Web3 & DAOs: an overview of the development and possibilities for the implementation in research and education

Conference Paper · April 2022

DOI: 10.23919/MIPRO55190.2022.9803324

1 author:

Sara Filipčić
University of Zagreb
4 PUBLICATIONS **5** CITATIONS

SEE PROFILE

Web3 & DAOs: an overview of the development and possibilities for the implementation in research and education

S. Filipčić
* University of Zagreb, Department of Social Work, Faculty of Law, Croatia
sfilipc@gmail.com

***Abstract* – Web3 brings an enabling set of technologies that has the potential to completely reshape many different fields, including research and education. Today we are faced with challenges around regulation, data safety and privacy, as well as governance and bureaucracy - to name just a few. As Web3 gains more traction globally it activates new paradigms to engage, govern, create, iterate, and implement around research results in ways that were previously complex and arduous. The Decentralised Autonomous Organisation (DAO) is one such empowering Web3 utility, and within this framework researchers and experts have the opportunity to implement and test their research results promptly on a small or large scale as required. In this paper, we provide an overview of Web3 technologies and their implications for education and research. Our aim is to introduce researchers, educators, and decision-makers to the potential of using Web3**

Keywords – Web3; DAO; research; education

I. INTRODUCTION

We are at the beginning of a new online era - the Web3 era. With its foundational technology, the Blockchain, Web3 has the power to change people's lives the way the Internet has over the last twenty years [1]. Blockchain is a disruptive technology that provides a decentralized solution for communication and transactions [2]. The decentralized nature of blockchain technology provides a foundation for profound systemic changes in society. In general, a centralized platform relies on a controlled database as a foundation to provide value to its users, which requires the trustworthiness of a third-party service provider. Many of the Internet applications (e.g., email and the Domain Name System) remain largely centralized in terms of their management and core development. This centralization brings with it issues with transparency, data integrity, data privacy and security, with clear correlations with the current multi-faceted embedded centrality of internet from client-server communication structure to the Public Clouds and Cloud based systems [2]. Similarly, the issue of trust in cloud-hosted data storage is another challenge of the centralized nature of the Internet, in the need for verifying that the cloud is not corrupting the data stored by customers [1].

In contrast, decentralization means that the database does not depend on a particular organization or administrator but is distributed among all peers [3]. Such technological advancement could bring positive change to

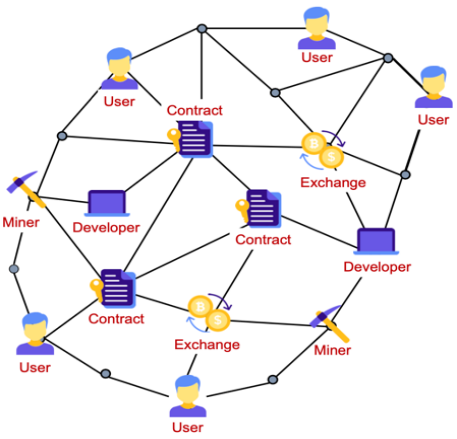

Figure 1. The structure of DAO [16]

systems facing trust issues (e.g., finance, politics, or any data collection system). Blockchain, with its premise of immutability, transparency, and peer-to-peer consensus as well as benefits of transparency, accountability, integrity, scalability, security and privacy can provide the means for trustworthy auditing of networked systems while returning much of the control to the edges of a network [2-3].

Today, Web3 is an early embodiment of blockchain's acceleration of technological change, which is already having a profound impact on society and the economy. The potential impact of Web3 technologies (e.g., blockchain) is endless - in transforming finance (DeFi), law (data privacy), research (data sharing), as well as new forms of ownership (NFTs) and, more recently, research and education (k12crypto, k20educators)

Central to this theme is an understanding of a DAO framework. DAOs are decentralized, autonomous organizations governed by a community and smart contracts (as seen in Figure 1) [16]. They enable people to coordinate and govern themselves through self-enforcing rules encoded in a software infrastructure on a public blockchain [4]. The community-centric nature of DAOs makes them potentially fertile ground for testing hypotheses and extending research findings to more practical insights. Beyond that, they are enabling a new research methodology based on transparency, data privacy, and ease of data sharing.

