voted on by bringing a dispute to Aragon Court. Selected Aragon Court jurors must choose between two options ([1] "allow the proposal regarding the crowdfunding campaign to be voted on", [2] "block the proposal regarding the crowdfunding campaign to be voted on"). The option which gets the majority of votes is directly and automatically executed through the smart contract.

The enforcement of the jury's decision is only possible if the DAO's code allows the decision to be self-enforced, which implies a technological connection between the DAO and Aragon Court. In other words, the dispute resolution mechanism can only be effective if the enforcement of the outcome is within technical reach of the court. In order to block a proposal before Aragon Court, the DAO must be under its jurisdiction. The code of all DAOs constituted on the Aragon platform automatically refer to Aragon Court for the resolution of disputes arising among the members of the DAO or between the DAO and its members. Other DAOs that run on the Ethereum blockchain can also refer to Aragon Court by implementing a connection in their code. This connection is necessary as Aragon Court does not have the technical power to enforce its decisions on DAOs that are outside its network. When the disputed proposal concerns the management or operation of a DAO that was not constituted on the Aragon platform or to which no connection was made to Aragon Court in its code, a decision of Aragon Court could not technically be directly and automatically enforced. If Aragon Court is not given the power to block or unblock the disputed proposal, it has *de facto* no power to rule on the dispute.

While it is unequivocal that maverick DAOs can subject disputes related to their governance to BDR, it remains to be determined whether regulated DAOs – which are DAOs that have a corporate body –²²⁷ can subject that kind of dispute to the jurisdiction of a BDR mechanism such as Aragon Court. The particularity of disputes related to the governance of a regulated DAO is that they can relate either

²²⁵ See *supra* chapter 5.4.

²²⁶ See *supra* n 204.

²²⁷ See *supra* chapter 2.3.2.

to the management and governance rules of the DAO set out in its code, or to those set out in the corporate law of the state in which the regulated DAO is incorporated (*i.e.*, its *lex societatis*).

When the dispute concerns a governance rule embodied in the code of the regulated DAO and governing the DAO as such, the dispute is best dealt with by an Aragon Court-type BDR mechanism. In this case, the jurisdiction of the BDR mechanism is in principle based on the opt-in clause in the regulated DAO's code,²²⁸ or, in the case of regulated DAOs created on Aragon's platform, dispute resolution through Aragon Court is an integral part of the DAO's code. The disputing parties can take advantage of the power of the BDR mechanism to enforce the decision directly and automatically.

On the other hand, when the dispute concerns a rule found in the corporate law of the state in which the DAO is incorporated, these rules apply primarily to the corporate body of the DAO (*e.g.*, a Vermont BLLC). Such a dispute falls within the jurisdiction of the authorities of the state in which the DAO was incorporated, whose jurisdiction may be based, in this case, on the seat of the company or possibly a choice of court clause in the bylaws or articles of association of the regulated DAO. The power to enforce a decision on the corporate body of the DAO (*i.e.*, in principle the registered agent of the regulated DAO) is solely in the hands of the state authorities of the place of incorporation of the regulated DAO.²²⁹ A BDR mechanism would not have the technical means to enforce a decision on such matters.

7. What is Effective and Fair Justice in the Crypto Economy?

The last chapters have shown us not only that the crypto environment has developed an economic ecosystem in which DAOs play a central role, but also that it has yielded dispute resolution mechanisms that can resolve a vast array of disputes – from contractual relationships to governance disagreements within DAOs – and are capable of self-enforcing the decisions they render through technology. But in order to be seen as legitimate authorities by the users who are submitted to their decision-making power, BDRs need to be trustworthy institutions of the blockchain environment. This can only be achieved if they can provide effective and fair justice.

BDRs that incorporate an enforcement mechanism provide effective access to justice, in the sense that actors of the crypto economy can choose to resolve their conflicts with a dispute resolution mechanism which allows them to obtain a decision and to execute this decision (7.1). As a private justice system, BDR must be able to inspire confidence by producing decisions that are fair. Otherwise, it will not be chosen by the disputants. In other words, the legitimacy of BDR rests in its ability to deliver fair justice (7.2). While BDRs render “fair and just” decisions with regard to the crypto-economic context, it is doubtful that their decisions can be considered fair in the legal sense of the term. This is a major impediment to the possible off-chain enforcement of BDR decisions (7.3).

7.1 Providing Effective Justice

We have seen that ODRs have been used to resolve disputes resulting from online transactions.²³⁰ These private justice systems are often the only practical means of asserting a claim resulting from an online transaction, for example in e-commerce. By providing a simple, fast and cheap way to resolve small-claim disputes, ODRs offer access to justice when the traditional state justice system is unable to deal with disputes because of the cost of legal proceedings – especially in an international context – and the huge number of disputes. Access to justice is the strongest benefit of ODRs.²³¹ On the other hand, the greatest

²²⁸ See *supra* chapter 5.4.

²²⁹ See *supra* chapter 3.2.2.

²³⁰ See *supra* chapter 4.

²³¹ Same opinion: LoebI (n 168), 16.

drawback of the majority of ODRs is their inability to render decisions that can be enforced by state authorities or, failing that, are self-enforceable. An ODR mechanism that does not produce an enforceable outcome cannot provide effective access to justice.²³² The right to access to justice as stated in Article 6 para. 1 of the European Convention on Human Rights (ECHR) also encompasses the right to obtain the execution of judicial decisions.²³³ The same applies to ODRs: effective access to justice implies that the outcome of ODR shall be enforceable. This is a central element for a justice system to inspire the confidence of its users.²³⁴ E-commerce has shown that the ability of the justice system to inspire user confidence affects the entire environment it regulates.²³⁵ When stakeholders have access to a trustworthy justice system, it strengthens their confidence in the business environment and benefits its development.

The experience with e-commerce can serve as a model for the crypto economy. If it truly wants to become a trustworthy business environment that fosters international transactions, the blockchain environment must incorporate a justice system that inspires user confidence. Granting effective access to justice to DAOs and other on-chain actors wishing to remain pseudonymous is essential to the future development of the crypto economy. To achieve this objective, BDRs must be able not only to render decisions, but also to enforce their own decisions. We have seen that BDRs have the power to directly and automatically enforce their own decisions on the blockchain through the use of smart contracts.²³⁶ As the immutability of the system makes it impossible to rely on the intervention of outside actors or state enforcement authorities to execute by force a blockchain operation, the ability of BDR to be self-reliant in the enforcement of its own decisions is crucial. This capacity offers a significant improvement over ODRs that do not use blockchain technology.

