Decentralised Autonomous Organisation (DAO) Regulation

Edited by
MADALENA PERESTRELO DE OLIVEIRA
and ANTÓNIO GARCIA ROLO

Schriften zum Recht der Digitalisierung
30

Mohr Siebeck

Schriften zum Recht der Digitalisierung

Edited by

Florian Möslein, Sebastian Omlor and Martin Will

30

Decentralised Autonomous Organisation (DAO) Regulation

Principles and Perspectives for the Future

Edited by
Madalena Perestrelo de Oliveira
and António Garcia Rolo

Mohr Siebeck

Madalena Perestrelo de Oliveira is Professor at the Faculty of Law of the University of Lisbon.
orcid.org/0000-0002-8908-2991

António Garcia Rolo is Guest Academic Assistant at the Faculty of Law of the University of Lisbon.
orcid.org/0000-0002-6406-6207

ISBN 978-3-16-163700-1 / eISBN 978-3-16-163701-8
DOI 10.1628/978-3-16-163701-8

ISSN 2700-1288 / eISSN 2700-1296 (Schriften zum Recht der Digitalisierung)

Die Deutsche Nationalbibliothek lists this publication in the German National Bibliography; detailed bibliographic data is available at *https://dnb.dnb.de*.

Published by Mohr Siebeck Tübingen 2024. www.mohrsiebeck.com

The book was typeset by using Stempel Garamond typeface and printed on non-aging paper by Laupp & Göbel in Gomaringen, and bound by Buchbinderei Nädele in Nehren.

Printed in Germany.

Foreword

Clearing the Way for an Informed Discussion on the Future of DAO Regulation

Madalena Perestrelo de Oliveira and António Garcia Rolo

I. About the Project and its Interim Conclusions

Decentralised autonomous organisations ("DAO"s) – as well as similarly decentralised arrangements based on the blockchain – are one of the most challenging phenomena emerging from the blockchain revolution, presenting unprecedented legal challenges to lawyers and academics. The emergence of DAOs has the potential to be *the* transformative event for corporate law in the 21st century, putting into question tenets we have had for granted and forcing corporate lawyers to rethink what they hold as immutable and to adapt many corporate law rules to the new reality.

At the Lisbon DAO Observatory, a research project set up within the Lisbon Research Centre for Private Law (CIDP – *Centro de Investigação de Direito Privado*) of the Faculty of Law of the University of Lisbon, we are seeking to find answers for these deeply enthralling and exciting challenges. The objective of this Research Project is to try to find legal answers to the current legal challenges posed by DAOs and similar arrangements in order to help shaping future legislative action.

Law and technology do not always make the best bedfellows. While it is true that legal certainty and the need to protect those involved in blockchain business arrangements often require the definition of a legal framework, there have been instances where the law is ill-suited to technology (such as the General Data Protection Regulation and the difficulty of reconciling the right to be forgotten with the use of blockchain technology). The law (or its interpretation) should not restrain technological innovation. On the contrary, it should create an environment conducive to its development and, where necessary, ensure adequate protection for markets and investors. Of course, this does not mean that technology should develop without any external control, regardless of the risks it may pose. Furthermore, DAOs are evolving rapidly and differ in purpose, structure, function and risks they pose for participants, which makes it particularly challenging to draw a one size fits all framework. We recognise that it is not

easy to regulate DAOs without losing the key features that make them special and attractive to market participants. At the Lisbon DAO Observatory we are trying to find legal answers that do not jeopardise the core DAO concept and philosophy.

The achievement of this objective is made possible by consecutive steps – the first step was the organisation of the 1st Lisbon DAO Legal Structure Workshop (on March 17th, 2022). We believe in the importance of freely discussing challenging and controversial issues, in constant articulation with relevant stakeholders and the DAO ecosystem. The legal system cannot be based on solutions or regulations that ignore social reality and practical experiences. This is why the Lisbon DAO Observatory's research project is based on the dialogue with the DAO ecosystem. Having that in mind, in the 1st Workshop we gathered representatives from seven DAOs of all shapes and sizes in order to ascertain their structure, the legal challenges they face and how they deal with them. On the 25th of May 2022, we organised a follow-up event – the 2nd Lisbon DAO Legal Structure Workshop – where we hosted legal scholars and practitioners explaining: (i) how most DAOs would be qualified under major European jurisdictions (Portugal, Germany, France and the UK); and (ii) how they are already being dealt with in more forward-looking jurisdictions, such as Malta, Wyoming and the Marshall Islands, with the latter three jurisdictions having explicitly recognised DAOs in their corporate law.

The outputs of this event can be consulted in our first publication *Decentralised Autonomous Organisations (DAOs) in Various Jurisdictions: from Old Rules to Innovative Approaches*, published by AAFDL Editora (Lisbon, Portugal) on 2023 and freely available online at https://lisbondaoobservatory.cidp.pt/publication/decentralised-autonomous-organisations-daos-in-various-jurisdictions-from-old-rules-to-innovative-approaches/8.

This 2nd Lisbon DAO Legal Structure Workshop and the resulting publication made clear the current legal status of DAOs in most jurisdictions. Our contributors concluded that in most major jurisdictions (Portugal, Germany, France and the UK in particular were addressed) most DAOs, even if their members do not want to, will be considered partnerships or other similar forms of business organisation and their members would be unlimitedly liable for the actions of the DAO. As we saw, more forward-looking jurisdictions (Malta, Wyoming and the Marshall Islands were addressed in our first publication) try to offer some respite from this consequence by providing different mechanisms of legal recognition of DAOs (which is explicit in the Wyoming and Marshall Island cases).

