A survey of DAOs and their governance procedures

Rahim Klabér[1] , **Johan Pouwelse**[1]

[1]TU Delft

r.e.p@student.tudelft.nl, J.A.Pouwelse@tudelft.nl

Abstract

The rise of blockchains has led to the idea of Decentralized Autonomous Organizations (DAOs). The organizations allow a group of people to work towards a shared goal. DAOs use smart contracts to ensure transparency and that no one has any special powers. However, DAOs are not as decentralized as they seem. In this paper, we described the governance process of several popular DAOs. We show that many of the popular DAOs use the same or similar governance processes and that many of these DAOs are not decentralized at all. In fact, they are controlled by a small majority and in some, the DAOs do not have any actual power to make decisions, only influence.

1 Introduction

The introduction of Bitcoin [1] allowed anyone to send and receive money without any middle-men. Newer blockhains like Ethereum [2] took this idea further by allowing financial application to be built that no one controls.

This eventually led to the so-called Decentralized Autonomous Organizations (DAO). These organizations are collectively owned with no one leader [3]. DAOs allow a group of people to work together towards a shared goal without anyone having special powers. A popular DAO was the DAO. However, the DAO was hacked and lost a significant portion of its funds [4]. This resulted in Ethereum undoing the hack and returning the stolen funds. This showed that DAOs are not as decentralized as they seems.

Currently, DAOs are mostly used to govern blockchain-based applications. Through proposals, DAO members can vote on the actions of the DAO. However, most DAOs are not decentralized at all [5].

In this paper, we describe the governance process of a number of popular DAOs and discuss what effect the processes have the DAO. section 2 gives some background on DAOs. In section 3 we describe the governance process of some of the current popular DAOs and discuss them in section 4. Finally, we conclude the paper in section 5.

2 Background: DAO

There is no one definition for what a DAO is. The Ethereum foundation describes a DAO as "a collectively-owned, blockchain-governed organization working towards a shared mission" [3].DAOs do not have a leader and decisions are made through voting. Proposals can be put forward and executed if enough members voted for them. Due to being blockchain-governed, decisions made by the DAO are transparent and executed automatically [3]. DAOs are often used as a way to govern blockchain-based applications.

Membership

There are different ways to model DAO membership. Namely, Token-based membership, share-based membership, and reputation-based membership [3].

DAOs with token-based membership model membership with specific DAO tokens on a blockchain. The more tokens a member has, the more their votes are worth. Prospective members can acquire tokens in multiple ways. For example, by buying it on an exchange, by being rewarded for providing liquidity on an exchange, or by being rewarded for using a blockchain-based application.

Share-based membership is more permissioned compared to token-based membership as users cannot become members as easily. Prospective members can join the DAO by submitting a proposal and fulfilling the requirements such as paying the DAO to receive shares. The shares allow members to vote. However, contrary to tokens, shares are non-transferable. An example of a share-based DAO is The Lao [6]. The Lao allows members to collectively invest in projects and is limited to 99 members. Members must pass an Accreditation process and are allowed to buy a limited amount of shares. Members receive proceeds from investments based on the number of shares they own.

Token-based membership allows anyone to influence the DAO if they have enough tokens. With reputation-based membership, users gradually gain voting power by participating in the DAO. Reputation cannot be sold or transferred.