We have highlighted above²³⁷ the four major issues arising in connection with disputes involving DAOs and preventing them from being resolved in state courts, which are the following: First, the localisation of operations that take place only on-chain within the borders of a specific state by using a connecting factor is most of the time impossible. Second, an entity without legal capacity cannot sue or be sued in its own name. Third, a lawsuit cannot be filed against a person whose identity and address is unknown. Fourth, enforcement of a decision by force, when the losing party does not comply voluntarily, is virtually impossible when enforcement involves the transfer of cryptocurrencies and other crypto assets or the performance of any other action on the blockchain. These four elements do not pose any particular problem when a dispute of a contractual nature involving a DAO or related to the governance of a DAO is resolved through BDR.²³⁸ The role of BDRs is crucial for the balance of the crypto economy as they allow for the resolution of disputes that could not be effectively resolved by state courts. When on-chain actors are involved in relationships on the blockchain, BDRs prevent them from being denied justice. BDRs are therefore of paramount importance, considering that most of the activity in the crypto environment involves on-chain actors, such as maverick DAOs, who do not have access to justice outside of the

²³² See *e.g.*, Ruha Devanesan and Jeffrey Aresty, “ODR and Justice – An evaluation of Online Dispute Resolution’s Interplay with Traditional Theories of Justice”, in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds), *Online Dispute Resolution: Theory and Practice* (eleven 2012), 251, 269.

²³³ European Court of Human Rights, “Guide on Article 6 of the European Convention on Human Rights” (30 April 2021), para. 187, available at <https://www.echr.coe.int/documents/guide_art_6_eng.pdf> accessed 5 November 2021.

²³⁴ Same opinion: Koulu (n 168), 8; Loebel (n 168), 21.

²³⁵ See Katsh and Rabinovich-Einy (n 159), 73-75.

²³⁶ See *supra* chapter 5.3.

²³⁷ See *supra* chapter 3.

²³⁸ See *supra* chapter 6.

blockchain. BDRs give the necessary stability to the crypto economy by bringing the hand of justice into this global business environment.

In comparison with state justice systems, the main drawback of BDRs is that they do not provide predictability as to the outcome of a dispute since jurors do not refer to a defined framework of rules or norms to make a decision, nor is the dispute resolution system based on precedent. The same situation can thus be solved differently depending on internal fairness considerations of each juror.²³⁹ At present stage of development, BDRs do not provide the same level of certainty as state courts, which apply the rules of law. As a result, on-chain dispute resolution systems are not yet able to reduce the risk of litigation, which means that the costs associated with the risk of litigation must be taken into account when parties enter into a contractual relationship using a smart contract of a certain complexity that falls under the jurisdiction of a BDR mechanism. If BDRs are to be viable in the long term, they must find a configuration that ensures a certain level of predictability and therefore certainty in their decisions. Only then will they be a realistic option to overcome the legal uncertainty related to state justice, associated in particular to the difficulty to locate relationships performed on the blockchain. That said, it must also be recognised that if a dispute involving a DAO were to be submitted to the jurisdiction of state courts, it is very likely that the solution on the merits would differ from one state to another. The legal rules applicable to blockchain transactions are indeed still very disparate.²⁴⁰ Legal diversity also brings legal uncertainty, maybe even more than a binary justice system where jurors must choose between two given solutions.

The main challenge for BDRs in providing effective justice is to find a way to resolve all types of disputes that might involve DAOs and to be able to enforce all their decisions. In their current state of development, an opt-in clause, encoded in one of the smart contracts governing the relationship between the parties, is necessary to subject disputes to the jurisdiction of a BDR mechanism.²⁴¹ If we get out of the contractual field or the governance of DAOs and venture into tort cases, an opt-in BDR is of no use as it would have no means to enforce a decision except if the defendant accepts to put assets within the power of the BDR mechanism.

In The DAO case, for example, BDR could have been used to settle the dispute among the members of The DAO who wanted to prove the hacker right, and those who wanted to undo the effects of the hacking.²⁴² At that time, there was no BDR mechanism in operation and the dispute could only be resolved at the level of the underlying blockchain (*i.e.*, Ethereum). Since a great amount of circulating ethers were invested in The DAO, confidence in the network was greatly diminished. The hack was affecting the very existence of the Ethereum blockchain. This pushed a majority of members of the Ethereum community to agree to a hard fork²⁴³ to reverse the hacker's misappropriation of The DAO's funds, which was very controversial. But a minority of members believed that the state of the blockchain should not be altered because blockchains are supposed to be immutable, and they considered that the hacker had simply used the code to its advantage. The dispute between both sides resulted in two Ethereum blockchains being maintained: Ethereum classic, where the hacker's transactions were upheld,

²³⁹ Buchwald (n 202), 1407.

²⁴⁰ See Matthias Lehmann, "National Blockchain Laws as a Threat to Capital Markets Integration" (2021) 26 Uniform Law Review 148, for an analysis of French, English and American blockchain legislations.

²⁴¹ See *supra* chapter 5.4.

²⁴² See *supra* chapter 2.1.

²⁴³ See Koulu and Markkanen (n 81), 390-393; Werbach and Cornell (n 82), 351. For more information on soft and hard forks, see *e.g.*, "Soft fork vs. hard fork: Differences explained" (*Cointelegraph*) <<https://cointelegraph.com/blockchain-for-beginners/soft-fork-vs-hard-fork-differences-explained>> accessed 5 November 2021.

and Ethereum, where the hacker's transactions were deregistered. While both blockchains are functioning to date and both of their cryptocurrencies hold market value, a majority of the nodes have only been maintaining the Ethereum blockchain and have left Ethereum classic. This case shows that blockchains themselves can also be subject to disputes, just like any decentralised entity.²⁴⁴ The community of a blockchain can disagree on what the state of the ledger should be. In The DAO case, the Ethereum community made the decision to modify the blockchain protocol to regulate the activities taking place on the network by invoking social norms.²⁴⁵ This highlights the power of the community to exert direct influence on the state of the blockchain.

