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Master's Thesis

# A Decentralized Governance Framework for Open Source Software Organizations

*Author:*
Jozef Siu
4290216

*Supervisor:*
Dr. Slinger Jansen
Dr. Sergio España

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# *Abstract*

**A Decentralized Governance Framework for Open Source Software Organizations**

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Decentralized Autonomous Organizations (DAO) are a nascent phenomenon. The execution and immutable registration of smart contracts on blockchains have presented the opportunity for smart contracts to be used in the governance of decentralized organizations in an autonomous manner. They enable new forms of decentralized decision making processes, incentive designs and more.

As DAOs can be traced back to Open Source Software(OSS) and are similarly founded on decentralization and transparency, this study approaches DAO governance from an OSS perspective. The study contributes an understanding of DAO governance from the perspective of OSS project governance for OSS organizations. This research proposes the *DAO for OSS governance framework*, that presents the governance dimensions and the respective governance concepts for a DAO for OSS.

Four case studies were conducted with DAOs, ranging from starting DAOs to mature DAOs. The mature DAOs have a complete governance model and utilize complex governance mechanisms. The case studies show that the framework is (I) useful for starting DAOs to understand the governance structures and governance considerations, (II) it serves as an intermediate check for DAOs to measure the maturity of their governance, (III) it serves as a research framework to analyze DAOs and (IV) it can be used as a checklist to track governance growth as a DAO develops.

The presented DAO for OSS governance framework provides a solid foundation for further research of DAO governance and contributes to the understanding of DAO for OSS governance.

**Keywords:** *Decentralized Autonomous Organizations, Open Source Software, Governance, Governance Structures, Blockchain, Commons, Community, Ecosystems, DAO for OSS Governance Framework.*

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# Contents

*To Leah...*

# Chapter 1

# Introduction

In the '90s, open-source software emerged as an alternative to commercial software. Early adopters were motivated by the notion of radical decentralization and believed that software should be treated as a commons. Similarly, early adopters of blockchain technology were motivated by the promise of decentralization. The widespread emergence of blockchain started with Satoshi Nakamoto who published the bitcoin whitepaper in 2009. This development enabled two parties to confirm an event or transaction had happened without the need of a middleman. In 2014 Buterin et al. presented Ethereum, a blockchain network that features Turing-completeness and state awareness. This development allowed for code, called smart contracts, to be written, deployed, and executed on the Ethereum network. In turn, smart contracts enable the creation of a range of decentralized applications, including decentralized autonomous organizations (DAOs). A DAO is, as Hassan and De Filippi (2021) have defined, "a blockchain-based system that enables people to coordinate and govern themselves mediated by a set of self-executing rules deployed on a public distributed ledger, and whose governance is decentralized".

When OSS projects grow and gain traction, governance becomes more important. The governance of a project starts with its license that sets the boundaries and direction of the project. With growth, organizational aspects of governance emerge such as who may contribute to the project, submit to the codebase or who may determine the direction and vision of the project. As such, more traditional organizational matters are needed. In some OSS projects, non-profit foundations are formed to formally govern and represent the project. These foundations are a centralizing effort to govern the OSS project and to have a formal representing body of the project.

The emergence of DAOs presents a new opportunity for OSS project governance to be truly decentralized and transparent. Especially for OSS projects that can be considered a digital commons, such projects are maintained by the community and should be governed by the ecosystem (Hou, Farshidi, and Jansen, 2021). At a larger scale, we can look at software ecosystems. Software ecosystem are defined as "a set of actors functioning as a unit and interacting with a shared market for software and services, together with the relationships among them" (Jansen, Brinkkemper, and Finkelstein, 2009). These interactions between these various actors, who are connected through the software product have the potential to be mediated in a decentralized manner through DAOs. The smart contracts of a DAO dictates the roles, relationships and interactions of the actors with each other and the system. As an OSS project scales to include many stakeholders, a DAO for an OSS project may eventually, not only govern the development of the project, but also include all stakeholders of the system and govern their interactions with the project.

> [In DAOs] "trust does not rest with the organization, but rather within the security and auditability of the underlying code, whose operations can be scrutinized by millions of eyes. In that sense, decentralized organizations can be thought of as open-sourced organizations" (Wright and De Filippi, 2015).

This quote highlights the relationship between OSS and DAOs and how DAOs may extend the decentralized nature of OSS to its organization. A DAO ensures transparency of the governance at the technical level. As OSS is regarded as a transparent manner of developing software, the organization that drives the development of the project, may be organized in a similar transparent manner. Moreover, a DAO ensures autonomy of the governance through the enforced rules that are programmed in the smart contracts of the DAO.

This thesis surveys the governance principles of OSS projects and explores how these can be translated to DAO governance mechanisms, to ultimately present a governance framework for OSS DAOs."

## 1.1 Problem statement

For OSS projects, DAO technology presents an opportunity for a novel governance approach. One that is even more transparent and offers true governance by the community. However, DAO technology has not matured yet. Efforts have been made to simplify and clarify the process of building DAOs and making DAOs an accessible organization form. However, due to its complexity and intricacies, it remains a complex task to build a DAO that fully incorporates all aspects of governance. Currently, the application domains of DAOs are mostly as investment funds or as a governance framework in blockchain projects that allows the community to vote on the direction of the blockchain project. In these applications, DAO governance consists of governing funds and supporting formal voting on proposals. However, the governance of OSS projects involves more than funds and decision making. E.g., it involves amongst others, the coordination of a community of developers, users and other stakeholders or coordination of development efforts.