Proposals

Proposals allow a DAO to make a decision. A proposal can include code that is executed if the proposal passes, this is the autonomous part of a Decentralized Autonomous Organization.
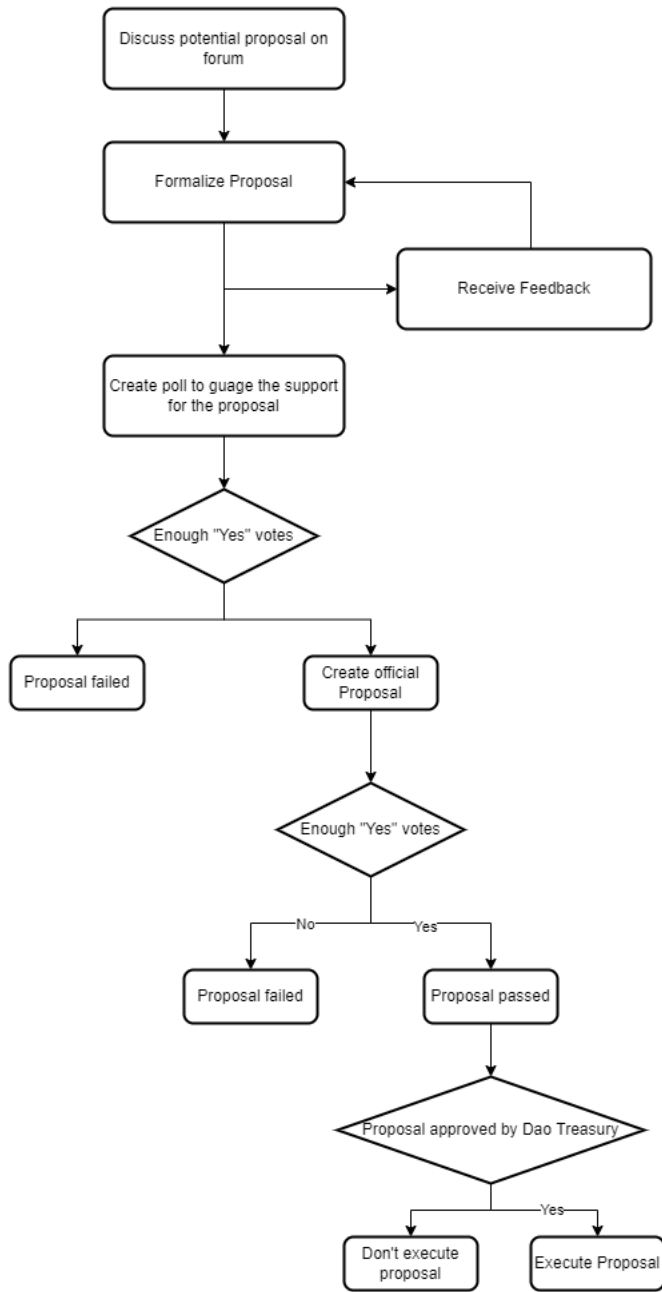
Figure 1: 1Inch Dao Lifecycle

Before a proposal is formally proposed, the idea might be discussed with members of the DAO to receive feedback or gather support for the proposal. The proposal is adjusted based on the feedback of the members before being proposed. Chat platforms or internet forums are used to discuss the proposal. There are also specialized DAO platforms, like alchemy [7], that enables both discussion and the possibility to submit and vote on proposals. Figure 1 shows the lifecycle of a proposal submitted in the 1Inch DAO.

There are two main proposals are submitted. First, proposals can be submitted through a smart contract. The smart contract registers the proposals and allows others to vote on them. Passing a proposal can allow for one or multiple transactions to be executed. Because of this, some DAOs institute a waiting period after a proposal is accepted, so the proposal can be reviewed to make sure no bugs are present. To prevent spam, members might need a certain amount of stake or reputation in the DAO to propose a proposal. Second, a proposal can be proposed by making a post on a forum. In the previous case, the forum might be a front-end for a smart contract. However, in this case the forum is a website that does not create or mutate a smart contract. As with the previous case, members can vote on the proposal. However, in this case, no transaction is executed in case the proposal passes. Instead of being binding, this is a way for members of the DAO to gauge the support of a particular proposal. However, there are certain DAOs where a small number of members control the smart-contract, in which case they would execute the proposal on behalf of the DAO. For example, in Figure 1 a proposal must be approved by the "DAO Treasury".

Voting

A proposal can be voted on once it has been created. In general, proposals need a minimum amount of votes and a majority of yes votes to be passed. There are two main ways voting can be done. First, members can cast their vote by interacting with a smart contract. This records their vote on the blockchain publicly. However, voting by interacting with the blockchain can incur fees. Instead, members can vote through an "off-chain" mechanism like Snapshot [8], which allows DAO members to vote without paying blockchain fees. However, since these votes do not occur on the blockchain, another mechanism must be used to execute the proposal. For example, relying on a small group of trusted members or through a more advanced mechanism like oracles [9].