II. The *Status Quo*

As we have mentioned in our previous publications, DAOs are difficult to define with precision and there are various definitions in articles, textbooks or glossaries. We will work on the basis of a narrow definition of DAO as a form of human organisation based on blockchain technology, in which various members pool funds or assets (usually, but not necessarily, cryptoassets) to undertake a given activity (not necessarily for profit). They are partially or mostly governed by a bundle of smart contracts, deployed on a given blockchain. As the name indicates, DAOs are simultaneously decentralised and autonomous: *(i)* decentralised because most DAOs seek to have no centralised management, instead placing important decisions in the hands of associates, seeking to mitigate the traditional agency problem between shareholders and management; and *(ii)* autonomous because many decision-making powers traditionally held by the management can be entrusted to a smart contract, that defines the rules of the organisation and usually holds the DAO's treasury.

As concluded in the 2nd Lisbon DAO Legal Structure Workshop and the resulting ebook published in 2023, regardless of the will of the members of a DAO, arrangements falling within this definition of DAOs (and other arrangements classified as DAOs) would be considered partnerships (or the equivalent "civil societies" in civil law jurisdictions) in most jurisdictions if the DAO is indeed a collective form of carrying out an activity with proceeds directly or indirectly split between its members. Such frameworks usually require the presence of a personal element (members who exercise varying degrees of control), a teleological element (carrying out an activity which can be more or less profit-oriented) and a material-economic element (pooled resources and splitting of proceeds).

In most jurisdictions, judges will emphasise the usefulness of a non-strict definition of partnership. The purpose of the framework is to apply to as many situations as possible and is usually not dependent on the will of the members.

The consequences of being classified as a partnership or similar arrangement, which will usually not have legal personality, is the unlimited liability of all members as partners, which is highly undesirable for participants in any form of economic activity.

Therefore, if DAOs fulfil these conditions (and many do), they will not escape the law (at least theoretically). They thus live in this legal limbo whereby they seek not to be legally analysed or find legal wrappers to try to insulate some legal risks in some aspects of their governance.

However, this legal uncertainty is not sustainable in the long term.

III. Thinking About Regulation

Since the legal uncertainty surrounding DAOs is not sustainable, as it subjects them to the framework applicable to partnerships regardless of their say on the matter and likely dissuades other actors of participating in or interacting with a DAO, the Lisbon DAO Observatory takes the next step and starts thinking about possible avenues to address this situation.

Therefore, on the 20th April, 2023, the Lisbon DAO Observatory organised an International Conference on DAO Regulation (https://lisbondaoobservatory.cidp.pt/Archive/Docs/f163312187242.pdf) that gathered top-tier scholars, industry players and practitioners from all over the world in order to discuss how should any future legislative intervention, recognition or regulation of DAOs be crafted.

In this conference, there were discussions and interventions on the shape of any future DAO Regulation and on major topics such as mandatory decentralisation, legal personality, governance structures, limited liability and on crucial sectorial issues, including dispute resolution, civil liability, tax law or conflict of laws.

It is worth noting that any discussion on future regulation of DAOs must consider a preliminary question – should DAOs even be specifically regulated? One must bear in mind that any legislator can choose between a holistic regulation of DAOs (creating a specific law addressing all legal aspects of DAOs) or sectorial (only addressing specific issues, be it liability, judicial standing or tax status).

Another interesting question is whether any regulation should be imposed by public authorities or if self-regulation is enough. This is a contentious issue which was hotly debated in our first roundtable in the International Conference on DAO Regulation – while there was a consensus around the need to have more clarity, there were differing perspectives on whether the industry itself can adhere to self-regulation instruments (for instance the COALA model law)[1] or if it should be entirely up to public legislators to address the issue, without prejudice of combining both approaches in a hybrid approach in which certain central tenets are determined by legislators and other aspects dealt with through self-regulation.

In the event that one determines that public legislative intervention is needed, if one is thinking from a European perspective, it is pertinent to ponder whether this initiative should come from the European Union legislator. Indeed, if each of the 27 Member States goes its own way, there will be significant problems in

[1] Coalition of Automated Legal Applications, *Model Law for Decentralised Autonomous Organisations (DAOs),* 2021, available at https://coala.global/wp-content/uploads/2022/03/DAO-Model-Law.pdf (accessed 10 October 2023).

mutual recognition and freedom of movement of DAOs within the European Union. However, DAOs, by their nature, are a bit everywhere and usually comprise people from various nationalities and locations. Addressing them on a purely national basis in a space which can benefit from common legislation would unnecessarily complicate their already fickle legal security. Therefore, it is our interim position that any legislative initiative in Europe should come from the European Union, either through Directive-led harmonisation or through uniform law such as a Regulation (to which there is a precedent, though not a very successful one, in the European Company Regulation). In future outputs, we will dwell more on how this could be done.

These are the major and transversal topics of how to regulate DAOs, vividly discussed in our Conference's first roundtable and incidentally mentioned in several of our chapters. The preceding paragraphs aimed at merely giving the reader a heads-up on where the regulation of DAOs we are discussing could come from.