The goal of this paper is to provide an overview of Web3 technologies, their benefits, and risks, and to explore the impact of Web3, particularly the DAO framework, on the research community and the education sector.

II. WEB3 OVERVIEW

A. Online evolution: from Web1 through Web 2 to Web3

A basic understanding of the concept of Web3 can be gained through comparison to its Web1 and Web2 predecessors, as shown in Table I. The hallmark of Web1 was "read-only", meaning that only technology enthusiasts and technology companies could create the content that users then consumed. Communication was created with Hypertext Transfer Protocol (HTTP) which was the hallmark for establishing static web pages as content on the Web [2]. Relative to today, only a small amount of content was created, and the majority of users were content consumers. But some of the problems of Web1 included its slowness and the constant need for site updates every time new information reached web pages; and the fact that it was not possible to use the power of network effects, relying only on a few authors and a large number of readers [5]. It was the crash of the dotcom bubble in 2000 which led to the next iteration of the Internet.

Web2 introduced the "read-write Web" - also referred to as the participatory social Web - allowing users to create shared content by utilizing server-side scripting to allow online services and proliferate [2]. With Web2 we saw the rise in popularity of centralized social platforms and global websites emphasizing user-generated content (UGC) and usability for end users. Web2 was the next generation of network services and transformed the world wide web network into a platform by supporting content sharing through applications such as wiki, web blogs, etc. [5]. Some of the problems of Web2 were in its security (easy to hack - e.g., Cross Site Request Forgery, Cross Site Scripting, Information Leakage etc.) and its centralized nature [5].

This leads us to the Web3 "read-write-own" version of the Internet, where user data is no longer owned by centralized platforms and users can more easily move their data assets between platforms, allowing different services to display different views for the same assets or data. Web3 tools provide interoperability that is immutable and trustless, enabling powerful new applications for every corner of society. Yahoo founder Jerry Yang said of Web3, *"...you don't have to be a computer scientist to create a program. We are seeing that manifest in Web2, and Web3 will be a great extension of that, a true communal medium... the distinction between professional, semi-professional and consumers will get blurred, creating a network effect of business and applications"* [5]. And that's what we are witnessing right now - both technical and non-technical people building the new Internet.

TABLE I. DIFFERENCES BETWEEN WEB1 – WEB3

Web1	Web2	Web3
Mostly Read-Only	Wildly Read-Write	Portable and Personal
Company focus	Community Focus	Individual Focus
Owning Content	Sharing Content	Consolidating Content
Web Forms	Web Applications	Smart Applications
Directories	Tagging	User Behaviour
Page Views	Cost Per Click	User Engagement
Low data richness (HTML/Portals)	Medium data richness (XML/RSS)	High data richness (RDF/RDFS/OWL)

B. What are Web3 technologies and applications?

To ensure the quality of the content of this article, we start with a clear explanation of a few important concepts: “Blockchain”, "DAOs", and "Smart Contracts".

The goal of the Web3 movement is for decentralised and democratised control of the Internet, rather than control being in the hands of an oligarchic group of interdependent multinational corporations [6]. In other words, one of the aims of Web3 is to provide solutions to data security and privacy problems in the 21st century by negating the roles of corporations that have established themselves as the trusted intermediaries.

This is possible due to blockchains that allow the Internet to achieve a distributed state of the network by allowing ‘trust’ to be shared across the connecting networks. This ‘trust’ gives the notion of web of trusts between nodes in the Blockchain [2]. Blockchain is described as a database that is used as storage for a decentralized network [2]. It can also be described as a decentralized and immutable database that facilitates its chain network with its participating nodes through a voting scheme [2].