Simple scoring rules like majority voting are susceptible to situations where a small group of members have substantial power. To combat this and other situations there are different scoring rules for voting, such as quadratic voting [10] and holographic consensus [11]. Quadratic voting is used to limit a single member's power by using a quadratic formula to price votes. While holographic consensus allows DAOs to scale to members by making voting require less participation.

Delegation

DAOs can be overwhelming for the normal user. DAO proposals can be extremely technical and not all members are qualified to vote on these proposals. Additionally, not all members have the time to evaluate and vote on proposals.

A solution to this is Delegation, which allows members to temporarily give their voting power to another member.

3 DAO analysis

3.1 1inch DAO

1inch [12] is a blockchain-based application that connects multiple decentralized exchanges together to give users a better price when trading digital assets. 1inch also has its own decentralized exchange. 1Inch is a token-based DAO that is governed using the 1INCH token. 1INCH tokens must be locked up for users to be able to participate in governance. The 1INCH tokens are allocated to investors, and contributors and are given as grants to projects building on top of 1inch. Users can earn 1INCH by providing liquidity to the 1INCH decentralized exchange. Additionally, users receive 1INCH tokens to subsidize blockchain transaction fees depending on how many 1INCH tokens the user has staked.

The first step of the 1inch governance process is to create a forum post to discuss the idea for a proposal on the 1inch forum. The goal of this step is to discuss and refine the idea so that it can be formalized. This step can last for an indeterminate amount of time.

The second step is when the proposal is formalized into a 1inch improvement proposal (1IP). The proposal must be posted on the governance forum so that it can be discussed. In this step, the proposal author can use the feedback of other users to improve the proposal. This step does not have a set duration.

The third step is the temperature check. In this step, a poll is added to the forum post to measure the community's sentiment. At this point, no changes are allowed to be made to the proposal. The proposal can move to the next step if it receives a majority of votes in favor of the proposal. This step lasts 5 days.

The fourth step is a formal vote using snapshot [8]. To create a vote, a minimum of 25 thousand voting weight is required. The proposal must receive a minimum of 10 million votes and a majority of the votes must be in favor of the proposal. The voting period lasts 7 days.

The final step is to implement the proposal. Votes that happen on snapshot are not recorded on the blockchain. 1inch uses an oracle [9] to execute the proposal. This process takes 3 days. However, there are another 3 days before the proposal is executed. In these 3 days, the proposal may be vetoed if deemed malicious by the 1inch network DAO treasury, a multi-sig comprised of community members.

3.2 Uniswap DAO

Uniswap [13] is a decentralized exchange [14] that allows its users to trade digital assets. Uniswap is governed by a token-based DAO, through the UNI token. UNI tokens were given to historical users of Uniswap, the founders,and investors, and are given as rewards for using the Uniswap application.

The Uniswap DAO uses different tools for governance. First, there is a forum for discussions related to governance. Second, snapshot [8] is used to check the sentiment of the DAO members. Lastly, the governance portal is used to delegate votes or to vote.

The first step in the governance process is to discuss the idea on the forum and create a poll through snapshot to gauge interest. After 3 days, the poll should have a minimum of 25 thousand UNI worth of votes that a change should be made to move forward to the next step. In the second step, a new poll is created based on the feedback received from the first step. In addition, a new topic on the forum should be created for discussion. During this period, the proposal should be further discussed and support for it should be raised by interacting with the community and campaigning for the proposal. After 5 days the poll result is evaluated to decide whether to go to the next stage. To continue the process, a minimum of 50 thousand UNI worth of votes need to indicate some support for the proposal. The third and final phase is when the proposal is formally created and voted on. First, the code for the proposal should be written and formally audited. Second, a new topic on the forum should be created and the relevant information should be posted. Afterward, the proposal can be formally submitted. This requires that the submitter has a minimum of 10 million UNI in voting weight. The proposal is active for 7 days. If passed, the proposal is executed after 2 days.