IV. Presentation of the Works

Our first three works will present differing perspectives on the relationship between the degree of decentralisation present in a DAO and its regulation. When is a DAO decentralised? Should any future regulation require a certain degree of decentralisation in order to apply to DAOs? Should any future regulation impose any governance structures to ensure such decentralisation?

Thereafter, other three chapters will provide us with insights on major issues on the application of company law principles to DAOs, which should be kept in mind of any prospective regulator – should DAOs be granted legal personality? Should they enjoy a limited liability comparable to companies and how would such framework operate? Should any regulation of DAOs provide for some minimum governance requirements?

Having addressed these nuclear issues, we will see how any future regulation should approach the relationship between DAOs and the off-chain world – can a DAO stand before a State court? How should civil liability be applied, do classical models still work? How can we know that a DAO *knows* something, an issue highly relevant for civil liability? And how should regulation further address transaction costs and security risks for DAOs?

Finally, the two concluding chapters will address how DAOs intersect with two particularly important fields of law – tax law and private international law. It is indeed crucial to understand how and if DAOs should be taxed, and how future regulation can provide clear paths to help determine the law applicable to DAOs.

With these insightful chapters we hope to have contributed to the on-going discussion about the content of any future DAO regulation and how key issues should be addressed, giving prospective legislators or academics material to reflect upon and to contribute to a truly informed discussion on the issues that come with regulating DAOs. Universities have a responsibility to challenge the legal *status quo* and provide strong theoretical foundations that can be used as a basis for thinking about the future regulation of DAOs and inspire practitioners, policy makers and community members to try out new solutions. In the Lisbon DAO Observatory, we will carry on our work and attempt to conclude on what we view as the most balanced path to take. As in all things, a balance must be struck. If DAOs continue to grow we cannot continue leaving them completely devoid of a particular framework other than partnership law, which is created for small and flexible business arrangements between parties with a high degree of mutual trust and may be inadequate for the big operations DAOs often undertake. However, to subject DAOs to the existing rules of company law would be antithetical to their purpose – the law should not impose traditional and rigid governance models and membership requirements for DAOs and should allow a certain degree of freedom and flexibility for their members. After all, the whole point of DAOs is to experiment with different governance models – that are more decentralised and which can function autonomously – that do away with traditional corporate structures and the agency problems related thereto.

Table of Contents

Madalena Perestrelo de Oliveira and António Garcia Rolo

Foreword: Clearing the Way for an Informed Discussion on the Future of DAO Regulation V

Madalena Perestrelo de Oliveira and Marta Boura

DAOs and Mandatory Decentralisation: How to assess decentralisation when shaping regulation for DAOs 1

Nathan Vandy

Progressive Decentralization requires Progressive Regulation: Do DAOs require direct legislative intervention, self-regulation or no regulation? 27

Henrik Axelsen, Johannes Rude Jensen and Omri Ross

When is a DAO Decentralized? 59

Florian Möslein and Daniel Ostrovski

Legal personality of Decentralized Autonomous Organisations (DAOs): Privilege or Necessity? 93

Biyan Mienert

Limited Liability as Applied to DAOs 113

Christopher Wray

Organizational Structure and the Regulation of DAOs 123

Florence Guillaume

Decentralized Autonomous Organizations (DAOs) Before State Courts. How can private international law keep up with global digital entities? 135

Peder Østbye

DAOs and Civil Liability. Some Policy Considerations 169

João Serras de Sousa

Decentralized autonomous organisations (DAOs) and knowledge attribution 191

João Vieira dos Santos

The Nature of the DAO: Transaction Costs, MiCA and a Specific Legal Framework 207

Bianca Kremer and Kanye Ye Wang

DeFi Attacks and the Role of DAOs 215

António Rocha Mendes

The Case for Taxing DAOs. Challenges, Methods and Impossibility . . 239

Luís de Lima Pinheiro

Laws Applicable to International Smart Contracts and Decentralized Autonomous Organizations (DAOs) 249

Index of Subects 285
Index of Contributors 287

DAOs and Mandatory Decentralisation: How to assess decentralisation when shaping regulation for DAOs*

Madalena Perestrelo de Oliveira and Marta Boura

Abstract Despite being defined as decentralised arrangements, the question on how to assess the required level of decentralisation when regulating DAOs is not obvious or simple. On the contrary, its analysis relies on the perception of decentralisation as a spectrum which is recognised at different levels. It's on this basis that this paper is construed.

I. Introduction: DAOs as decentralised arrangements

1) DAOs are decentralised autonomous organisations and it is based on these three elements that this concept is construed.[1] In simple terms, DAOs are (i) decentralised as they are collectively owned and lack a centralised management, (ii) autonomous due to the automatic execution of decision-making powers through smart contracts and (iii) organisations as, ultimately, they are merely a form of human organisation. Therefore, in order to analyse DAOs (and how to draft a future regulation that is adequate, if needed) one must start by determining which organisations fall within the scope of a DAO and which do not.

Autonomy in a DAO is achieved through smart contracts, which can be defined as "a computer program that operates based on distributed ledger technology, namely the blockchain, and which allows the automatic performance of certain obligations when certain facts occur".[2] These self-executing agreements define the rules on which the DAO operates. Besides, all associates' rights result from smart contracts whose content is defined by the community, therefore

* This article was prepared in the context of the International Conference on DAO Regulation 2023 organised by the Lisbon DAO Observatory on 20 April 2023.