One of the applications of Web3 that provides the framework for the above is “DAO” - a blockchain-based system whose governance is decentralised, that is, independent from central control [10]. DAOs can also be viewed as participatory governance structures for self-management of digital resources, where rules are mediated by software code. As such, they are a promising digital governance infrastructure for people to operationalize data trust principles [7].

Currently, DAOs are still a highly experimental governance model, as both the tools and the science behind them are still evolving through the research and development of different DAO communities. They are heterogeneous and appear in many forms with different goals, from shared investment vehicles like FlamingoDAO to community platforms for building and funding the Open Web like GitcoinDAO.

DAOs vary widely in their legal structure, from registered legal entities in which only accredited investors can participate to completely unregistered open-source software organisations. Varying goals mean that some DAOs are optimised for a variety of objectives, including financial gain, ideologically motivated efforts at

decentralised software development, social engagement, or more complex social purposes [7].

As an example, to design DAOs as data trusts, there is a need for a clear purpose, an infrastructure of smart contracts and tokens, clear rights, and duties over the data, clearly defined decision-making processes, an articulation of how benefits are shared, and a token economics model for sustainable funding [7]. In this structure, digital tokens are leveraged as value to align incentives (rewards); as payment to fund the operations of the DAO; or as staked collateral which risks penalty upon misbehaviour to enforce good behaviour in the system [4].

The most important aspect of DAOs is that they are collectively owned and managed by their members (through the ownership of digital tokens). By using smart contracts, a DAO can easily enforce its own rules, policies, and functionalities - but they are only as good as their underlying smart contract.

In simple terms, smart contracts are code that is installed on and executed by a blockchain. They have a unique address where they store code, data, and a balance that provides them value [8]. As visible in Figure 2 [16], Smart contracts are the backbone of any DAO, ensuring that automated processes run according to predefined rules - the rules that are written into the code, where they are transparent, verifiable, and enforceable.

C. *Web3: Challenges and steps towards building solutions*

As with all new technologies, Web3 brings important challenges to be aware of, provided here with some examples of the tools and systems being developed to solve them.

1) Perceived high barriers to entry: similar to the early days of the Internet, one of the current problems of Web3 is the public perception of applications of these technologies as "scams" - particularly noticeable in the areas of crypto-coins and digital non-fungible-tokens (NFTs). To participate, the current requirements do require some technical understanding, and these perceived complexities create barriers to entry, so mainstream consumers are resistant to many of these ideas. To address this problem, there are many Web3 projects that are educating the general public about the technologies behind Web3. One of the biggest projects is "Rabbit Hole" - a learn-to-earn platform where individuals earn tokens while learning how to use and contribute to decentralised applications. Another example is "BuildSpace" - a project-based learning program for developers, where they can learn Solidity (a programming language designed for developing smart contracts that run on Ethereum), and how to create NFT and/or DAO projects.

In addition, there are many “no-code” tools that allow non-technical people to quickly build and work in the Web3 space. The best known are: 1) Aragon - a platform that allows any participant to collaborate with others without involving a third-party organization by creating a DAO; 2) Colony - an infrastructure that enables organizations to collaborate with each other through decentralized software implemented on Ethereum; 3) DAOstack - an open source, modular DAO project which leverages the technology and adoption of decentralized governance and allows people to create dApps (decentralized applications), DAOs, and DAO tools [1].