3.3 MakerDao

Maker DAO [15] is a DAO that manages the Maker Protocol, which allows users to receive Dai tokens in return for other tokens. Dai is supposed to have a value equal to 1 American dollar, which the Maker protocol tries to achieve. The Maker DAO is governed by the MKR token. The MKR token also serves a second purpose as a way to keep DAI at 1 dollar, in which case more MKR tokens would be created [15]. MKR can only be used to voted after it is locked up in a voting smart contract.

Maker Dao does not specify a formal governance process, but there are some tools available to help the governance process. Forum signal threads can be created by anyone on the MakerDao forum to measure the sentiment of the DAO members. The threads can contain polls that users can vote on. However, these polls are not a perfect way to gauge sentiment as users' votes are weighted the same and not by the amount of MKR tokens they hold. Once a reasonable number of members have voted, the creator of the post can decide to refine it further and create a new thread or create an on-chain poll.

Governance polls are used to further gauge the sentiment of DAO members. These polls occur on-chain and are weighted by the voter's MKR tokens. They use instant run-off voting [16] to allow members to select multiple options. The polls do not have a set voting period and can vary in length.

Executive votes occur on-chain and can make changes to the Maker protocol by interacting with the Maker Protocol's smart-contracts and DAO members are encouraged to audit the code themselves. Executive votes allow competing proposals to be introduced at any time. Executive votes do not have a set duration unless specified in the proposal.

3.4 Compound DAO

Compound [17] is a blockchain-based application that allows its users to loan each other digital assets. The Compound

DAO is a token-based DAO governed by the COMP token. The tokens were given to the company behind Compound, their investors, and employees. COMP is also rewarded to users for using the Compound application. Compound is mainly governed by a few organizations as the top 5 members of the DAO have roughly 38 percent of voting power [18].

Compound does not specify a formal governance process, which could be explained by the small number of organizations that hold a significant portion of the voting power. However, there is a forum that is used to discuss proposal ideas and discuss proposals.

Proposals can be proposed by members if they have at least 25 thousand COMP worth of voting power. However, members can also create an autonomous proposal by locking 100 COMP. The autonomous proposal will be come a proposal if it receives 25 thousand COMP worth of voting power through delegation. After the governance proposal has been created, it will enter a review period of 2 days. If the proposer of the contract does not have enough voting power at the end of the 2 days then the proposal is canceled. Afterward, it enters the voting period, which lasts for 3 days. The proposal passes if it receives a majority of votes and if it has received a minimum of 400 thousand votes. Afterward, it is queued in a time-lock smart contract, which allows the proposal to be executed after 2 days. While in the time-lock period, the proposal can be canceled at any time during this period if the proposer does not have enough voting power by losing delegated votes for example.

To protect against vulnerabilities found in the Compound application, there is a multi-sig made up of community members that is able to pause certain functions of the application.

3.5   AAVE DAO

AAVE [19] is a blockchain-based application that allows its users to lend and borrow digital assets. Users lending out their assets receive interest while those taking loans pay interest. The AAVE DAO is a token-based DAO that governs the AAVE application using the AAVE token. AAVE tokens are rewarded to the users of the application. AAVE tokens can also be locked up to receive rewards and to secure the application. The locked-up tokens may be used as funds to recover from a bug or exploit. Users who locked their tokens receive stkAAVE tokens which have the same voting weight as normal AAVE tokens.

The first step of the AAVE governance process is to create an AAVE Request for Comments (ARCs) in the AAVE governance forum. The post should contain the details of the governance proposal, the rationale for it and a poll that members can vote on. Afterward, the proposal can be discussed and should be improved based on feedback. The next step is to create a vote on snapshot [8] to measure the community sentiment. The last step is to create an AAVE Improvement Proposal (AIP), which includes the changes that will be made to the AAVE application. An AIP can be created by writing the proposal and making a pull request to the AAVE AIP github repository. The AIP should pass the CI pipeline, be uploaded to ipfs [20], and should be sufficiently tested.

An AIP can include small changes, in which case the proposer should have a minimum of 80 thousand AAVE worth of voting power to make the proposal and the proposal should receive a minimum of 320 thousand AAVE worth of votes. In this case, the voting period is 3 days and requires 1 day before the proposal can be voted on. A passed proposal can only be executed after 5 days.