[1] *Jentzsch*, Decentralized Autonomous Organization to Automate Governance: Final Draft (2016). Available at: https://download.slock.it/public/DAO/WhitePaper.pdf (19.07.2023). Providing further analysis on the rise of DAOs, *Rolo*, RDT 1-1 (2019), 33–87.

[2] *Lima Pinheiro*, Laws Applicable to International Smart Contracts and Decentralized Autonomous Organizations (DAOS), 2023, 1. Available at: https://ssrn.com/abstract=4467408 or http://dx.doi.org/10.2139/ssrn.4467408 (19.07.2023).

there is no one who centrally decides the future of a DAO. In that sense, "a DAO is a *smart contract conceptualised as an organisation*".[3/4]

In general, smart contracts bring the promise of (i) elimination of ambiguity, (ii) prevention of non-performance and fraud, as they do not rely or depend on any human intervention, (iii) transparency, as the entire community is duly aware of the terms on which the smart contract is created, (iv) disintermediation, (v) no litigation, as a result of the autonomation of compliance and (vi) irreversibility of its terms. However, this model is not without its challenges. While the irrevocability offered by a smart contract grants the "advantage of eliminating or reducing the risk of non-performance"[5], doubts arise as to how the codification is carried out in relation to operational and non-operational aspects and/or mandatory legal rules, the applicable law[6] and the inclusion of off-chain information. It is also difficult to determine how subsequent events or changes in applicable law are considered in the code, or whether the obligations codified are lawful or unlawful. Changes to the blockchain may affect the performance of a smart contract, and the impact of insolvency events or consumer's rights are yet to be determined. There is also some uncertainty about how smart contracts implement vague or indeterminate ideas or concepts, such as best efforts obligations, market practice standards, or reasonable performance or execution that is contrary to the parties' intention (for example, due to errors in coding or execution of a code that is different from what the parties expected).[7] In addition, in most civil law jurisdictions, it could also be discussed how immutability or irrevocability affect remedies for non-performance of *off-chain* obligations that cannot be automated. This comes to show that execution of smart contracts can, in practice, indeed lead to litigation and entail difficulties around its enforceability.

As to the organisational element, DAOs can be generally defined as a vehicle through which its members pursue a common purpose (which may or not be profitable). This only requires a certain structure through which a DAO can

---

[3] *Rolo* (fn. 2), 56.

[4] On how smart contracts are implemented, see *Jentzsch* (fn. 2).

[5] *Lima Pinheiro* (fn. 3), 2.

[6] *Lima Pinheiro* (fn. 3); *Perestrelo de Oliveira/Rolo/Santos/Teixeira*, Decentralised Autonomous Organisations (DAO): Conceito, Enquadramento Legal e Desafios, 2022. Available at: https://boletim.oa.pt/decentralised-autonomous-organisations-dao-conceito-enquadramento-legal-e-desafios1/ (19.07.2023).

[7] Addressing these issues, see *Ana Perestrelo de Oliveira*, Smart Contracts, Risco e Codificação da Desvinculação ou Modificação Negocial – Os Falsos Dilemas da Inter-relação Lei-código nos Contratos Empresariais, Almedina, 2023; *Freire*, Blockchain e Smart Contracts – Implicações Jurídicas, Almedina, 2022 (reprint); Thematic report prepared by the European Union Blockchain Observatory Forum entitled Legal and Regulatory Framework of Blockchains and Smart Contracts, 2019. Available at: https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf (19.07.2023).

aggregate its members and provide a sense of community.[8] Although it is possible to find traditional corporate features within a DAO, such as governance rights granted to token holders, assets and a treasury, the fundamental differences between a DAO and a traditional corporation make it difficult to determine its legal nature or qualification. In fact, DAOs aim to create a community where there are no top-down decision-making processes, and which is based on full transparency and democracy. Therefore, the culture of a DAO is inherently different from that of a corporation.

Generally, under Portuguese Law, a DAO would be considered a civil partnership, in the sense that, under the Portuguese Civil Code, such partnership will exist if two or more partners undertake to contribute assets or services towards the joint exercise of an economic activity and agree to distribute the profits arising therefrom. This is a classical legal framework, which was designed to frame the typical joint exercise of economic activities and has just begun to be applied to DAOs. There is a level of uncertainty regarding the applicability of this legal framework to DAOs, although the legal response to the questions typically raised by the functioning and operation of DAOs tend to rely on an analogy between the participation, by token holders, in DAOs and the joint pursuit of an economic activity. However, the level of decentralisation of the DAO may impact how these entities are qualified under different jurisdictions. In fact, if a DAO is sufficiently decentralised in the sense that there is no coordinated effort of its participants, it might be argued that there is no joint exercise of an economic activity, rendering it harder to qualify a DAO as a civil partnership. However, under Portuguese law there is little development by legal scholars regarding what should be considered a "joint exercise of an economic activity", which makes it difficult to evaluate how greater decentralisation would impact any DAO's qualification. However, one should note that the mere fact that participants undertake decisions through voting could be sufficient to identify a "joint exercise" of an economic activity. Moreover, even if a DAO is not qualified as a civil partnership, we believe that a court of law, under Portuguese law, would likely apply civil partnership rules by analogy to such contractual relationship.