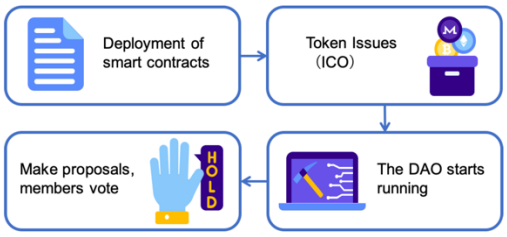

Figure 2. Steps to launch a DAO project [16]

2) Energy consumption: On the technical side, the current consensus mechanics for establishing the trustworthiness of blocks, called "proof-of-work," is not only complex to understand, but can also consume a non-trivial amount of energy. "Proof-of-work" (PoW) requires network validators to solve a mathematical puzzle to become the entity responsible for validating the last block, consuming a large amount of energy in the process [9]. The complexity of the calcuation is determined by the overall computation power of the Blockchain, and the length of the chain is proportial to the amount of workload [2]. PoW has its foundations from cryptocurrenctis like Bitcoin and Ethereum. If Bitcoin were a country, it would be one of the top 30 energy consumers in the world [9]. To move this in a "greener" direction, developers are steadily rolling out implementations of proof-of-stake models that consume less energy than proof-of-work because it does not require computing power to solve a mathematical problem, but instead awards the right to validate transactions to different validators depending on the percentage of tokens locked by each validator [9].

3) Legal aspects: Another point that shows both how early the implementations of these technologies are, and their risk, is the fact that there are little to no regulations or laws that specify what can be published or used. Currently, the state of Wyoming is the only US state that has approved a DAO with having legal status, whilst El Salvador is one of the earliest nation-state adopters of cryptocurrency, having introduced bitcoin as the country’s legal tender in September 2021.

A 2021 research study [7] notes that the “autonomous” nature of a DAO is incompatible with the notion of legal personhood, as legal personhood can only be established if there is one or more identified actors responsible for the actions of a particular entity. For DAOs however, this might not necessarily be the case. The discussion on whether a DAO should be identified and recognized as a legal person has important implications in the legal field, as it can determine the extent to which a DAO can be considered a separate legal

entity from its human actors, and thus the extent to which these actors can be shielded from the liabilities of the DAO [7].

4) Security threats: In 2016 the first ever instance of a DAO resulted in a well-publicised scandal - "The DAO" taught the world about the potential of getting hacked. The DAO project was the largest crowdfunding project in history with 11,000 members and 150 million dollars raised [1]. The project was an overnight success - until a hacker took advantage of a well-intentioned but poorly implemented DAO feature designed to prevent the majority from tyrannising over dissenting DAO token holders [3]. This made The DAO vulnerable and in return the attacker was able to steal about $50 million dollars' worth of ETH (cryptocurrency) [3]. The outcome resulted in a "hard fork" in the Ethereum blockchain and an expensive list of risk mitigating procedural best-practices [3].

One potential solution could be in endowing the curators with limited decision authority, something equivalent to a "pause" button on transaction [14]. For this to happen, the governance model should change.

5) Engagement: As for the challenges within DAOs, one of the current biggest one is related to the engagement's numbers - existing research shows that less than 10% of members vote on proposals [10]. In addition to that, procedures are slow, as consensus is required for certain actions.

Regardless, these first organisations can be seen as guinea pigs that are experimenting with a novel system for the first time thus still finding and building a way towards a higher engagement [10].

III. WEB3 IN SCIENCE

A. Web3: potential of improving research field

For more than 300 years, scientific publications have served as cornerstones of scientific knowledge, linked by citations. This model has continued, with only minor interruptions, over the past several decades into today's digital age of Web3. As we now move toward a future in which the peer-to-peer Web3 is increasingly disruptive and entire industries are rapidly changing, it is highly likely - if not inevitable - that the implementation of Web3 technologies will continue to improve the research field.

In the last decade, technological innovations have led research consortia to use data-driven approaches and make smart decisions together to improve research activities [8]. One of these is data sharing, which has the potential to maximize knowledge gains from research efforts in multiple domains.

Previously widely used privacy and data sharing tools were often criticized for problems with centrality. In recent years, distributed ledgers and blockchain technology have shown promise in supporting immutable and trusted data sets in a variety of use cases. The use of blockchain technologies in data collection and sharing ensures that participants have the ability to obtain, own, and use their data [13]. In a 2019 article [13], the researchers propose a viable blockchain-based model for researcher data collection that makes access verifiable, provides complete and updated information, and offers variable proof of provenance, including all accesses/shares/uses of the data.