If the AIP includes changes to the core of the application then the proposer should have a minimum of 320 thousand AAVE worth of voting power and the proposal should receive a minimum of 3.2 million AAVE worth of votes. In this case, the voting period is 10 days and requires 7 days before the proposal can be voted on. A passed proposal can only be executed after 5 days.

To protect against malicious proposals and against vulnerabilities found in the AAVE application, there is a multi-sig made up of community members who have the power to veto and governance proposal and pause the application.

3.6   Sushi DAO

Sushiswap [21] is a suite of blockchain applications. The core of Sushi is Sushiswap, which allows its users to trade digital assets. Sushi is governed by a token-based DAO, through the SUSHI token. SUSHI tokens can be locked up and exchanged for xSUSHI, which allows users to receive a portion of the trading fees collected by the platform and participate in the governance process. A voting metric called SUSHIPOWAH is used to describe the voting weight of a member. xSUSHI tokens contribute 1 SUSHIPOWAH, while SUSHI tokens being to provide liquidity in the Ethereum-SUSHI marked counts as 2 SUSHIPOWAH. New SUSHI tokens is continuously created and users can earn sushi by providing liquidity on the exchange. A portion of the newly created tokens is set aside to fund the development of the platform.

Sushi uses a forum to discuss ideas. Members should create a discussion post and describe the idea on the forum. The post should include a poll to measure public sentiment. Once the proposal gains enough traction it will be brought for voting by the Sushi core team.

For official votes, snapshot is used [8], And only core team members of Sushi can create official proposals. Small changes to Sushi are decided on by the core team, while larger must be voted on by the members. Proposals must have received a minimum of 5 million votes to be considered passed. Sushi is controlled by 2 multi-sigs. The approval of one is needed to use the development funds, while the approval of the other is needed to make changes to the application.

3.7   Balancer DAO

Balancer [22] is an investment platform that allows users to make portfolios of multiple digital assets. Balancer is governed by a token-based DAO through the BAL token. BAL tokens are rewarded to users of the application. BAL tokens have also been allocated to the founders, investors, and grants. Users can lock BAL tokens to receive veBAL tokens. veBal tokens have the same voting weight as BAL tokens, but users holding veBAL tokens receive a share of the fees that Balancer charges.

The first step in the Balancer governance process is to create a Request For Comment (RFC) post on the Balancer governance forum. Users should discuss the proposal and give feedback.

After 2 weeks, the proposal can move to the next step. The proposal should be updated to include the feedback received from the previous discussions. At this step, feedback is still collected and the proposal can still be changed.

After 7 days, the proposal can be put to a vote. Balancer using snapshot [8] for voting. Votes on snapshot require at least 2 million votes to be passed and only certain approved members can submit a proposal on snapshot.

After the proposal passes it has to be executed. The proposal is executed by a multi-sig made up of trusted community members.

4 Discussion

In theory, DAOs should be decentralized and autonomous. However, this is often not the case. Correctly creating DAOs is very technical, which leads to compromises [23].

The DAOs discussed in this paper have many similarities. They are all token-based, many are controlled by a multi-sig, all use forums and all use snapshot for at least a part of the governance process.

4.1 Decentralization

Decentralization is hard to implement in practice. For example as shown in Figure 1, 1Inch needs proposals to be accepted by a 7 out of 12 multi-sig before they are executed, to deal with malicious proposals [12]. However, this means that only 7 members need to collude to effectively stop the DAO from doing anything. Migrating an organization to a DAO is not trivial, therefore this technique is often used as a way to start the conversion of an organization into a DAO. Most of the DAOs discussed in this paper have some mechanism where a small group of persons can at least partially control the DAO.