Extensive research has been conducted on OSS governance. Researchers have identified OSS governance concepts, patterns, dimensions and more (Laat, 2007; Markus, 2007; Germonprez et al., 2014). This has resulted in a thorough theoretical and conceptual understanding of the various governance aspects of OSS projects. Due to its novelty and complexity, literature of DAO governance has been limited so far. Researchers have first begun working to understand the closely related field of blockchain governance (Hsieh et al., 2018). For instance, Pelt et al. (2021) have created the Blockchain Governance framework. However, DAOs are a nascent phenomenon that is built on top of Distributed Ledger Technology(DLT) or Blockchain. Its governance is even more extensive, intricate and applicable to many more contexts. This is a knowledge gap that we have observed, the problem statement of this research is therefore as follows.

> **Problem statement:** It is currently unclear to what extent DAOs can support OSS projects in their governance. A clear understanding of the DAO governance mechanisms and how they can be used in OSS project governance does not exist in literature.

## 1.2 Research objective

As outlined in the problem statement above, a knowledge gap exists in the application of DAO in OSS projects. Furthermore, DAOs are a novel technology supported phenomenon of which much remains unclear as it currently establishes itself. Therefore the objective of this research is to (a) provide a thorough overview of the current state of DAO as a technology and its application domain, (b) research DAO governance concepts and mechanisms and (c) determine how governance of OSS projects may be expanded through a DAO.

As a result, the following goal statement was formed using the design problem template as presented by Wieringa (2014). This template ensures that the statement incorporates the problem context, proposed solution and stakeholder goals.

> **Goal statement:** *Improve* clarity on governance mechanisms of DAO in OSS project context, *by* developing a model that decomposes the governance mechanisms of a DAO, *such that* DAOs can be used for OSS projects *in order* to provide better guidance into the governance decisions in setting up a decentralized autonomous organization for open source software projects.

## 1.3 Thesis outline

This thesis is structured as follows. This first chapter has introduced the subject, highlighting the scope of the project, outlining the research problem and introduced the research objective. Chapter 2 explains the research design and outlines the various research methods that are used. Chapter 3 proceeds to provide an overview of relevant literature. The chapter provides context to the subject and forms a theoretical foundation. Starting at chapter 5, the process of creating the DAO for OSS governance framework is presented. The chapter outlines and traces the process of the OSS governance structured literature review(SLR) and accordingly presents the results of the SLR. Chapter 5 continues by presenting and tracing the process of the multivocal literature review(MLR) of DAO governance and shows the results of the analysis. Chapter 6 presents the DAO for OSS governance framework and details the process of creating the framework as a result of the findings of the previous two chapters. Chapter 5.3 takes the encountered DAO challenges of the MLR and further highlights the challenges and risks of DAOs. Chapter 7 proceeds to detail the case studies of the DAO for OSS governance framework. Chapter 8 reflects on the findings of the case studies and the resulting evaluation of the framework, as well as presenting the threats to validity, limitations and future work. Lastly, chapter 9 concludes this study by reflecting upon the research questions with concluding remarks.

# Chapter 2

# Research approach

This study aims to fill a knowledge gap of applying DAO governance in an OSS context by producing and evaluating an artifact. Hence it suits the problem-solving paradigm of Design Science Research (DSR) as described by Hevner and Chatterjee (2010). This chapter explains the research approach in this study. It addresses the decision for DSR and describes how this study is structured accordingly.

> "Design science research is a research paradigm in which a designer answers questions relevant to human problems via the creation of innovative artifacts, thereby contributing new knowledge to the body of scientific evidence. The designed artifacts are both useful and fundamental in understanding that problem" (Hevner and Chatterjee, 2010).

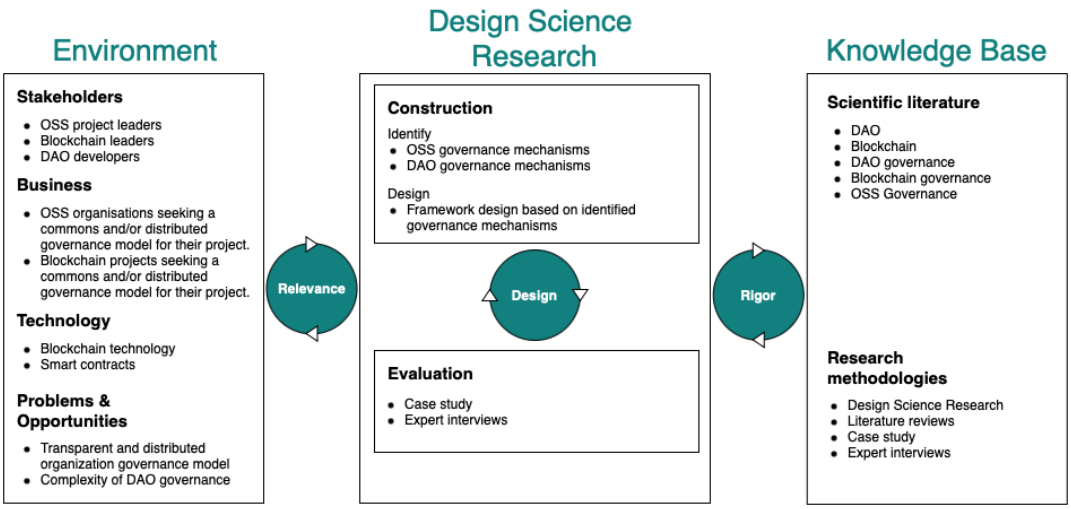


FIGURE 2.1: The Design Science Research Framework applied to this study, adapted from (Hevner and Chatterjee, 2010).