2) Decentralisation is not binary as an element: the market is not divided into completely decentralised organisations (or structures) and others completely centralised. As a fact, decentralisation moves on a spectrum that is particularly difficult to achieve conceptually.[9] However, we believe that decentralisation is

[8] *Boss*, ALSRP 2023, 15. According to the Author, "(…) this element does not cause much debate: it can be understood as the requirement that the DAO should have somewhat of a structure. This does not necessarily imply a specific (legal) form, but it mostly focuses on whether the DAO in question is more than just a spontaneous group of individuals".

[9] *Veas*, DeFi and MiCA: How much decentralisation is enough?, Lexology, 2023. Available at https://www.lexology.com/library/detail.aspx?g=ada74ccc-c1aa-4dfd-bdbc-93fcda62bdb2

the key element on which not only the qualification of a blockchain arrangement as a DAO depends on, but also as the cornerstone for future regulation of DAOs. However, the difficulty remains as to how we can pursue a draft regulation for DAOs without establishing criteria to assess decentralisation or its different levels.

II. The spectrum of decentralisation: from centralisation to absolute decentralisation

1. Are (pure) DAOs a myth?

1) Decentralisation is not a univocal concept, nor a legal one; yet DAOs depend on decentralisation to define themselves as DAOs.

DAOs first emerged as an alternative to traditional organisation models.[10] Their development is linked to the advancement of blockchain technology but, at its core, it intends to provide for cheaper and easier solutions of pursuing collective purposes.[11] In fact, DAOs represent the so-called emergence of "platform cooperatives", which consist in "a governance model that centres on digital tools and is underpinned by the cooperative principles of democratic decision-making and shared ownership of the platform by workers and users".[12] This new concept is governed by seven principles, which were established in 2017 by the International Co-operative Alliance. Those are (i) voluntary and

(28.06.2023); *Boiron*, Sufficient decentralization: a playbook for web3 builders and lawyers, 6 ss. Available at: https://variant.fund/wp-content/uploads/2022/08/Sufficient-Decentralization-by-Marc-Boiron.docx.pdf (28.06.2023).

[10] DAOs' model also differs from other strucutres as crowdfunding or ICOs, see *Bellavitis/Fisch/Momtaz*, The rise of decentralised autonomous organizations (DAOs): a first empirical glimpse, Venture Capital, 2022, 3 ss. Available at SSRN: https://ssrn.com/abstract=4074833 or http://dx.doi.org/10.2139/ssrn.4074833 (18.07.2023).

[11] Also, "DAOs have begun to disrupt intermediated business models and industries in which such platforms are dominant through disintermediation. At the core of the movement toward greater disintermediation is the promise of more favorable rent sharing, as entrepreneurs and investors or sellers and buyers get to share the transaction surplus exclusively, without the need to pay for intermediation services thanks to smart contract technology (Momtaz, 2022). In principle, markets, industries, and entire economies could be governed by smart contracts, powered by robotics, and independently regulated by the DAOs' members. Consider the example of Amazon: Today Jeff Bezos is the main shareholder of Amazon, Amazon's CEO is the manager, and Amazon sellers are the service providers. Through a DAO, Amazon sellers could cooperate and share decision-making and a DAO could allow every Amazon seller to be a shareholder, manager, and service provider at the same time", see *Bellavitis/Fisch/Momtaz* (fn. 11), 4.

[12] *Nabben/Puspasari/Kelleher/Sanjay*, Grounding Decentralised Technologies in Cooperative Principles: What Can 'Decentralised Autonomous Organisations' (DAOs) and Platform Cooperatives Learn from Each Other?, 2021, 1. Available at SSRN: https://ssrn.com/abstract=3979223 or http://dx.doi.org/10.2139/ssrn.3979223 (21.07.2023).

open membership, (ii) democratic member control, (iii) member economic participation, (iv) autonomy and independence, (v) education, training and information, (vi) co-operation among co-operatives and (vii) concern for community.[13]

In general, we can say that centralised management structures have been discredited in some sectors of society over the last few years. Participants turn to DAOs hoping to find a system where corporate decisions lie in the hands of associates creating a more democratic organisation and avoiding typical corporate issues which compromise the organisation autonomy and independence (e.g. traditional agency problem between shareholders and management). In DAOs, participants also find a community where their purposes are most likely to be achieved considering that no human interference is allowed in the management of the DAO's treasury, for instance, due to the automatic execution of smart contracts. Ultimately, DAOs are a project to work on that does not depend on any physical infrastructures. Therefore:

"Because of their decentralized nature, DAOs offer transparent, distributed, and decentralized decision-making that increases disintermediation not only within organizations, but also at the market, industry, and economy levels. The distinction between shareholders, managers, and other stakeholders, such as industry participants, is blurred, giving rise to numerous benefits (and challenges)".[14]

However, from a conceptual point of view, such broad delimitation comprises difficulties. First, it fails to sufficiently define how much decentralisation is required for a DAO to qualify as such. Also, it may be argued that, as a wide concept, it may capture all blockchain systems therefore lacking any conceptual substract.