DAOs can have members that control a large portion of the voting power. This can result in scenarios where a small number of members can pass proposals, even if everyone else disagrees. This can occur when the founders are rewarded with DAO tokens, the investors are rewarded with DAO tokens, if large amounts of tokens are available on the open market or over the counter or if many members delegate their voting power to a few members. In fact, most of the DAOs discussed had investors that were given governance tokens in exchange for an investment. One example of centralization of power is when Justin Sun, the founder of the Tron blockchain, was able to take over Steemit, a blockchain based social network [24]. By buying a large number of tokens from the founder and by getting cryptocurrency exchanges to help, Justin was able to effectively take over Steemit. Previous research has concluded that DAOs are not decentralized at all [5].

Even when not controlling a significant portion of voting power, some members can have a large influence on the DAO. For example, the founder or the core team of a DAO are influential for the sole reason that they are trusted. Even if members do not understand a proposal, they might vote just because they trust the submitter of the proposal.

Many of the DAOs discussed give the possibility to earn governance tokens by using the application governed by the DAO. However, this leads to the centralization of power [5], since more tokens are given the more money is used in the application.

Even the governance process itself may not be decentralized. Most DAOs require proposals to start off on forums that a core team controls. Other steps in the process could also require review or approval from a core team.For example, AAve requires a proposal to be submitted to a github controlled by a few members. In addition, DAOs often require a large number of tokens to submit proposals

4.2 Smart-contract

DAOs rely on smart contracts to be trustless and autonomous. However, smart contracts is just computer code, which is error-prone. Many DAOs and blockchain-based applications (which may be managed by a DAO) have been hacked due to vulnerabilities found in the smart contracts [25] [26]. Even when the vulnerability is found before an exploit was performed, fixing the problem is not trivial. A proposal is required to fix a vulnerability. Therefore, attempting to fix a vulnerability will make it known. This is further exacerbated due to the fact that there is often a minimum amount of time before a proposal can be passed, to allow for voting. An example of this is when Compound [17], a lending market, allowed its members to claim more tokens than intended [27]. To fix the problem a proposal was passed, but by then many had already exploited the vulnerability.

Because of the risk of exploits, DAOs often rely on community members to approve passed proposals. However, by doing so the DAOs are sacrificing decentralization for security.

DAOs are also vulnerable in other ways. For example, if a disadvantageous proposal is about to be passed then it may be worth the cost of spam attacking the blockchain [28]. Other problems like front-running are also an issue and if taken into account can lead to disastrous consequences [29].

5 Conclusion

In this paper, we explained how DAOs work and described the governance process of several popular DAOs. We then discussed the governance processes.

Decentralized Autonomous Organizations (DAOs) are supposed to be organization not controlled by anyone and where anyone can participate. However in practice, DAOs are controlled by a small minority and not anyone can particpate in the governance process.

DAOs seem to be scared to experiment. They all use similar processes that have been proven to work. However, without any expirementation the fiel will not go forward.

[1] S. Nakamoto, "Bitcoin: A peer-to-peer electronic cash system," *Decentralized Business Review*, p. 21 260, 2008.

[2] G. Wood *et al.*, "Ethereum: A secure decentralised generalised transaction ledger," *Ethereum project yellow paper*, vol. 151, no. 2014, pp. 1–32, 2014.

[3] E. Foundation, *Decentralized autonomous organizations (daos)*. [Online]. Available: https://ethereum.org/en/dao/.

[4] M. I. Mehar, C. L. Shier, A. Giambattista, *et al.*, "Understanding a revolutionary and flawed grand experiment in blockchain: The dao attack," *Journal of Cases on Information Technology (JCIT)*, vol. 21, no. 1, pp. 19–32, 2019.

[5] T. Barbereau, R. Smethurst, O. Papageorgiou, A. Rieger, and G. Fridgen, "Defi, not so decentralized: The measured distribution of voting rights," in *Proceedings of the 55th Hawaii International Conference on System Sciences*, 2022.

[6] T. Lao, *The lao*. [Online]. Available: https://thelao.io/.

[7] DAOstack, *An operating system for collective intelligence*.

[8] Snapshot, *Snapshot docs*. [Online]. Available: https://docs.snapshot.org/.