## 2.1 Design Science Approach

The DSR framework as presented by Hevner and Chatterjee (2010) consists of three iterative cycles. The cycle of relevance, the cycle of design and the cycle of rigor. Each cycle is based on information learned during the preceding iteration. Figure 2.1 presents the DSR methodology of Hevner and Chatterjee (2010) as applied in the context of this research. In their methodology Hevner and Chatterjee describe six

activities in the design science research methodology: problem identification and motivation; definition of the objectives for a solution; design and development; demonstration; evaluation; and communication. This research is approached accordingly. The first activity is to define the specific research problem and justify the value of a solution. After which, the second activity is to define the objectives for a solution based on the problem definition. The third activity is then to create the artifact that solves the problem. Having created the artifact, it is in need of validation. Hevner and Chatterjee (2010) present the fourth activity as a demonstration and the fifth activity as an evaluation. A demonstration involves using the artifact to solve one or more instances of the problem through, for example, a case study. Evaluation pertains to the observation and measuring of how well the artifact supports the solution. Hevner and Chatterjee (2010) leave it to the researcher to choose whether to execute a demonstration or an evaluation or do both. The sixth and final activity is to communicate the executed activities to the audience. Figure 2.2 shows how this research is structured accordingly.

| Design Science Process Step | Problem Identification | Derive Solution Objectives | Design and Development | Demonstration | Evaluation | Communication |
|---|---|---|---|---|---|---|
| | Setting up a DAO is complicated and there is no comprehensive overview of DAO governance for OSS projects. | A framework clarifies the governance mechanisms of DAO and improves decision making for governance of OSS projects with DAO. | (I) Identify OSS and DAO governance mechanisms in literature.<br>(II) Develop framework based on literature. | The framework is applied in four case studies, demonstrating its use. | Testing the framework by applying the framework in the case studies with evaluation through case studies. | Publication of thesis and possibly a research article. |
| **Research Step** | Identification of problem and determining its validity. | Determine the research objective and the scope of the research. | Systematic and multivocal literature reviews, extracting concepts through codification and synthesizing framework. | Application of framework in four case studies. | Evaluation with case study participants. | Publication of this thesis on Arxiv and possibly a research article. |
| **Addressed in** | **Chapter 1, 2.2, 3.1** | **Chapter 1.2, 2.2** | **Chapter 2.4, 2.5, 3 - 6** | **Chapter 2.6, 8** | **Chapter 2.6, 8, 9** | **Thesis** |

FIGURE 2.2: Design Science Process structure

## 2.2 Research questions

This study researches the governance mechanisms of DAOs and aims to understand how they can be applied for the governance of OSS projects. The objective and problem statement translate into the following main research question:

**MRQ:** How can DAOs support OSS project governance?

The main research question consists of two parts, the first is DAO governance, and the second is OSS governance. The sub-questions decompose the main research question into these two parts and combine them to form an understanding of DAO governance for governing an OSS project. The sub-questions are listed and described below.

**SQ1:** How are OSS projects governed?

The first sub-question serves to explore and understand OSS governance. In order to answer the main research question, we first need to understand the governance elements and structures of OSS projects thoroughly. This question results in an overview of the governance elements that need to be addressed through DAO governance, are no longer relevant in DAOs, or are still relevant in DAO governance, but are not replaced by DAO governance mechanisms.

**SQ2:** What governance mechanisms do DAOs provide?

SQ2 serves to explore and document the governance mechanisms that DAOs enable. By identifying the DAO governance mechanisms, we can understand how these can be used to govern an OSS project.

> **SQ3:** What elements of governance can be considered for a DAO that governs an OSS project?

This research question uses the output of the previous questions and combines them to understand how DAO governance mechanisms can be applied to OSS governance. This question determines which mechanisms are complementary, which can be replaced and which are relevant or irrelevant to DAO governance for OSS.

## 2.3 Research methods

This research uses four research methods in order to answer the research questions as described in the previous section. The set of research methods that are utilized are shown in table 2.1. A set of 3 different literature reviews are used to form a theoretical framework that is used as input for the governance framework. The literature reviews consist of an unstructured literature review, a structured literature review and a multivocal literature review. The literature reviews are further discussed in chapter 2.4. The framework that is formed is then evaluated through a holistic multiple case study.

| **Method** | **Purpose** |
|---|---|
| Unstructured Literature Review | To form a theoretical foundation and to present the context of the study. |
| Structured Literature Review | To answer **SQ1** by analyzing OSS governance concepts in literature. |
| Multivocal Literature Review | To answer **SQ2** by analyzing DAO governance concepts in literature. |
| Multiple case study | To evaluate the created framework, that is the output of **SQ3**. |

TABLE 2.1: Overview of research methods

## 2.4 Literature review protocol

The theoretical component of this paper is laid out in three parts: (I) a theoretical foundation, (II) governance mechanisms in OSS projects and (III) governance mechanisms of DAO. The first part serves to form a theoretical foundation that covers the state of the art of DAO and provides an overview of OSS and DAO governance. The second and third parts serve as a basis for the created model. Each part of the literature review is approached differently. In the following sections, the procedure for each part is explained.