Even if a BDR mechanism had existed at the time of The DAO case, the solution would not necessarily have been different. The only way resorting to BDR would have been useful for the members of The DAO who had their investment defrauded is if the hacker had agreed to place the stolen ethers under the jurisdiction of the BDR mechanism, which is highly unlikely. Otherwise, the BDR mechanism's decision would have been only symbolic and effective justice could not have been provided. However, in such disputes involving a tort, other mechanisms could be imaged to allow BDRs to indirectly enforce their decisions without having power over the disputed cryptocurrencies or crypto assets. For example, a BDR mechanism could allow the victim of a wrongful act on the blockchain (*e.g.*, a hack) to unilaterally seize its court. The claim would be made public and the BDR mechanism would invite the perpetrator to defend itself. In the event that a decision finding the perpetrator guilty is rendered and the perpetrator refuses to compensate the victim for the damage, the BDR mechanism could place the perpetrator (*i.e.*, the wallet address where the disputed crypto assets are located) on a blacklist. The legitimacy of such a decision would likely be recognised by the entire community because a decision rendered by BDR is one rendered by a jury of peers representing the community. The enforcement of the decision of the BDR mechanism would be indirectly performed by the actors of the crypto economy who refuse to enter into business relations with a blacklisted user. Compliance with social norms would thus be the basis for the enforcement of the BDR decision by each member of the community. The role of a BDR mechanism as a court could even be pushed to the next level: instead of being an opt-in dispute resolution mechanism, a BDR mechanism could be implemented into a blockchain's core protocol so that it would be granted jurisdiction over all transactions within this blockchain.

7.2 Providing a Fair Resolution of Disputes

BDRs make the most of blockchain technology by producing outcomes that are directly and automatically enforceable by the computer system. But this is not enough to bring truly effective justice in the crypto economy. In order to acquire legitimacy, a BDR mechanism must inspire confidence from the actors of the blockchain ecosystem in its dispute resolution mechanism. This confidence in the justice system is crucial for building trust in the blockchain-based economic environment. Confidence in a BDR mechanism – and thus its legitimacy – is associated with its ability to render fair decisions. But are BDR decisions fair? It is not possible to answer this question in a binary way by choosing between the option “the decisions of a BDR mechanism are fair” and the option “the decisions of a BDR mechanism are not fair”. The answer depends not only on each case examined, but especially on the respondent's frame of reference. The resolution of a dispute can be fair without being legally fair. A conflict resolution system must be configured to match the expectations of its users. While a state justice system is expected to be fair in the legal sense (7.2.1), a private justice system may depart from this model to fit the socio-economic environment it is called upon to regulate (7.2.2).

7.2.1 Fair Justice in the Legal Sense

²⁴⁴ Some blockchains, such as Bitcoin and Ethereum, can be characterised as DAOs. See *supra* n 17.

²⁴⁵ De Filippi and Wright (n 13), 188-189.

So, are BDR decisions fair? A lawyer would likely answer “no”. BDR jurors are anonymous and buy their way into office. As such, they have a direct economic interest in the outcome, which leads them to disregard the solution that seems fair based on an assessment of the facts and an application of the law, and to opt instead for the decision that is most likely to be chosen by the other jurors. In those conditions where economic interests are prominent, a BDR decision cannot be fair in the legal sense of the term. This type of decision offends the sense of justice as defined in legal instruments aimed at protecting the fundamental procedural rights of the parties to a proceeding. It is universally accepted that every person has the right to have its case heard by a competent, independent, and impartial tribunal as defined under Article 6 para. 1 of the ECHR, Article 14 para. 1 of the International Covenant on Civil and Political Rights (ICCPR), and Articles 8 and 10 of the Universal Declaration of Human Rights (UDHR).

The obligation of ODRs to respect fundamental procedural rights has been recalled on several occasions at the supra-national level.²⁴⁶ In its Technical Notes on Online Dispute Resolution, UNCITRAL made it clear how important it is that ODRs respect the “principles of impartiality, independence, efficiency, effectiveness, due process, fairness, accountability and transparency”.²⁴⁷ The United Nations Conference on Trade and Development (UNCTAD) referred to the same basic quality criteria for the evaluation of ODRs dealing with e-commerce disputes.²⁴⁸ This reflects the concern of the international community that ODRs provide a justice system that guarantees respect for fundamental rights even if they are not part of the state justice system. Among legal scholars, there is a consensus that procedural minimum standards must be applicable to ODRs, even in the absence of unified rules of procedure adopted at a supra-state level.²⁴⁹ Justice achieved through an ODR mechanism can only be effective if procedural minimum standards are respected. ODRs are encouraged to spontaneously comply with minimum standards as to the technological and legal requirements, since there is no global supra-state body with the necessary authority to verify their effective compliance.²⁵⁰

²⁴⁶ See e.g., Organization for Economic Cooperation and Development (OECD), “The Economic and Social Role of Internet Intermediaries”, April 2010 <<https://www.oecd.org/internet/ieconomy/44949023.pdf>> accessed 5 November 2021. In the EU, see e.g., Council of Europe, Recommendation CM/Rec(2018)2 of the Committee of Ministers to Member States on the roles and responsibilities of internet intermediaries, 7 March 2018; European Parliament, Digital Services Act: Opportunities and Challenges for the Digital Single Market and Consumer Protection, Collection of Studies for the IMCO Committee, June 2020 <[https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/652712/IPOL_BRI\(2020\)652712_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/652712/IPOL_BRI(2020)652712_EN.pdf)> accessed 5 November 2021.

²⁴⁷ UNCITRAL (n 183), para. 4.

²⁴⁸ UNCTAD, “Dispute resolution and redress”, 30 April 2018, TD/B/C.I/CPLP/11, para. 43.

²⁴⁹ See e.g., Loebel (n 168); Richard Susskind, *Online Courts and the Future of Justice* (Oxford University Press 2019); Wang (n 161); Leah Wing, “Ethical Principles for Online Dispute Resolution – A GPS Device for the Field” (2016) 3 *International Journal on Online Dispute Resolution* 1; Devanesan and Aresty (n 232), 263-292; Lodder and Zeleznikow (n 188), 18-38; Kaufmann-Kohler and Schultz (n 156), 108-119.

²⁵⁰ However, there is an accreditation system for ODR providers in the EU under which they must comply with minimum standards. See Directive 2013/11/EU of the European Parliament and of the Council of 21 May 2013 on alternative dispute resolution for consumer disputes and amending Regulation (EC) N 2006/2004 and Directive 2009/22/EC (Directive on Consumer ADR), [2013] OJ L 165/63, and Regulation (EU) N 524/2013 of the European Parliament and of the Council of 21 May 2013 on online dispute resolution for consumer disputes and amending Regulation (EC) N 2006/2004 and Directive 2009/22/EC (Regulation on Consumer ODR), [2013] OJ L 165/1.