In this way, data owners not only enjoy greater transparency and protection of their data but may also be given an additional incentive through digital tokens, acknowledgements, or both, to share their data with data seekers and become active participants benefiting from the research data economy.

One of the elements of data sharing is the easy availability of data and the opportunity for researchers/data owners to be rewarded with either digital tokens or recognition for their data collection efforts. The system gives registered users clear guidance on what smart contracts do with their data [4]. With their smart contract on the public Ethereum blockchain, researchers can retain ownership of their data and are rewarded according to agreed-upon terms. An example of this would be that users no longer need to log in with an "@pravo.hr" email address to access databases, a valid token holder could simply connect their wallet as confirmation and then access the relevant data as required.

One of the examples of Web3 technologies providing the foundation for decentralized science is "The Open Science Decentralized Autonomous Organization" (OPSI), which is working with its community towards open scientific research workflows that are discoverable, accessible, interoperable, and repeatable. Its active working groups address decentralized file storage for research data management, variable scientific reputation, game-theoretic peer review, and the renewal of scientific work.

Another potential impact of Web3 technologies is the provenance of research results. By having a simple process to connect their digital wallet, researchers increase their accountability by enabling transparent data collection and analysis by signing off on relevant entries and/or data transactions. This also gives participants the ability to take ownership of their data, empowering them and potentially increasing participation rates. This could be achieved through incentivising crowdsourced data collection. In this way, participants can sign up and receive tokens in return. One such example is Brave.com - an Internet browser created around privacy, shielding its users from unsolicited advertisements and trackers, whilst allowing them to take control of their data, and even opt-in to a desired level of advertising in return for earning BAT coins ("Basic Attention Tokens").

An existing problem in research is that its organization and culture is increasingly centralized, hierarchical, top-down, and privatized. This includes the centralized organization of institutional research activities, research evaluation and funding, publishing, and the centralized view of the global research community [15]. Increasing centralization combined with its private commercialization contributes to challenges faced by the global research community that include: a) an unsustainable business model, b) inflexible and inefficient funding, c) increasing inequality, d) fixed boundaries and

social norms, e) inaccessibility, f) lack of transparency (detailed in [11]. One possible solution is the creation of a Global Research Decentralized Autonomous Organization (GR-DAO).

A Global Research Decentralized Autonomous Organization (GR-DAO) has been proposed as a global community of researchers dedicated to collectively creating knowledge and sharing it with the world. As part of their DAO they support research activities such as: Research funding, research evaluation and assessment, research education, and the dissemination of scientific research via Open Access and Creative Commons licences in the public domain [11]. As a result, they provide the following solutions: a) They are faster: by utilizing smart contracts, research findings may be published more quickly allowing for more chances to be built upon. The acquisition of information and data may be done quickly by utilizing the data sharing platforms outlined above [11]; b) Anonymity and access: allows for the productive use of data that has been obtained in a secure way, as well as access to such data; c) Influence of culture: the notion of privacy and sharing and "User-centric" information that provides the feeling of safety.

B. Education: use cases

There are already several Web3 projects building towards a new educational system, two of which stand out and we will highlight here.

K12 Crypto is a free learn-to-earn platform for K12 students and schools that enables students to earn reserve-backed stablecoins and other digital assets during their educational journey. Students can explore different learn-to-earn curriculum on their platform, while schools can integrate the K12 crypto to unlock additional learner rewards and incentivize value-aligned metrics important to their communities. Upon graduation, students take full custody of their time-locked wallets.