### 2.4.1 Part I: Theoretical foundation

Part I presents a theoretical foundation, providing an overview of the state of the art of DAO, DAO governance and OSS governance. This provides a solid understanding of the concept of DAOs, the supporting technology and the challenges that it faces. The primary purpose is to set a baseline of knowledge for this research. Therefore

this theoretical foundation is formed based on an unstructured literature review. The results of the unstructured literature review are presented in chapter 3.

The literature in this part was sourced in two ways, firstly through a literature search through Google Scholar and Scopus, secondly through the SecureSECO research group. Literature sourced through the research group came from recommendations from members or was based on other research of the group. For the literature search through google scholar, the following main subjects were identified to provide relevant literature:

- Blockchain
- Decentralized autonomous organization
- Decentralized autonomous organization governance
- Open source software governance

Forward and backward snowballing as described by Wohlin (2014) is applied to the initially gathered literature to broaden the search. The snowballing technique is especially useful on the topic of DAO, as the number of high-quality literature is limited. Snowballing is then an effective way of finding related literature when search engine results are proving to be limited.

### 2.4.2 Part II: Governance principles in open source software projects

Part II serves to answer SQ1; to identify governance concepts in open source software projects. Since OSS governance is a well-researched subject, a systematic approach is necessary to ensure proper synthesis of the existing literature. For this part, guidelines from Okoli (2015) and Kitchenham and Charters (2007) were adapted to identify governance concepts in a systematic manner. The focus of this literature review is governance mechanisms and conceptual frameworks of OSS governance. Hereafter the exact process of the literature review of part II is described.

Once again Google Scholar and Scopus are used to find relevant papers. Scopus is an excellent database of published literature. For a well-researched field such as OSS governance, Scopus provides references to well-regarded literature of high quality. Additionally, Scopus allows for the use of complex search strings and easy saving and organizing of the search results. Google Scholar, in addition, casts a wider net to include literature that could not be found through Scopus, as the Google Scholar search engine is less restrictive. However, Google Scholar does not offer the same quality of tools that Scopus provides for filtering and organizing search results.

The search query is based on the experience that was gained from part I and is built to account for acronyms and closely related topics of "open source software", resulting in the following search query:

> **Search query:** Title: (open source software *OR* oss *OR* ossd) *AND* governance

The resulting literature is excluded from evaluation if it is (a) not publicly available or accessible through the Utrecht University library services and (b) not written in English. Next, the title and abstract of the filtered literature are evaluated. The title and abstract must indicate that the literature discusses or is related to OSS governance. The resulting set of literature is the final set of literature that is read in its entirety and used for model design.

### 2.4.3 Part III: State of the art and governance of DAO

DAO's are a nascent technology-enabled phenomenon that has not matured yet. The majority of its governance mechanisms are based on the underlying technology and technological implementations. The primary focus of this part is to identify the governance mechanisms of DAO and the challenges that DAOs face. Secondly, it also serves to assess DAO platforms through the existing literature. However, qualitative scholarly literature on this subject is currently limited. Instead, much of the state of the art is published in the form of gray literature.

To provide a state-of-the-art overview of DAO, gray literature is included in addition to the scientific literature. This part adopts the guidelines of Garousi, Felderer, and Mäntylä (2019) for a multivocal literature review that includes gray literature. Once again, Google Scholar and Scopus are used to search for literature. In this part, Google Scholar is most relevant, as the multivocal literature review guidelines incorporate the inclusion of gray literature. The following search string is used to find the literature:

> **Search query:** Title: decentralized autonomous *AND* (organization *OR* organizations)

This search string aims to find any literature on the topic of DAO. As the amount of literature is limited, the search string is not specified any further to avoid excluding any relevant literature. I.e., the search string was not set to be more restrictive by including the word *governance* to form *decentralized autonomous organization governance*. Furthermore, the acronym *DAO* is not included in the search string, as the word or acronym *DAO* is not distinct enough and is used in different unrelated fields, resulting in many unrelated search results.

The resulting papers are filtered, on their (a) accessibility (publicly available or through Utrecht University library services) and (b) language (English). The papers are then scanned on their title and abstract and must indicate a contribution on the topic of DAO.

## 2.5 Model design

This research aims to create a model that captures the DAO governance mechanisms and OSS mechanisms that enables a DAO to be used in an OSS governance context. The model improves the understanding of DAO governance for OSS and provides an overview of the governance aspects and considerations. This section describes the approach for the design of the model. This part of the research is where an artifact is designed in accordance with the DSR process.