In this legal conception of the fairness of justice, decisions rendered by the BDRs that have been examined (*i.e.*, Kleros and Aragon Court) cannot be qualified as fair.²⁵¹ While it could be argued that those mechanisms respect due process to some degree because the parties can submit evidence, and that the jury is independent because each juror is chosen randomly,²⁵² the fact remains that jurors have an economic interest that is linked to the chosen solution, which pushes for the popular solution to be chosen rather than the fair one. That being said, major ODRs such as eBay's Money Back Guarantee depart much further from the fundamental rights mentioned above and the concept of fair justice in the legal sense. In eBay's model, the e-commerce platform has a corporate interest in the resolution of the conflict, which may skew its decisions. Some sellers have expressed their concern that eBay is the judge, the jury, and the executioner²⁵³ and some others have reported that chargebacks have been unfairly executed to please the buyers.²⁵⁴ It appears that eBay's ODR unfairly favours the buyer and does not provide the seller with sufficient recourse options.

7.2.2 Fair Justice in the Crypto-economic Sense

Economists, as well as actors of the crypto economy, will not necessarily refer to the legal sense of fair justice to assess the quality of decisions made by BDR. Lodder and Zeleznikow noted that an ODR mechanism which uses game-theoretic techniques to resolve a dispute is "fair in the sense that each disputant's desire is equally met. [It does] not, however, meet concerns about justice."²⁵⁵ These authors highlighted that an ODR mechanism which uses principles of game theory for resolving disputes has the advantage of avoiding the parties negotiating "in the shadow of the law"²⁵⁶, which means taking into account what would be possible to obtain in a judicial proceeding.²⁵⁷ In BDR, the rules of the code prevail over the rules of law. This makes it possible to dispense with the concept of "legally just and fair" in favour of the concept of "just and fair" by avoiding, in particular, a juror being seen as biased by the solution that is legally valid.²⁵⁸ Richard Susskind has come to the same conclusion by considering that the decision of an ODR mechanism must above all "reflect a popular sense of right and wrong".²⁵⁹ The defendant's right

²⁵¹ See Robert J. Condlin, "Online Dispute Resolution: Stinky, Repugnant, or Drab" (2017) 18 *Cardozo Journal of Conflict Resolution* 717, 758. Other opinion: Daniel Dimov, "Crowdsourced Online Dispute Resolution" (thesis University of Leiden 2017), available at <<https://ssrn.com/abstract=3003815>> accessed 5 November 2021, who proposes a model of ODR procedure that complies with the procedural minimum standards. Kleros claims using a procedure consistent with this interpretation; see Ast and Deffains (n 194), 252-254.

²⁵² See *supra* chapter 6.

²⁵³ See "since when is ebay judge & jury?" (*eBay Community*, 30 December 2015) <<https://community.ebay.com/t5/Archive-My-Account-Q-A/since-when-is-ebay-judge-amp-jury/qaq-p/24967062>> accessed 5 November 2021.

²⁵⁴ See "eBay sellers can no longer use PayPal under new terms" (*BBC News*, 1 June 2021) <<https://www.bbc.com/news/technology-57318294>> accessed 5 November 2021.

²⁵⁵ Lodder and Zeleznikow (n 188), 91.

²⁵⁶ In the words of Robert H. Mnookin and Lewis Kornhauser, "Bargaining in the Shadow of the Law: The Case of Divorce" (1979) 88 *The Yale Law Journal* 950. In ADR proceeding, the parties usually bargain "in the shadow of the law", meaning that they do not apply the rules of law but are aware of their existence and their potential application.

²⁵⁷ Lodder and Zeleznikow (n 188), 165-166.

²⁵⁸ Buchwald (n 202), 1404-1408, has pointed out how problematic the lack of reference to a legal framework is in the long term.

²⁵⁹ Susskind (n 249), 76.

to a fair trial could thus be guaranteed in ODR and BDR proceedings without necessarily complying with the wording of Article 6 para. 1 ECHR, Article 14 para. 1 ICCPR, and Articles 8 and 10 UDHR.²⁶⁰

Some authors have highlighted the fact that the particularities of the socio-economic environment of the Internet need to be considered to assess the concept of justice for online transactions.²⁶¹ A system of justice must above all be perceived as fair by the community using it. In other words, the expectations of the actors of the blockchain community are important to assess the fairness of the justice rendered by BDR.²⁶² Blockchain users think that this technology, which is fundamentally based on the use of cryptographic protocols and economic incentives, has the capacity to maintain confidence in social and economic relations.²⁶³ It is therefore not surprising that a BDR mechanism should offer a conflict resolution mechanism based solely on “strict economic incentives achieved through mechanism design” and that jurors are expected to act honestly because “it is in their rational interest to act in such a way in order to optimise their economic gain”.²⁶⁴ In such a system of “decentralized justice”²⁶⁵, where fairness in the decision-making process is achieved primarily through the use of crypto-economic mechanisms, it is clear that the notion of fair justice departs from that which prevails in state justice, where the focus is to protect the fundamental procedural rights of parties. The dispute resolution mechanisms used by Kleros and Aragon are indicative of a new approach to dispute resolution, devised by computer scientists and economists, in which the rules of law are replaced by the rules of the market, including reputation, speculative predictions, profit-seeking and trust.²⁶⁶ This approach is consistent with the ideology behind the creation of a crypto economy independent of any state influence, in the sense that the law of the states should (or could) not apply in this “anational” environment.²⁶⁷ De Filippi and Wright noted in this regard that “[a]s a general rule, because of their decentralized and transnational nature, blockchain-based systems exhibit a degree of *alegality*”.²⁶⁸

Actors of the blockchain must have confidence in the dispute resolution mechanism for it to acquire legitimacy. Confidence in the dispute resolution mechanism is paramount in a private justice

²⁶⁰ See Willemien Netjes and Arno R. Lodder, “e-Court – Dutch Alternative Online Resolution of Debt Collection Claims. A Violation of the Law or Blessing in Disguise?” (2019) 6 International Journal of Online Dispute Resolution 96.

²⁶¹ See *e.g.*, Katsh and Rabinovich-Einy (n 159), 164-165.

²⁶² Same opinion: Koulu and Markkanen (n 81), 397-399.

²⁶³ See Vitalik Buterin, “On Public and Private Blockchains” (*Ethereum blog*, 7 August 2015) <<https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/>> accessed 5 November 2021. See also Jack Parkin, *Money Code Space – Hidden Power in Bitcoin, Blockchain, and Decentralisation* (Oxford University Press 2020), 20-23.