The Educators at k20 are building the “Eduverse” – a metaverse hub for educators. Their mission is to connect educators from around the world to “collaborate transcending local obstacles to produce global solutions”. As the k20 founder Vriti Saraf says: *“For a very long time, our credentials have focused on grades and the name of the verifying institute. Instead, what if we focused on the output and performance, you’re able to gain? If I took a class on robotics, I could put the actual robot [coursework] on chain, not the grade. People could track the process, and it’s a much better indicator of who I am and what I learned.”*

Another project gaining a lot of traction in this space is "CCS - Crypto Culture and Society" where people can come together to explore the broader social implications of Web3.

As Jerry Yang, the Yahoo founder predicted, people from different backgrounds are building, contributing with their unique skillsets and perspectives to a better collective future. Vriti Saraf and Courtland Leer (a co-founder of K12 Crypto) are educators, who are now on the frontier of building Web3 solutions to challenges in education.

C. Legal structure in practice

Most of the emerging DAOs originated in the United States and have evolved in confrontation with the local U.S. regulatory environment. According to Aaron Wrights (founder of LexDAO and LAO), DAOs can be either “wrapped” or “unwrapped [15].

“Unwrapped” DAOs are not legally registered in any country and rely on their internal digital dispute resolution mechanisms to regulate the group. On the other hand, 'wrapped' DAOs use existing legal structures such as U.S.-based corporations (e.g., a Delaware limited liability company (LLC)) to register DAO as a business or other nonprofit entity, giving it legal personality [15]. Member-managed LLCs are permitted in the U.S., where no single registered manager or owner is required for the entity. In this structure, the members jointly manage the business with limited liability protection and are not subject to joint and several liability [15]. The member-managed LLC structure fits the collective mechanisms of DAOs to some degree and has proven effective in the early stages.

Recently, both Wyoming and Vermont have passed legislation allowing DAOs to register as LLCs or blockchain-based LLCs under their own names with legal personality. There is also a new regulatory regime from Malta that allows the registration of 'Innovative Technology Arrangements' or ITAs for Bitcoin technologies (DTLs) [15]. This will provide some level of government oversight and recognition for new and emerging forms of discontinuous innovation in legal, financial, organizational, and other applications of DTLs. While this system does not give legal personality to ITAs, it does provide a degree of certainty to stakeholders. This system is an application- and technology-independent approach to regulation that considers new and discontinuous innovations on a case-by-case basis, allowing for greater flexibility in dealing with the emerging and potentially radical new applications of DLTs [15].

Given that DAOs will play an important role in the development of blockchain, DeFi, Web3, and governance, it is likely that a more permissive regulatory environment will be required in Croatia. Given that DAOs hold the promise of being massively scalable, efficient, and non-hierarchical organizations capable of disempowering players in various industries and providing innovation for governance in general, researchers and legal advisors should begin work on a potential regulatory framework in Croatia.

D. Future Implications

We are just beginning to see the use of Web3 in a variety of areas, including research and education. The sheer volume of developers entering the Web3 space in these early days shows just how promising these technologies are.

Web3 developers are already creating user-friendly platforms that allow non-technical people to work and interact with Web3 technologies. One example is the development of Layer 2 technologies that enable lower cost, scalability, and higher throughput while preserving

the integrity of the original blockchain, allowing for further decentralization, transparency, and security.

While Web3 gave rise to massive data centers to store, organize, and use people's data, these centralized stores are now being replaced with decentralized computing. The decentralized way of handling data will allow us to produce and consume 150 times more data in 2025 than in 2010 [12]. This upward trend will further advance the "data economy" by enabling people to take control of their own data and sell/trade (or otherwise) it as required without relying on third parties.

Web3 is paving the way for a “trustless” future where people and machines can interact sharing services, data, and value without counterparties being involved - leading to a human-centric, privacy-preserving computing structure for the next wave of the Internet.