**Concept extraction**
First, the literature of part II and part III from the literature review are codified using Nvivo. Nvivo is a tool for codifying documents. Using Nvivo, concepts can be extracted from literature, grouped and referenced in the document. Relevant concepts in the literature are marked and labeled in Nvivo. In the codifying process, we look for concepts related to OSS Governance and DAO Governance. These are used to create a DAO governance framework for OSS. Additionally, we are also searching the literature for DAO challenges. These are used to form an understanding of DAO challenges.

**Concept selection and structuring**
Having analyzed the literature, we start on designing the artifact. The artifact is constructed, based on the identified concepts that are codified in Nvivo. The codified concepts contain classifications, dimensions, levels and categories of governance along with the individual governance aspects. The resulting framework is created by a process in which we match related or similar concepts of OSS and DAO governance. We identify structuring concepts or classification concepts such as dimensions or categories. Additionally, individual governance aspects are identified and assigned to the relevant dimension in the governance structure of the framework. These concepts can (a) replace or complement each other or (b) they can be deemed no longer relevant. Concepts can be deemed irrelevant if they do not fit the context of DAO for OSS governance or if another concept replaces them. Furthermore, throughout the literature, identical or similar concepts can be approached from different perspectives by different researchers. In such cases, we select the most suitable or inclusive concept.

## 2.6 Model evaluation

Having synthesized the literature to form a framework, it is important to determine how well the created artifact works. DSR distinguishes itself as a science through the fact that its essence lies in the scientific evaluation of artifacts (Hevner, 2007).

To evaluate the created artifact, a *holistic multiple case study* is conducted. Yin (2009) defines a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". The advantage of a multiple case study is that more qualitative evidence is generated from multiple sources, making it easier to generalize the findings. Moreover, we select four case studies of DAOs that vary in their maturity and purpose. This allows for a qualitative evaluation of the framework from various perspectives, without saturation of data.

The strategic framework for evaluation in DSR from Pries-Heje, Baskerville, and Venable (2008) serves to help answer what, how and when the artifact in DSS is evaluated. The produced governance framework *artifact* is evaluated, *naturalistically* - evaluating the real artifact in use by real users solving real problems (Sun and Kantor, 2006) - through a multiple case study, *ex-post* (after the design artifact is developed).

### 2.6.1 Case study design

In order to evaluate the framework, we demonstrate its use through case study interviews and evaluate the framework with the interviewees. Runeson and Höst (2009) presents five steps for conducting a case study.

1. Case study design
2. Preparation for data collection
3. Collecting evidence
4. Analysis of collected data
5. Reporting

The objective of the case study is to evaluate the framework on its completeness and its usefulness. It assesses whether the literature reviews, coding process and framework design have properly captured the relevant governance concepts. Participants are selected based on convenience sampling and include the SecureSECO initiative, as this study originates from the SecureSECO initiative. Although we use convenience sampling, we aim to evaluate all aspects of the framework through the case studies. Therefore we have set the following selection criteria: *Case study participants must be a DAO that are in some way active in OSS development.* Additionally, the cases must be able to provide a substantial contribution to the evaluation of the framework. I.e., the selected case studies were chosen as they had one or more of the following attributes: (a) having a mature governance model, (b) having a focus on (OSS) development, (c) having an immature governance model, but the context of the case fits the framework and (d) having a long history in DAO development.

To conduct the case studies, we design a case study protocol. "A case study protocol is a container for the design decisions on the case study as well as field procedures for its carrying through" (Runeson and Höst, 2009). The case study protocol informs the participants of the context and purpose of the case study and contains an informed consent form. Furthermore, it contains the questions that guide the interview through the framework in a semi-structured manner. The protocol finalizes with evaluating questions regarding the completeness and usefulness of the framework. The protocol is included in appendix C. The case study results are reported in chapter 7 and discussed in chapter 8.

### 2.6.2 Action research

In addition to the holistic multiple case study, the *action research*(AR) paradigm applies to the SecureSECO case study. Action research is unique in the way it connects research and practice; research informs practice and practice informs research synergistically" (Avison et al., 1999). The goal of AR is the resolution of a practical problem while simultaneously contributing to scientific theory" (Hevner and Chatterjee, 2010). AR is recognized as a closely related paradigm of design research and can be integrated.

This research originates from the plans of the SecureSECO initiative to organize themselves as a DAO. Their goal, to *help improve security of the worldwide software ecosystem*, lends itself to the model of a commons and governance by the ecosystem. A DAO fits this application. The initiative identified a knowledge gap in setting up DAO governance for an OSS organization. This study aims to fill this knowledge gap through emperical research. In return, the case study of SecureSECO serves to validate how the research output answers the research problem. As the framework and case study aids in the design of the governance of the SecureSECO DAO and is not purely observational and exploratory, the case aligns with the AR paradigm (Runeson and Höst, 2009).

# Chapter 3

# Literature review

This chapter lays down a theoretical foundation, provides context to the research questions and helps to bring the research questions into focus (Okoli, 2015). In the following sections the concept of DAOs is thoroughly explored, its technical background and its limitations explained and finally it provides a high-level overview of the governance principles in OSS and DAOs.