2) Some state DAOs are, ultimately, DINOs (*Decentralised in Name Only*[15]), meaning decentralisation is nothing more than an illusion[16] or a mirage.[17] Indeed, even in communities that are committed to political decentralisation, based on the idea of "distributed consensus"[18], it is very common for control groups to be formed, i.e., a small number of people who hold the majority of the

[13] International Co-operative alliance, *Guidance Notes to the Co-operative Principles*. Available at: https://ica.coop/sites/default/files/basic-page-attachments/guidance-notes-en-221700169.pdf (21.07.2023). Also, see *Nabben/Puspasari/Kelleher/Sanjay* (fn. 13), 3.

[14] *Bellavitis/Fisch/Momtaz* (fn. 11), 6.

[15] *Kerstens*, speech at *I International Conference on DAO Regulation*, organised by *Lisbon DAO Observatory*, at Faculty of Law University of Lisbon (April 2023).

[16] *Omlor/Franke*, Europäische DeFi – Regulierungsperspektiven. Ein- und Ausblick der EU-Kommission, BKR 2022, 682.

[17] Study requested by ECON Committee, European Parliament, entitled "Remaining regulatory challenges in digital finance and crypto-assets after MiCA", 2023, 17. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2023/740083/IPOL_STU(2023)740083_EN.pdf (11.07.2023).

[18] *De Filippi/Lavayssière*, Blockchain technology: toward a decentralized governance of digital platforms?, The great awakening, Puctum Books, 2020, 185-222, 201.

governance tokens of a given project, in such a way that they can condition the decisions taken, thus jeopardising decentralisation.[19]

This comes to state decentralisation as a complex concept. In addition to compromising the scalability of the protocol, a bad decision at the wrong time can be ruinous for the organisation and the conflict of interests in a wide community is unavoidable. Added to this is the inevitable community tendency towards the pursuit of short-term goals, which can be an obstacle to making decisions that would favour the community in the long term. Decentralisation can mean chaos, especially when accompanied by a lack of communication. By way of example, if those responsible for marketing do not communicate with other contributors to the protocol, they will not know how it is offered to the public and, in turn, those who develop the software do not have access to the elements to understand the needs of their users.[20] On the other hand, permanent communication flows in most cases mean that there is centralisation comparable to that of a traditional corporate structure, with the associated legal consequences.

Seconding Guilherme Maia and João Vieira dos Santos[21], we believe that only systems built on a decentralised settlement layer (architectural decentralisation), with no control over user assets (decentralisation in the custody of crypto-assets) and in which all aspects of decision-making, responsibility for maintaining the code and rights associated with control and ownership of the protocol belong to the token holders (political decentralisation) should be considered decentralised protocols. To this we would only add that political decentralisation cannot ignore the way in which off chain activities are carried out. The impossibility of translating all the rules into code means that there will be issues that need to be decided outside the protocol. In most blockchain networks, changes relating to the network protocol will need to be made through an off-chain decision-making process, where some level of centralisation can be identified.[22] Off-chain community governance raises delicate questions related to the invisible forces at work behind supposedly decentralised communities.

This means that effective decentralisation is likely to be illusory, as it is generally possible to identify centralised custody or cloud services that allow, at least, centralised analysis of the data collected by the applications.[23] The promised decentralisation of DAO will likely give way to concentration and oligopoly, as decentralised functioning does not prevent the concentration of market

[19] *Möslein/Kaulartz/Renning*, RDi 2021, 517, Rn. 37; *Omlor/Franke* (fn. 17) 682.

[20] *Boiron* (fn. 10) 9.

[21] *Maia/Santos*, RED 2, Vol. 28, 2022.

[22] *De Filippi/Lavayssière* (fn. 19), 204 ss. Consider, among other examples, the fork Ethereum decision following a diversion of funds that exploited a flaw in The DAO's code. Community members who did not agree to this fork continue to use an alternative version of the network (the Ethereum Classic).

[23] *Zunzunegui*, Revista de Derecho del Mercado Financiero, WP 1/2022, 10. Available at: https://ssrn.com/abstract=4040930 or http://dx.doi.org/10.2139/ssrn. 4040930.

power. Primavera Di Filipi and Xavier Lavayssière[24] predict that, if left to the invisible hand of the market, these blockchain-based applications will, with high probability, evolve into centralized platforms and lead to the emergence of new intermediaries and even new incumbents. It is important to be aware of these risks.

3) In any case, as per our view, a DAO does not live merely within the scope of a complete decentralisation. Should it be the case and DAOs would be anything and nothing at the same time. Our research points in a different direction. Instead, different levels of decentralisation should be recognised.

2. Levels of decentralisation

1) At its core, decentralisation is not a legal concept hence the difficulties on how to assess it. Differently:

"(…) decentralization has technical, geographic, political, economic and legal dimensions. How technically decentralized a DAO is depends on several factors, such as the kind of blockchain it is deployed on and how many nodes are operating on the network to validate transactions. Geographic decentralization can be understood as the degree to which DAO contributors operate in different jurisdictions. Political decentralization is dependent on how diffuse power is in the organization. (…) Economic decentralization refers to the distribution of resources across the community. (…) Each of these dimensions has implications for how the DAO could be legally categorized. Moreover, these dimensions are rarely static. DAOs may become more centralized or decentralized over time as the community and resources evolve". [25]

This means decentralisation can be assessed at several levels and exists in different degrees, in terms that allow the conclusion that decentralisation develops on a spectrum between total centralisation and absolute decentralisation. We can therefore state centralisation takes place along three axes, all relatively independent of each other: (i) architectural decentralisation (number of physical computers in the system and level of tolerance for their failure, which leads us to the analysis of the settlement layer and to the consideration of the existence of a server or central organisation or, on the contrary, of a public blockchain that allows P2P relationships); (ii) political decentralisation (number of people/organisations that control the system's computers); (iii) logical decentralisation (determine if the interface and data structures are likely to be fractionated without loss of functionality).[26]

---

[24] *De Filippi/Lavayssière* (fn. 19), 204.