²⁶⁴ Ast and Deffains (n 194), 249-250.

²⁶⁵ The term “decentralized justice” is borrowed from Kleros, *Dispute Revolution – The Kleros Handbook of Decentralized Justice* (Kleros 2020), available at <<https://kleros.io/book.pdf>> accessed 5 November 2021.

²⁶⁶ For a critical approach, see Matthew Dylag and Harrison Smith, “From cryptocurrencies to cryptocourts: blockchain and the financialization of dispute resolution platforms” (*Taylor & Francis Online*, 23 June 2021) <<https://www.tandfonline.com/doi/full/10.1080/1369118X.2021.1942958>> accessed 5 November 2021. For a global analysis of the legal challenges related to regulation by blockchain technology, see Paolo Tasca and Riccardo Piselli, “The Blockchain Paradox”, in Philipp Hacker and others (eds), *Regulating Blockchain – Techno-Social and Legal Challenges* (2019 Oxford University Press), 27; Primavera De Filippi and Samer Hassan, “Blockchain technology as a regulatory technology: From code is law to law is code” (*First Monday*, 5 December 2016) <<https://firstmonday.org/ojs/index.php/fm/article/view/7113/5657>> accessed 5 November 2021.

²⁶⁷ Guillaume (n 1), 183-184.

²⁶⁸ De Filippi and Wright (n 13), 44.

system that derives its legitimacy from the parties' choice to submit their dispute to its jurisdiction. As a private justice system, a BDR mechanism must be tailored to the expectations of the disputants in order for them to choose it. In relation with Kleros, it was noted that "[a]t the heart of dispute resolution lies the concept of legitimacy, which is ultimately premised on trust (trust in the system, trust in the process and trust in its fairness) and therefore a willingness to abide by outcomes."²⁶⁹ Confidence is brought by fair decisions. This requires, among other things, that disputants feel that the decision-making process gives them the opportunity to make their case. The right to be heard is indeed essential to satisfy the subjective sense of justice.²⁷⁰

With the exception of classic arbitration, private justice systems do not need to respect fundamental rights of the parties as a state court does. But the higher the stakes of the disputes submitted to BDR, the more the dispute resolution mechanism should take into account moral, social and political norms.²⁷¹ If a BDR mechanism is chosen to resolve disputes that affect people's lives as individuals, the decisions it renders could have a much more profound impact than minor disputes arising from a simple contractual relationship, which can only lead to economic effects of marginal significance. The expectations of the parties as to the fairness of the decision are higher in this type of case. This is the reason why the justice system defined by the BDR mechanism's code must then be "reasonable, caring and fair"²⁷² in order to produce decisions that are just and fair.²⁷³ As Lessig has demonstrated, the code can reflect such values since it is not value neutral.²⁷⁴ However, as long as the complexities of judicial procedures cannot be reduced to a set of mathematical axioms, the decision-making process of a BDR mechanism will not be as fair in the legal sense as decisions from traditional courts.²⁷⁵ In reality, disputes that can be resolved by a binary "if/then" equation are a very small part of commercial and private life.

The model followed by existing BDRs is a departure from the jury model used in state courts and is closer to the arbitral tribunal model. In the dispute resolution model adopted by Kleros and Aragon Court, jurors are anonymous (or pseudonymous), and cannot communicate with each other, which has the effect that each juror makes an individual decision without consulting the other jurors. The decision resulting from this process is a popular decision that reflects a form of consensus because it corresponds to a universality of opinions for the purpose of reaching the wisdom of the crowd. However, one can wonder whether a sum of individual decisions rather than a collective opinion can lead to a just and fair decision. Especially considering that jurors are driven by economic incentives not to decide according to what they think is the right answer but what they think the popular opinion will be. Furthermore, the jury

²⁶⁹ Ast and Deffains (n 194), 243.

²⁷⁰ See Koulu and Markkanen (n 81), 398; Fahimeh Abedi, John Zeleznikow and Emilia Bellucci, "Universal standards for the concept of trust in online dispute resolution systems in e-commerce disputes" (2019) 27 International Journal of Law and Information Technology 209, 226; Anjanette H. Raymond and Scott Shackelford, "Technology, Ethics, and Access to Justice: Should an Algorithm be Deciding Your Case?" (2014) 35 Michigan Journal of International Law 485, 516-519; Rebecca Hollander-Blumoff and Tom R. Tyler, "Procedural Justice and the Rule of Law: Fostering Legitimacy in Alternative Dispute Resolution" (2011) Journal of Dispute Resolution, available at <<https://scholarship.law.missouri.edu/cgi/viewcontent.cgi?article=1612&context=jdr>> accessed 5 November 2021.

²⁷¹ About the consideration of moral, social and political norms in the dispute resolution system, see Condlin (n 251), 733-734.

²⁷² Condlin (n 251), 734.

²⁷³ However, the rules incorporated in the code of a smart contract are not (yet) able to achieve this goal because they are less flexible than the rules of law. Several authors speak in this respect of the "tyranny of code". See Perritt (n 136), 225; De Filippi and Wright (n 13), 205-210.

²⁷⁴ Lawrence Lessig, *Code. Version 2.0* (Basic Books 2006), 124-125.

²⁷⁵ Same opinion: Dylag and Smith (n 266); Buchwald (n 202).

is often composed of too few people to be considered representative of the community. This is compounded by the fact that, unlike arbitrators, jurors are not selected primarily on the basis of their qualifications but on their economic contribution in the system, creating a significant risk that the power of justice will be in the hands of a very small number of community members who also hold the financial power.²⁷⁶ The crypto-economic model adopted by existing BDRs still needs to be improved in order to be sufficiently just and fair to be entrusted with resolving disputes that are not entirely economic in nature but may impact individuals' personhood.

7.3 Issue of the Off-chain Effect of a BDR Decision

From the point of view of economists and computer scientists, BDR is able to guarantee effective and fair access to justice without necessarily complying with minimum procedural guarantees as high as those required from state courts in the vast majority of countries. The dispute resolution mechanisms implemented in the two BDRs we studied provide effective justice not only by producing decisions that are directly and automatically executed by the system, but are also viewed as fair by the actors of the crypto economy. They have the double benefit of matching the expectations and needs of the actors of the crypto economy and of being adapted to the particularities of the crypto-economic system. They are therefore likely to inspire user confidence and to be accepted by the actors of the crypto economy.²⁷⁷ We are thus in the presence of an actual justice system specific to the crypto economy which is independent and autonomous from the states.