[9] R. Mühlberger, S. Bachhofner, E. C. Ferrer, *et al.*, "Foundational oracle patterns: Connecting blockchain to the off-chain world," in *Lecture Notes in Business Information Processing*, Springer International Publishing, 2020, pp. 35–51. DOI: 10.1007/978-3-030-58779-6_3. [Online]. Available: https://doi.org/10.1007%2F978-3-030-58779-6_3.

[10] S. P. Lalley and E. G. Weyl, "Quadratic voting: How mechanism design can radicalize democracy," *AEA Papers and Proceedings*, vol. 108, pp. 33–37, May 2018. DOI: 10.1257/pandp.20181002. [Online]. Available: https://www.aeaweb.org/articles?id=10.1257/pandp.20181002.

[11] Y. El Faqir, J. Arroyo, and S. Hassan, "A scalable voting system: Validation of holographic consensus in daostack.," in *HICSS*, 2021, pp. 1–10.

[12] 1Inch, *1inch proposal lifecycle*. [Online]. Available: https://docs.1inch.io/docs/governance/proposal-lifecycle.

[13] H. Adams, N. Zinsmeister, M. Salem, R. Keefer, and D. Robinson, "Uniswap v3 core," *Tech. rep., Uniswap, Tech. Rep.*, 2021.

[14] Y. Lo and F. Medda, "Uniswap and the rise of the decentralized exchange," University Library of Munich, Germany, MPRA Paper 103925, Nov. 2020. [Online]. Available: https://ideas.repec.org/p/pra/mprapa/103925.html.

[15] MakerDao, *The maker protocol: Makerdao's multi-collateral dai (mcd) system*.

[16] C. M. Burnett and V. Kogan, "Ballot (and voter)"exhaustion" under instant runoff voting: An examination of four ranked-choice elections," *Electoral Studies*, vol. 37, pp. 41–49, 2015.

[17] R. Leshner and G. Hayes, "Compound: The money market protocol," *White Paper*, 2019.

[18] *Compound — Leaderboard*. [Online]. Available: https://compound.finance/governance/leaderboard.

[19] E. Boado, *Aave whitepaper*, 2020.

[20] J. Benet, "Ipfs-content addressed, versioned, p2p file system," *arXiv preprint arXiv:1407.3561*, 2014.

[21] *Sushi*. [Online]. Available: https://www.sushi.com/.

[22] F. Martinelli and N. Mushegian, "A non-custodial portfolio manager, liquidity provider, and price sensor," *URl: https://balancer.finance/whitepaper*, 2019.

[23] H. Axelsen, J. R. Jensen, and O. Ross, "When is a dao decentralized?" *Complex Systems Informatics and Modeling Quarterly*, no. 31, pp. 51–75, 2022.

[24] T. Copeland, *Steem vs tron: The rebellion against a cryptocurrency empire*. [Online]. Available: https://decrypt.co/38050/steem-steemit-tron-justin-sun-cryptocurrency-war.

[25] G. Destefanis, M. Marchesi, M. Ortu, R. Tonelli, A. Bracciali, and R. Hierons, "Smart contracts vulnerabilities: A call for blockchain software engineering?" In *2018 International Workshop on Blockchain Oriented Software Engineering (IWBOSE)*, 2018, pp. 19–25. DOI: 10.1109/IWBOSE.2018.8327567.

[26] M. White, *Web3 is going just great*. [Online]. Available: https://web3isgoinggreat.com/.

[27] M. Sigalos, *Bug puts $162 million up for grabs, says founder of defi platform compound*. [Online]. Available: https://www.cnbc.com/2021/10/03/162-million-up-for-grabs-after-bug-in-defi-protocol-compound-.html.

[28] J. Zhang, Y. Cheng, X. Deng, *et al.*, "Preventing spread of spam transactions in blockchain by reputation," in *2020 IEEE/ACM 28th International Symposium on Quality of Service (IWQoS)*, 2020, pp. 1–6. DOI: 10.1109/IWQoS49365.2020.9213029.

[29] K. Qin, L. Zhou, and A. Gervais, "Quantifying blockchain extractable value: How dark is the forest?" In *2022 IEEE Symposium on Security and Privacy (SP)*, 2022, pp. 198–214. DOI: 10.1109/SP46214.2022.9833734.