## 3.1 Decentralized autonomous organizations

A *Decentralized Autonomous Organization* is an organization form in which the organization is jointly owned by its members, with each having direct influence in the decision making of the organization. It is facilitated by blockchain technology due to the transparent, immutable and auditable nature of blockchain. Something that must be noted is that DAOs are a relatively recent development. Only in 2016 did we see the first high profile DAO (Jentzsch, 2016). One that failed spectacularly due to an exploit of its smart contract. The attacker stole a significant amount of funds. The events had severe consequences for its Ethereum blockchain community. These events are further detailed in chapter 3.1.4. Since then, for some time, the advancements and adoption of DAOs were tempered and their technology remains is in its infancy. Currently DAOs are the process of maturation as adoption increases and more technology is developed to support DAOs.

In short, regarding its technology DAOs are firstly enabled by the emergence of blockchain technology and secondly the application of smart contracts in blockchain. Blockchain technology provides the underlying transparency and trust, by supplying an auditable ledger on which all events of a DAO are recorded. Smart contracts then allow for codified rules to be executed automatically, enabling governance through code. Together these technologies are the base on which DAOs are built on. Section 3.1.2 further explains the technology underneath DAO in depth.

### 3.1.1 DAO definition

The concept of *Decentralized Autonomous Organization* (DAO), as is referred to today, was first known as *Decentralized Autonomous Corporation*. This term emerged shortly after the appearance of Bitcoin and was mostly used in informal forums and chats by crypto enthusiasts (Hassan and De Filippi, 2021). However, this term was considered too restrictive as it is too deeply linked to conventional corporate governance. This led to the generalization to the term Decentralized Autonomous Organization. Hassan and De Filippi have defined DAOs as:

> A DAO is a blockchain-based system that enables people to coordinate and govern themselves mediated by a set of self-executing rules deployed on a public blockchain, and whose governance is decentralized (Hassan and De Filippi, 2021).

Hassan and De Filippi formed this definition on the basis of existing scientific literature. Of the scientific literature found, they find several definitions with common characteristics such as (a) *decentralization*, (b) *self-governance*, (c) *autonomous operation*, (d) *blockchain and smart contract based* and characteristics that are inherited from blockchain such as (e) *transparency* and (f) *cryptographic security*. In regards to how DAOs are percieved, Hassan and De Filippi finds unclarities in the restrictiveness of the term DAO. Primarily regarding the level of decentralization (decentralization of governance or infrastructure), level of autonomy (autonomous or automated) and if or how DAO can be seen as a legal entity. All in all, despite the unclarities, Hassan and De Filippi presents an inclusive clear definition that highlights the decentralized, autonomous, governance and infrastructural aspects of DAO.

### 3.1.2 DAO technology

The concept of DAO is only enabled by the introduction of blockchain technology and smart contracts. The major contribution of blockchain is that it provides a solution to the Byzantine Generals problem as raised by Lamport, Shostak, and Pease (1982). In the Byzantine Generals problem, the generals of the Byzantine army are camped surrounding an enemy city. They have to collectively agree on a battle plan, by communication of a messenger. However, there may be one or more traitors amongst the generals who will try to confuse the others. The Byzantine Generals problem illustrates the challenge of reaching an agreement in a distributed environment (Zheng et al., 2017). Blockchain provides a solution with its consensus mechanism through a probabilistic approach. The technology allows for a secure auditable ledger on which transactions, can be verified and recorded. The transactions are grouped in blocks, where each block also contains a reference to the previous validated block. Thus creating a chain of validated blocks. As the blockchain is public and distributed, it allows anyone to audit its transaction history.

#### Bitcoin

Bitcoin was proposed by Nakamoto (2009) in 2009, as a decentralized digital currency. It is an online payment system that uses encryption techniques to generate new coins. Miners provide computing power and provide security to the network. They securely verify the transactions, and the Bitcoin protocol ensures the immutability of the ledger. As a result the system removes the need of a central party (e.g., a central bank). Bitcoins are created as a reward for the miners who offer the computing power to verify transactions and record payments into the public ledger (Swan, 2015).

The bitcoin protocol as designed by Nakamoto (2009) is as follows: Users can create transactions. Transactions from one bitcoin address to another are broadcast on the network. The miners collect these new transactions in a block and work on finding a difficult proof-of-work by calculating cryptographic hashes. Hashing is a process in which data is put through a mathematical function, resulting in a hash, this process is explained below. If a miner has found a hash that matches the set difficulty, the block is completed and broadcast to all other nodes. The nodes accept the block if all transactions in it are valid and then proceed to mine the next block. The next

block contains new transactions and the hash of the previous block. Thus creating a chain as each new block references the previous.

Because of this protocol, an attacker would have to redo the work of the target block and all the of the work of the subsequent blocks. As long as the honest nodes collectively control more CPU power, the attacker will be slower in validating blocks and the probability that an attacker succeeds diminishes exponentially with each block that is added. Only when the attacker controls more CPU power than the honest nodes, the attacker may succeed, which is referred to as a 51% attack (Li et al., 2020).