While a key element of any justice system is its ability to enforce the decisions it produces, we have seen that the dispute resolution system implemented by BDRs, such as Kleros and Aragon Court, is limited in scope to cryptocurrencies and other crypto assets, as well as actions that can be put within their power by means of a smart contract (the so-called "statutory deposit").²⁷⁸ However, a dispute involving a DAO may also concern non-crypto assets or actions that need to be performed outside the blockchain. In this case, the decision arising from a BDR mechanism cannot be directly and automatically executed through a smart contract. Therefore, the intervention of state authorities may be required to enforce the decision in the physical world. This raises the question of recognition and enforcement of a decision arising from a BDR mechanism in a state jurisdiction for its execution on non-crypto assets with the assistance of state authorities. Such an operation is only possible if the legitimacy of the dispute resolution mechanism offered by BDR is recognised by the states. If this is not the case, the effectiveness of the BDR justice system would be limited to the crypto environment.

Should a BDR decision be enforced off-chain, respect for the procedural fundamental rights of the parties will in principle be verified at the time of enforcement by state authorities. Enforcement outside the blockchain environment (*e.g.*, execution on non-crypto valuable resources) will not be possible if the decision cannot be qualified as fair in the legal sense. Indeed, the decision will not be recognised and enforced by state authorities if it is manifestly incompatible with the public policy of the requested state. The concept of *ordre public* aims to protect in particular the fundamental principles of procedural fairness. This could be an issue when a decision made by a BDR mechanism cannot be executed entirely on-chain and has to be executed in part or entirely off-chain.

²⁷⁶ See also Dylag and Smith (n 266), who state that the administration of justice is placed in the hands of a "technocratic elite."

²⁷⁷ See World Economic Forum (WEF), "Bridging the Governance Gap: Dispute Resolution for Blockchain-Based Transactions", 16 December 2020, 6 <<https://www.weforum.org/whitepapers/93bd1530-0ded-48fa-8dee-e9b2d109d84d>> accessed 5 November 2021.

²⁷⁸ See *supra* chapter 5.3.

The ability to enforce off-chain a decision rendered by a BDR mechanism depends on the rules that are applicable in the state in which enforcement is being sought. The authors are not aware of any decisions made by Kleros or Aragon Court that have already been enforced as such by state authorities. It is interesting to examine in this respect two different situations: first, the application of the New York Convention (7.3.1) and second, the application of a PIL convention allowing the recognition or enforcement of a foreign judgment (7.3.2).

7.3.1 Off-chain Enforceability of a BDR Decision as an Arbitral Award?

In the opinion of the authors, the decisions of the BDRs that have been studied in this article are made in the context of non-binding arbitration proceedings.²⁷⁹ This follows, among other things, from the fact that a BDR decision is, by definition, not made in the territory of a state. The decentralisation characteristic of this private justice system means that there is no seat of arbitration.²⁸⁰ It is therefore not possible to formally attribute the enforceability or *res judicata* effect of a BDR decision to the law of a state. As such, the decisions made by those BDRs are not enforceable by state authorities in the same manner as judgments rendered by state courts as opposed to arbitral awards rendered in classic arbitration.

The term “BDR” as defined by the authors²⁸¹ only covers dispute resolution mechanisms that exclusively use blockchain technology to provide and enforce decisions. BDRs offer an on-chain-only dispute resolution mechanism. ODRs that offer the services of arbitrators who render arbitral awards using blockchain technology is outside the research field of this paper. When an arbitrator issues an arbitral award by somehow using the services of a blockchain-based ODR mechanism, it is quite conceivable that the ensuing arbitral award can be enforced under the New York Convention. For example, when an arbitrator acts as an interface between a BDR mechanism (*e.g.*, Kleros) and a state jurisdiction, the BDR decision can be transcribed into an arbitral award that meets the requirements of formal and substantive validity in order to be recognised and enforced by state authorities. This situation arose in a case where the parties to a real estate leasing agreement over a property located in the state of Jalisco, Mexico, agreed to have a sole arbitrator resolve their dispute in connection with that agreement using Kleros to render the decision. The arbitrator instrumented the proceedings, submitted the case to Kleros and “formalised” Kleros’s decision (rendered unanimously by three anonymous jurors on 23 November 2020) by transcribing it into an arbitral award that met the formal and substantive validity requirements of the state of Jalisco. The arbitral award was subsequently enforced by the Mexican authorities. However, the application of the New York Convention was not needed in this particular case, as it was a domestic arbitration governed by Mexican procedural law.²⁸² This very unusual situation (for the time being) is beyond the scope of this study because Kleros was used as a mere tool in the decision-making process of an arbitrator acting in the context of arbitral proceedings.

²⁷⁹ See *supra* chapter 4.1.2.

²⁸⁰ Same opinion: Maxime Chevalier, “From Smart Contract Litigation to Blockchain Arbitration, a New Decentralized Approach Leading Towards the Blockchain Arbitral Order” (2021) *Journal of International Dispute Settlement* 1, 12.

²⁸¹ See *supra* chapter 5.1.

²⁸² This Mexican case is described in detail by the arbitrator: Mauricio Virues Carrera, “Accommodating Kleros as a Decentralised Dispute Resolution Tool for Civil Justice Systems: Theoretical Model and Case of Application” (with the documents of the procedure attached), available at <https://ipfs.kleros.io/ipfs/QmfNrgSVE9bb17KzEVFoGf4KKA1Ekaht7ioLjYzheZ6prE/Accommodating%20Kleros%20as%20a%20Decentralized%20Dispute%20Resolution%20Tool%20for%20Civil%20Justice%20Systems%20-%20Theoretical%20Model%20and%20Case%20of%20Application%20-%20Mauricio%20Virues%20-%20Kleros%20Fellowship%20of%20Justice.pdf> accessed 5 November 2021.

If we were to consider that a BDR decision was rendered in the context of international arbitration proceedings, the decision would have to be analysed in light of the New York Convention in order to determine whether it could be recognised and enforced in a contracting state. The New York Convention provides several grounds for refusing to recognise or enforce an arbitral award in its Article V. In the opinion of the authors, a BDR decision does not in any case fall within the scope of application of this instrument. Nevertheless, and for the sake of argument, the main grounds that could pose a problem when the enforcement of a decision rendered by a BDR mechanism is requested in application of the New York Convention will be listed, without going into the details of its Article V.²⁸³

First, a decision is not enforced if the arbitral agreement is invalid. This covers, in particular, incapacity of the parties. The validity of the arbitral agreement could thus be called into question, at the stage of enforcement of the decision, when one of the parties does not have the capacity to make a legally valid commitment (*e.g.*, a maverick DAO). Furthermore, it is not certain that an arbitral agreement concluded by electronic means (*e.g.*, by smart contract) meets the requirements of formal validity.²⁸⁴ This question may be answered differently depending on the state in which enforcement is sought.