IV. Conclusion

As society’s data needs continue to evolve, the Web3 era is fundamentally changing many systems that have proven to be flawed, outdated and that have negatively impacted people's everyday lives. Some of these include finance, politics, news and social media - and now research and education. Regardless, there are still a lot of challenges to be solved and regulations to be put in place to make this space both more human-friendly and trustworthy.

This paper has explored some of the implications of Web3 in research and education, such as the potential of using a DAO framework for conducting research and testing hypotheses, as well as using blockchain-based-solutions to tackle educational challenges. We’ve also touched on several initiatives to explain the context in which DAOs are an appropriate tool for research and for research outcome implementation.

While Web1 was reserved exclusively for tech-savvy people and Web2 brought centralized problems with its inclusivity, Web3 is blazing a trail for inclusive, trustworthy systems built by people from all walks of life. The Web3 stack enables systematic change, and since we are still in the early stages, space is created for experimentation and learning by doing. Therefore, we invite researchers, lawyers, policy makers, and others to explore the possibilities of Web3 technologies and contribute to a better Internet.

This paper might benefit decision makers in legal systems to further explore potential legal structures for Web3 technologies to be implemented in Croatian research and education as well as any other data driven systems. It can also help researchers and educators to get a general idea about potential of Web3 in the space.

References

[1] H. L. Gururaj, A. A. Manoj, A. A. Kumar, A. M. Holla, S. M. Nagarajath, and V. Ravi Kumar, “Blockchain: A new era of technology,” Cryptocurrencies and Blockchain Technologies and Applications, in press.

[2] J. Zarrin, H. W. Phang, L. B. Saheer, and B. Zarrin, “Blockchain for decentralization of internet: prospects, trends and challenges,” Cluster Computing, in press.

[3] L. Liu, S. Zhou, H. Huang, and Z. Zheng, “From technology to society: an overview of blockchain based DAO,” unpublished.

[4] K. Nabben, “Decentralised Autonomous Organisations (DAOs) as data trusts: a general-purpose data governance framework for decentralised data ownership, storage and utilisation, upublished.

[5] K. Nath, S. Dhar, and S. Basishtha, “Web 1.0 to Web 3.0 – evolution of the Web and its various challenges,” International Conference on Reliability Optimization and Information.

[6] J. M. Garon, “Legal implications of a ubiquitous Metaverse and a Web3 Future, unpublished.

[7] S. Hassan, and P. De Filippi, “Decentralised Autonomous Organisation,” Internet Policy Review, in press.

[8] O. Rikken, M. Janssen, and Z. Kwee, “The ins and outs of Decentralised Autonomous Organisations (DAOs): unravelling definitions, characteristics and emerging developments,” unpublished.

[9] FTSE Russel, “Proof-of-stake: a crypto path to lower energy consumption and yield,” Digital Asset Research, in press.

[10] Y. Faqir-Rhazoui, J. Arroyo, and S. Hassan, “A comparative analysis of the platforms for decentralised autonomous organisations in the Ethereum blockchain,” Journal of Internet Services and Applications, in press.

[11] K. L. Page, and A. Elmessiry, “Global Research Decentralised Autonomous Organisation (GR-DAO): A DAO of Global Researchers,” unpublished.

[12] D. Reinsel, J. Gantz, and J. Ryding, “The Digitization of the World,” unpublished.

[13] A. K. Shretsha, and J. Vassileva, “Blockchain-based research data sharing framework for incentivizing data owners,” Springer International Publishing, AG, part of Springer Nature 2019, S. Chen et al., Eds. ICBC 2018, LNCS 10974, 2018, pp. 259-266.

[14] R. Morrison, N. C. H. L. Mazey, and S. C. Wingreen, “The DAO controversy: the case for a new species of corporate governance?” Policy and Practice Reviews, in press.

[15] S. Moore, “Towards a functioning legal framework for emerging DAO technologies in Australia,” unpublished.

[16] L. Liu, S. Zhou, H. Huang. And Z. Zheng., “From technology to Society: An overview of Blockchain-Based DAO