**Hashing**

To explain the process of hashing, it refers to the process of applying a hash function to data. This process transforms the original data using a mathematical algorithm and results in a number, called a *hash value* or simply a *hash*. Swan (2015) describes it as "*running a computing algorithm over any content file (a document, a genome file, a GIF file, a video, etc.), the result of which is a compressed string of alphanumeric characters that cannot be back- computed into the original content*". Using hashing, an encoded human genome can be processed into a 64-character hash string as a unique and private identifier. A key property of hash functions is that they are one-way, meaning that the original content can not be reconstructed from the hash value. Because of this property they are used in cryptography. A second property is that they are deterministic, repeatable, meaning that by applying the same hash function to the same data, the same hash value will be a result. If someone changes the input data, the hash will as a result be changes as well, meaning that one can easily verify that data was not changed. In blockchain, the hash of the previous block is used as input data in the hash of the new block, therefore past transactions can not be changed without changing the resulting hashes of the next blocks.

### Consensus

In blockchain, the consensus algorithm is the protocol that is followed by the parties in the network to reach a consensus when there is no central authority, as illustrated in the Byzantine Generals problem. The protocol ensures that the ledgers of all nodes are consistent (Zheng et al., 2017). Many mechanisms to reach consensus have been invented since Bitcoin. Farshidi et al. (2020) describes several common consensus mechanisms as seen in table 3.1. It shows how there are many different approaches to reaching consensus in a decentralized environment. Currently Proof of Work and Proof of Stake are the most well-known consensus mechanisms. These consensus mechanisms are explained to provide an explanation of consensus and to illustrate how the mechanisms may vary.

**Proof of Work**

Proof of Work(PoW) is the consensus mechanism that is used in Bitcoin. In a decentralized environment, someone has to record the transactions in the ledger and distribute it to the network. The easiest way is to randomly appoint someone. However, this method is vulnerable to attacks (Zheng et al., 2017). Bitcoin solves this with PoW. The nodes reach consensus over the new transactions in the latest block, by requiring a difficult hash to be computed. The algorithm requires the hash value to be equal or lower than a set value. By changing this value, the network can change the difficulty of mining a block.

| **Consensus algorithm** | **Description** |
|---|---|
| Proof-of-work (PoW) | A consensus algorithm that is employed to confirm transactions and generate new blocks to the chain. With PoW, miners compete against each other to perform transactions on the network and gain rewards. |
| Proof-of-Stake (PoS) | A consensus algorithm by which a cryptocurrency blockchain network aims to achieve distributed consensus. In PoS-based cryptocurrencies, the producer of the next block is chosen on diverse combinations of random selection, wealth or age. |
| Delegated Proof of Stake (DPoS) | A consensus mechanism for maintaining the final agreement across a blockchain network, validating transactions and performing as a form of digital currency. |
| Practical byzantine fault tolerance (pBFT) | A consensus algorithm that works efficiently in asynchronous systems. It is optimized for low overhead time. |
| Proof of Authority (PoA) | A replacement for PoW, which can be utilized for private blockchains. It does not depend on nodes solving arbitrarily severe mathematical problems but instead uses a set of "authorities" - nodes that are explicitly permitted to generate new blocks and secure the blockchain. |
| Directed acyclic graph (DAG) | Directed graph structure that uses a topological ordering. The blockchain combinations with DAG come from the idea of sidechains. Different types of transactions can run on different chains simultaneously. |

TABLE 3.1: Consensus algorithms with descriptions by Farshidi et al. (2020)

As previously explained, a hash function requires input data and outputs a distinctive number for the data. The input data in Proof of Work as implemented in Bitcoin consists of the data in the blockheader. The blockheader contains the winning hash result of the previous block, the hash of all the transactions in the block and a nonce. The nonce is an arbitrary value that is iteratively changed by the miner to generate a different hash value each time. If a miner has more computing power, they can compute more hashes and have a larger chance of finding a hash that satisfies the requirements that is set by the difficulty.

When a node finds a hash that satisfies the set difficulty, the block is completed and broadcast to all other nodes. All other nodes will verify the correctness of the hash value, append the block to their ledger and move on to the next block with new transactions. The difficulty is set so that only every 10 minutes a hash is found. Calculating a hash requires computation power. If new miners join the network and add computation power, a valid hash is found more quickly, as a result the network increases the difficulty threshold, requiring more computation power, thus increasing the time it takes to find a valid hash. Performing these computations, requires energy. Using this energy to perform computations is referred to as work. Finding a valid hash is therefore proof that the work has been done (Zheng et al., 2017).

Nakamoto (2009) explains that an attacker will need more than 50% of the computation power in the network in order to create invalid transactions. An example of an invalid transaction is using the same coin to pay twice, also called a double spend problem. This is not impossible, however Nakamoto argues that the cost of attacking

the network would be higher than the potential reward of a successful attack. Note that a 51% attack has been successfully executed on smaller blockchain networks such as Bitcoin Gold and Ethereum Classic (Canellis, 2020). Attackers used the 51% attack to execute a double spend. Larger networks such as Bitcoin have remained secure.

**Proof of Stake**

As PoW requires CPU power and energy, it has been deemed as inefficient and energy-intensive. Proof of Stake (PoS) is proposed as an energy-saving alternative to PoW. In PoS, miners have to prove the ownership of an amount of currency. They are allowed to mine blocks proportionately to the percentage of the currency that they own. In PoS an attacker would need 51% of the currency to perform a 51% attack. Arguably it is not in the best interest of people that own a large amount of the currency to attack the network (Zheng et al., 2017).

Opponents argue that it is more vulnerable to attacks as there is no work involved in mining. Another criticism of PoS is that it is biased to the most wealthy nodes in the network. Essentially being a plutocratic model that favors the rich.