Second, enforcement may be refused if the scope of the decision goes beyond what is agreed in the arbitral agreement. To the extent that the scope of a BDR mechanism is limited, as it stands, to the valuable resources within its jurisdictional power,²⁸⁵ the off-chain enforcement of the decision could be challenged in the absence of an agreement by the parties on this issue.

Third, enforcement of an arbitral award may be refused if it has not yet become binding on the parties. In the opinion of the authors, the decisions rendered by BDR are not binding on the parties since they have not acquired enforceability or *res judicata* effect under the law of a state. However, the question of whether a BDR decision is “binding on the parties” within the meaning of the New York Convention may be answered differently from state to state.

Fourth, the enforcement can be refused on public policy grounds, which is the most important safeguard. There is no doubt that the lack of legal fairness would be raised in the event that a party attempts to obtain the off-chain enforcement of a BDR decision. It would then be up to the recognition authority in the requested state to determine whether or not recognition of the BDR decision is contrary to the public policy of its state.

This brief analysis shows that the application of the New York Convention to a decision rendered by a BDR mechanism – and more generally to decisions rendered by an ODR mechanism²⁸⁶ – raises many questions that have not yet been clearly answered. The possibility that some states will agree in the future to recognise and enforce BDR decisions under the New York Convention cannot be excluded. It is nevertheless dubious that such decisions could be enforced in all the contracting states of the New York Convention. Furthermore, some states may agree to enforce the decisions rendered by BDRs under their

²⁸³ It should be noted that some blockchain-based ODR projects intend to use blockchain technology only for the decision-making process, but do not take advantage of its execution potential. Those projects are trying to set up systems whereby they could render decisions that could be qualified as arbitral awards in order to take advantage of the enforcement system of the New York Convention. One famous example is the project Decentralized Arbitration and Mediation Network (DAMN) proposed in early 2016 to The DAO community, but which was never achieved because of the early fall of The DAO.

²⁸⁴ Same opinion: Chevalier (n 280), 14-15.

²⁸⁵ See *supra* chapter 5.3.

²⁸⁶ See *e.g.*, Mohamed S. Abdel Wahab, “ODR and E-Arbitration – Trends and Challenges”, in Mohamed S. Abdel Wahab, Ethan Katsh and Daniel Rainey (eds), *Online Dispute Resolution: Theory and Practice* (eleven 2012), 387, 392-395.

national rules of PIL or their domestic rules of procedural law. But this would at least require that BDR decisions be characterised as arbitral awards and be compatible with the public policy of the state in which enforcement is sought.

7.3.2 Off-chain Enforceability of a BDR Decision as a Foreign Judgment?

Since it is very unlikely that a BDR decision could be recognised or enforced as an arbitral award under the New York Convention, the question arises as to whether it could be recognised as a foreign judgment under a PIL convention allowing the recognition or enforcement of foreign judgments. For the sake of argument, three international instruments deserve to be examined in this context, even if a BDR decision is not enforceable in the same manner as a judgment in the opinion of the authors.

The Hague Convention on the Recognition and Enforcement of Foreign Judgments of 2 July 2019 (the “Judgments Convention”) is the first international instrument worthy of consideration. However, a BDR decision does not qualify as a “judgment” within the meaning of the Judgments Convention, because it is not a “decision on the merits given by a court”.²⁸⁷ The term “court” is not defined in the Convention, but there is a consensus that this word does not refer to “non-state authorities”.²⁸⁸ The application of this convention is therefore irrelevant.²⁸⁹

The Hague Convention on choice of court agreements of 30 June 2005 (the “Choice of Court Convention”) could be applicable to the recognition or enforcement of a BDR decision. This Convention facilitates the recognition and enforcement of a judgment given by a court of a contracting state designated in an exclusive choice of court agreement in another contracting state. Entrusting the resolution of a dispute to BDR necessarily results from an agreement between the parties (an opt-in clause), which could possibly be assimilated to a choice of court clause.²⁹⁰ However, the scope of application of the Choice of Court Convention is the same as the one of the Judgments Convention regarding the concept of “judgment”.²⁹¹ The rules of recognition and enforcement contained in this convention are therefore only applicable to decisions rendered by a state authority. Thus, the Choice of Court Convention cannot apply to the recognition and enforcement of outcomes of the two BDRs that have been studied for this paper.

The Lugano Convention could be applied if a BDR decision could be qualified as a judgment within the meaning of “any judgment given by a court or tribunal of a state bound by [the] Convention”.²⁹² In the opinion of the authors, this is not the case and the Lugano Convention cannot be applied to recognise or enforce a BDR decision either.

The fact that these three international instruments apply only to the recognition or enforcement of judgments rendered in another contracting state is a strong impediment to their application to decisions rendered by BDRs since these cannot be attached either to a state authority or to the territory of a contracting state. Furthermore, what has just been said about the New York Convention²⁹³ is also valid for the two Hague Conventions as well as the Lugano Convention: the grounds for refusal of

²⁸⁷ See Art. 3 para. 1 sub-para. b of the Judgments Convention.

²⁸⁸ See Francisco Garcimartin and Geneviève Saumier, *Explanatory Report of the Convention of 2 July 2019 on the Recognition and Enforcement of Foreign Judgments in Civil or Commercial Matters* (HCCH 2020), para. 101-102.

²⁸⁹ Furthermore, the Judgments Convention does not apply to arbitration according to its Art. 2 para. 3.

²⁹⁰ See *supra* chapter 5.4.

²⁹¹ Art. 4 para. 1 of the Choice of Court Convention.

²⁹² Art. 32 of the Lugano Convention.

²⁹³ See *supra* chapter 7.3.1.

recognition or enforcement of all these instruments have almost all the same effect. Compatibility of the decision with the public policy of the requested state is a *sine qua non* condition for the enforcement of the decision. Both Hague Conventions expressly state that the enforcement of a decision is refused in “situations where the specific proceedings leading to the judgment were incompatible with fundamental principles of procedural fairness of that State”.²⁹⁴ This is also valid, *mutatis mutandis*, when the Lugano Convention applies.