[25] World Economic Forum, Decentralized Autonomous Organizations: Beyond the Hype, in collaboration with the Wharton Blockchain and Digital Asset Project, White Paper, 2022, 15. Available at: https://www3.weforum.org/docs/WEF_Decentralized_Autonomous_Organizations_Beyond_the_Hype_2022.pdf (19.07.2023).

[26] *Buterin*, The meaning of decentralization. Available at: https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274 (30.06.2023).

When considering the specific operation of a DAO, decentralisation may also be achieved under three main criteria: hierarchy, influential mechanisms and keyholder/executor centralisation.[27] While hierarchically we do not find, as a rule, any degree of centralisation in a DAO, in the mechanisms and keyholders we can uncover different levels of (de)centralisation. First of all, it is usual in a DAO to have core members with more influence over the remaining members either derived from social rules (i. e., other members tend to follow core members' decisions) or from specific voting rules (which would grant core members decisive voting rights).[28] Should we reflect on the social perspective and we would conclude there is no absolute decentralisation in a community. Since Aristoteles, principles of governance within democracy models have been explored laying down a rule under which diversity would result in better decisions.[29] However, there is a paradox found in the knowledge of people within a community. People don't have the knowledge to vote on everything, which means that decisions on this model are reached by having some people following other people's vote and influence. These informal mechanisms of influence, which are inevitable in a DAO as in any other community, may compromise the goal of independent member participation. To measure this risk, the diversity of the membership should be assessed, even though confidentiality and anonymity may in some cases constitute an obstacle. This monitoring would be helpful in following voting trends in order to assess the degree of decentralisation within influential mechanisms.

Also, it may be possible to identify a centralised power in the keyholder (i. e., "the person who could execute changes to the smart contracts"[30]) which would compromise the decentralisation governance. In any case, it should be noted that decentralisation is shown differently among DAOs. Many DAOs opt for a mix of centralised and decentralised governance, while others evolve from centralisation management when starting a DAOs aiming to achieve, along DAOs life, moderate or complete decentralisation.[31] In fact, we would say that full decentralisation is impossible to achieve at the deployment of a DAO, which means that decentralisation is necessarily a path that needs to be taken.

II. Apart from the complexity of decentralisation due to its different meanings and manifestations in a DAO, there are also difficulties in defining which

---

[27] For the development of these three concepts, see *Boss* (fn. 9), 10 ss.

[28] *Boss* (fn. 9), 12.

[29] On history of politics and lessons for DAO Governance, see *Ast* (public lecture available online at: https://www.youtube.com/watch?v=TIcZj-Oxcgc).

[30] *Boss* (fn. 9), 12.

[31] On this point, *Axelsen / Jensen / Ross* state that "no DAO can start decentralized, as any project must be initiated by a small core team, bootstrapping development until the project matures and attracts open-source contributors", see, CSIMQ, no. 31, 51–75, 2022, 69. https://doi.org/10.7250/csimq.2022-31.04, Available at SSRN: https://ssrn.com/abstract=4210073 (19.07.2023).

aspects of the DAO's functioning should be assessed in order to determine the level of decentralisation. In fact, decentralisation may be considered on the basis of the structure of a DAO or based on the degree of decentralisation of its activities. The question arises as to whether we should consider only the governance structure of a DAO or also the way in which off-chain activities are carried out.

In respect to decentralisation of off-chain activities it should be noted that decentralisation can be achieved in several different ways. A first hypothesis consists in attributing decision-making powers to each member of the community, another way to consider is the division of the community into subDAOs, which may receive funding from the DAO and be subject or not to the instructions of the community, expressed through voting. Finally, a legal entity – typically a foundation or trust – can be set up to carry out functions on behalf of the community.[32]

III. How can a future regulation address decentralisation?

1. Principles and COALA Model Law

1) The exercise of EU competences should be governed by subsidiarity and proportionality principles.[33] Adequacy should be also assessed when shaping regulation. In fact, "the very function of proportionality is to reconcile the need for uniform rules and for the further integration of the single market with the adaptation of the rules, with proper justification, to realities that are still very different within the internal market, in order to achieve fair and efficient application of the law".[34] When considering the financial sector, "proportionality obliges the Union legislator to strike a balance between all the principles, objectives and interests involved when crafting the Union banking regulations".[35]

---

[32] *Boiron* (fn. 10) 16. Naturally, also in relation to each subDAO, it will be necessary to evaluate the degree of coordination of efforts among its participants, insofar as, with efficient coordination between them, they may be subject to securities regulation. It is also possible to split the subDAOs into "supported subDAos" and "operations subDAOs". The former would dedicate themselves to off-chain tasks that generate value for the protocol, while the latter would assume the role of supporting the former (17). It is not easy to determine which legal entities should be used by subDAOs to carry out off-chain activities without consequent centralisation. If all DAO off-chain activity is performed through a single entity there will certainly be efficiency gains, but also loss of decentralisation. A possible solution is to have a legal entity corresponding to each subDAO and offering some protection to its members (20).