Without an international instrument that could be applicable to the enforcement of a decision rendered by a BDR mechanism, such a decision could only be enforced in a state if its national rules of PIL allow it. This presupposes that the requested state agrees to give effect to a BDR decision in its territory by enforcing it as if it were a foreign judgment. However, this seems even more doubtful than the enforcement under the rules applicable to arbitral awards.

It must be concluded that the off-chain enforcement of BDR decisions is unlikely in the current state of development of BDRs. When the decision arising from a BDR mechanism is to be enforced on non-crypto assets and cannot be recognised or enforced in the state where the enforcement is to take place, the BDR justice system loses its effectiveness. If the losing party does not voluntarily comply with the decision, the other party must accept that the dispute should be (re)submitted to a judge who will render a judgment on the basis of its assessment of the facts as well as the legal situation. Nevertheless, it is up to each state to determine whether, in the future, it is prepared to enforce decisions that do not respect fundamental procedural rights. One can assume that BDRs will have to implement justice systems governed by their code that better respect the fundamental procedural rights of the parties for their decisions to be recognisable or enforceable in state jurisdictions. For the time being, it is premature to count on the recognition of the legitimacy of the BDR justice system by states. In any case, the two systems of justice do not need to be interconnected for BDRs to deliver effective and fair justice in the crypto environment.

8. Conclusion: BDRs are Decentralized Autonomous Justice (DAJ)

The deployment of Bitcoin in 2008 has greatly impacted the ways in which communities of peers can come together and organise their activities in an independent and autonomous way. Satoshi Nakamoto laid out the first stone with a peer-to-peer electronic cash system²⁹⁵ that would enable millions of people around the globe to access money in a more democratic way and eliminate the need for intermediaries. Then, Ethereum has allowed users to build more complex systems on the same peer-to-peer architecture that made Bitcoin so unique. DAOs are now reinventing the way people can contract and organise, which is generating a whole new economy led by DeFi. DAOs are also giving rise to other novelties such as decentralised identity, which is promising to restructure the currently physical and digital identity ecosystem into a decentralised and democratised architecture. With decentralised governance and autonomy from central institutions, DAOs represent a new type of democratically run economic and social entities which promise to be fairer and to benefit all the members of their communities.

As with any social environment, the blockchain ecosystem rapidly saw the need for dispute resolution mechanisms to be available to DAOs and other actors of the blockchain economy. Traditional state justice was not the answer because of the autonomy of blockchain technology. A similar phenomenon was seen with the rise of the Internet and e-commerce, when a plethora of ODRs were developed for new kinds of disputes that were unsuitable for state courts. Small-claim disputes between people from different jurisdictions led Internet actors such as eBay to develop dispute resolution

²⁹⁴ Art. 7 para. 1 sub-para. c of the Judgments Convention; Art. 9 sub-para. e of the Choice of Court Convention.

²⁹⁵ Satoshi Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System”, 6, available at <<https://bitcoin.org/bitcoin.pdf>> accessed 5 November 2021.

mechanisms that are specifically designed to meet the needs of their e-commerce platform: render high-volume enforceable decisions in a cheap and quick way. However, this model of ODR remains dependent on payment service providers that can charge additional fees, and often decisions are made unilaterally and can seem arbitrary.

BDRs such as Kleros and Aragon Court answer the needs of their own ecosystem by providing DAOs and other actors of the crypto economy with dispute resolution mechanisms that can render enforceable decisions in a cheap and quick way. While pseudonymity and lack of legal capacity prevent those actors from seeking justice in state courts, they are not obstacles to delivering justice in the blockchain environment. The only limits to BDR's power of enforcement are technological constraints. Whether a dispute is of a contractual nature or pertains to the governance of a DAO, smart contracts allow BDRs to render decisions and directly enforce them so long as valuable resources are in their technological environment. Kleros and Aragon Court have created independent and self-reliant justice systems that function without the intervention of state authorities or other intermediaries at any point in either the decision-making process or the execution of the decision. Furthermore, as they run on blockchains and are themselves organised as DAOs, BDRs are autonomous systems that are shielded against any outside authority. In particular, states do not have the power to interfere with the decision-making process and the enforcement of a BDR decision. As such, BDRs are not only independent, but also autonomous.

Along with their independence and autonomy, BDRs have a monopoly of justice within the crypto environment. Even though the kind of justice they offer does not meet procedural standards set by states and cannot be qualified as fair justice in the legal sense, BDRs nonetheless offer a kind of justice that is fair in the crypto-economic sense. But most importantly, it is an effective justice in that the parties are provided with directly enforced decisions. This has been enough for the actors of the crypto environment to have confidence in this justice system as it is one that portrays the crypto-economic mechanisms which are the underlying foundations of the blockchain ecosystem. Actors who wish to submit to BDR can obtain a decision which first of all is rendered by their peers through mechanisms that use game theory and economic incentives and secondly is automatically enforced by the smart contract.

BDRs do not need to render decisions that can be recognised by states as arbitral awards or as foreign judgements to uphold their legitimacy, as long as the decisions they render are fully executed on-chain. Individuals make the deliberate decision to submit to BDRs for their on-chain activities, and BDRs offer a system of justice that matches the moral, social, and political ideals of the crypto environment. When individuals choose a service offered in the blockchain environment by an independent and autonomous platform (*e.g.*, DeFi services provider, decentralised identity provider, *etc.*) over its counterpart offered by traditional institutions (*e.g.*, banks, governmental agencies, *etc.*), it is only legitimate that the chosen Decentralized Autonomous Justice (DAJ) system rules over disputes that occur on that platform.

There is already a long tradition of submitting international commercial disputes to ADRs such as arbitration, and the BDRs we have analysed created a new milestone by bringing decentralisation and autonomy to private justice. However, the crypto environment is already developing towards much more personal matters that state jurisdictions have traditionally kept within their power to safeguard public policy interests. For example, a Proof of Humanity dApp is inviting individuals to prove their "humanity" (*i.e.*, the fact that they are an actual person) so that they be awarded a daily crypto income.²⁹⁶ Members of the community can challenge the alleged humanity of a user and Kleros has jurisdiction over determining whether an applicant is an actual human and qualifies for the unconditional basic income. It

²⁹⁶ See <<https://www.proofofhumanity.id>> accessed 5 November 2021.

is undeniable that people around the globe are starting to entrust on-chain self-sovereign institutions with matters that affect their personhood, and this trust is reinforced by access to a DAJ system. Those individuals are no longer part of simple on-chain communities; they belong to a fully-fledged crypto jurisdiction.

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