[33] See both Article 5 of TEU and Protocol (no 2) on the Application of the Principles of Subsidiarity and Proportionality.

[34] *Zilioli*, in: Baums/Remsperger/Sachs/Wieland (eds.), Währungsunion und stabiles Finanzsystem (in the honor of Helmut Siekmann), Duncker & Humblot, 2019, 28.

[35] *Zilioli*, (fn. 35) 16.

The right balance between these principles and the interests found within the (more) digital financial sector is not an easy task. Difficulties arise when considering blockchain-based technology underlying the provision of services or the existence of new agents as DAOs. In fact, digital transformation does not solely impact the market and business operators but also the legal field and, consequently, how law is perceived, interpreted, and applied. Digital legal framework currently requires the articulation with both multiple players (and regulators) and different levels of regulation, which include policies, codes and co-regulation. Besides, the legal system is now presented with a "rule as code" approach consisting in creating and publishing rules and regulation in a way that is considered "better suited" for digital service delivery which definitely impacts how regulation is construed. Following this path, legal concepts are increasingly being replaced by technical descriptions of the technology itself, and rules are created taking into account the specific uses of said technology, categorising behaviours according to the potential risk or consequences of the use of the technology. The Recently approved Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence constitutes an example.[36]

2) Stating human-centred legal design as a challenge entails regulators to also consider the application of new principles, such as the functional equivalence and technology-neutrality.

Functional equivalence approach first appeared on the UNCITRAL Model Law on Electronic Commerce[37] as "based on an analysis of the purposes and functions of the traditional paper-based requirement with a view to determining how those purposes or functions could be fulfilled through electronic-commerce techniques".[38] This approach would facilitate regulation of technology if EU institutions were to follow technology developments more closely. Despite

[36] Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts, COM(2021) 206 final, 2021/0106 (COD), Brussels, 21.04.2021. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0206 (27.07.2023).

[37] United Nations Commission on International Trade Law (UNCITRAL), Model Law on Electronic Commerce with Guide to Enactment 1996 with additional article 5 *bis* as adopted in 1998 (the "Model Law on Ecommerce"). Available at: https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/19-04970_ebook.pdf (27.07.2023).

[38] Model Law on Ecommerce, 20. For these purposes, it is clarified that "[the] Model Law does not attempt to define a computer-based equivalent to any kind of paper document. Instead, it singles out basic functions of paper-based form requirements, with a view to providing criteria which, once they are met by data messages, enable such data messages to enjoy the same level of legal recognition as corresponding paper documents performing the same function. It should be noted that the functional-equivalent approach has been taken in articles 6 to 8 of the Model Law with respect to the concepts of "writing", "signature" and "original" but not with respect to other legal concepts dealt with in the Model Law. For example, article 10 does not attempt to create a functional equivalent of existing storage requirements" (21).

Index of Subects

Attacks 227–237
Arbitration 163–164, 268–274

Blockchain
– Concept 29–31, 62 ff., 208
Blockchain-based dispute resolution 165–168
BORG (Blockchain Organised and Governed) Model 48–50, 120–121

COALA Model Law 9–13, 19, 37, 118, 129–131
Code is law 188
Conflict of laws
– Law applicable to smart contracts 254–274
Civil Liability 169 ff.
– Between DAO members 177
– Between DAO and third parties 177–178
– Causal relation 180–183
– Group liability 183–184

Decentralisation 1 ff., 27 ff., 59 ff., 127–128, 174 ff., 195
– Categories 32 ff., 66 ff.
– Decentralised in name only (DINO) 5
– Full decentralisation 4 ff., 33
– Technical 34–40
– Economic 40–45
– Legal 46–52
DeFi (Decentralised Finance) 13–14, 88, 107–109, 215–225
– Risks 220–225
Determination of law applicable to companies 278 ff.
Duties of care 186–188

Employment 132–133
Enforcement of Court Decisions 158–160

Firm 207 ff.

Governance 2 ff., 194
Governance tokens 20, 102, 147–148, 174 ff.

Jurisdiction of State Courts 148–158

Knowledge attribution 191 ff.

Legal Status of DAOs under
– Portuguese law 3, 193–194
– Swiss Law 142–148
– US law 49–51,139–141
Legal Personality 93 ff., 214
Legal wrapper 49–50, 65, 102–106, 117, 140, 197–198, 203–206
Limited liability
– In general 115
– For DAOs 115 ff., 214

Maverick DAO 141 ff.
MiCA Regulation 13–14, 17–19, 39, 65–66, 87–88, 108, 210–213

Oracles 173, 253

RegTech 23–25
Representation 196

Smart contracts 2 ff., 30–31, 96–97, 198–203, 250 ff.

State court 138 ff.
Service 160–163
Sub-DAO 130–132, 197, 203–206

Taxation 46, 240 ff.
– Ability to pay taxes 240
– Autonomous taxation 241–242
– Indirect taxation 244–245
– Of participants 245–246
TIGER Assessment 19, 20, 72–79
Transaction costs 208 ff.

Voting 63–64, 76–77, 100–102