### Smart contracts

Blockchain can be seen as the decentralized infrastructural layer that can host and execute smart contracts. Smart contracts were first conceptualized by Szabo in 1996 as:

> 'A set of promises, specified in digital form, including protocols within which the parties perform on these promises' (Szabo, 1996).

A smart contract can be thought of as a contract in a digital form that can be defined through code. Szabo (1996) names the vending machine as the primitive ancestor of a smart contract. The contract of the vending machine is that it takes in coins and returns a product and some change. In a digital environment, smart contracts go beyond the simple vending machine. With the blockchain network Ethereum smart contracts were taken into practice in blockchain. Ethereum was presented in 2014 as a platform for decentralized applications (Buterin et al., 2014). This is made possible through its turing-completeness, value-awareness, blockchain-awareness and state. These properties allow for applications to be programmed in the form of smart contracts. Having been drafted in code, these contracts can then be deployed on the blockchain network. Where deploying means that the code is stored, verified and executed on the blockchain (Christidis and Devetsikiotis, 2016).

### Decentralized autonomous organizations

Jensen and Meckling (1976) theorize that organizations can be seen as nothing more than a collection of relationships and contracts. As smart contracts offer the possibility to define specific rules in code, the theory of Jensen and Meckling (1976) can be applied in this context: decentralized autonomous organization can be formed by creating a set of smart contracts that specify the rules and procedures of the organization (Wright and De Filippi, 2015). Smart contracts become the codified versions of traditional contracts and sets the rules of the governance of an organization.

The decentralized infrastructure provided by blockchain provides transparency and security. Governance can be achieved by recording all transactions directly to a blockchain, providing an auditable trail of every decision and event (Wright and De

Filippi, 2015). While blockchain provides a secure infrastructure, smart contracts make it possible to define the rules of the organization. Together these technologies ensure all stakeholders that the organization operates in accordance with the smart contracts. However, if the smart contracts are not properly coded, the organization may not operate as intended. Chapter 5.3 dives deeper into this challenge of DAOs.

The current conceptual understanding of how the concept of DAOs translate to their operations, is that they use smart contracts to govern themselves. Often DAOs distribute voting power to their members, which is registered through smart contracts. It enables the members to vote on proposals in the decision making process of the DAO. Through smart contracts, proposals may also trigger the automatic execution of financial transactions from the treasury of the DAO.

### 3.1.3 DAO frameworks

Due to the complex nature of DAO, different frameworks have emerged to address the complexity and to simplify the process of building a DAO. Some frameworks offer platforms with additional services. The platforms simplify building a DAO, while services aid in the operations and governance of the DAO. Mostly these frameworks or platforms offer the possibility to register a DAO on-chain, provide the possibilities of creating a token, creating proposals, vote on such proposals and to manage funds. It is possible to create smart contracts for these functions yourself, however, these frameworks attempt to make it easy to create a DAO. They provide different templates or mechanisms that a DAO can use for their governance and operations, without the need of writing it themselves.

Liu et al. (2020) mentions Aragon, DAOstack and Colony as popular DAO platforms. Valiente Blázquez, Hassan, and Pavón Mestras (2020) perform an analytical comparison of Aragon DAOStack and Colony frameworks, focusing on their current functionalities for building DAOs. It finds Aragon to be the most complete. Baninemeh, Farshidi, and Jansen (2021) created a DAO platform selection decision model. They collected 82 features of DAO platforms. Additionally they have analyzed the features of 28 DAO platforms to create the decision model using multi-criteria decision-making. Futhermore, they found Aragon, Colony and DAOStack to be the most well-known DAO platforms.

A different trend in DAO services that has emerged is for DAOs to use a combination of Snapshot for proposals and voting and Gnosis Safe as a DAO treasury (Weber, 2021). Snapshot is an off-chain voting system, that can interact with Blockchains and stores the votes on the Interplanetary File System (IPFS), by hashing and storing the votes on the decentralized IPFS, it provides a measure of immutability. Chapter 5.3.3 further explains the specific workings of Snapshot. The autonomous aspect of such DAOs is greatly reduced as proposals can not be enforced through Snapshot. Gnosis Safe is a treasury service that offer multi-signature wallets, that require multiple signatures to sign a transaction.

### 3.1.4 DAO exploits

The hack of *The DAO* in 2016 was a major event in the history of DAOs, and had large consequences for the Ethereum network. The events led to the split of the Ethereum network into Ethereum and Ethereum Classic through a hard fork. In this part two exploits of DAOs are highlighted that show two attack vectors. The case

of *The DAO* shows an exploit at the smart contract level, while the recent events of *Build Finance DAO* show an exploit at the governance level.

### The DAO

DuPont (2017) presents a detailed account of the events of *The DAO*. *The DAO* was one of the first major DAOs and operated on the Ethereum blockchain. It was an investment DAO that allowed cryptocurrency investors to directly fund and manage the investments made by the DAO. As the DAO used smart contracts on the Ethereum blockchain, its business logics could be programmed and it would be virtually unstoppable. *The DAO* gathered a record $250m USD in investments through an estimated 10,000 to 20,000 investors. The investors contributed 11,994,260.98 Ethereum tokens (ETH), which was 14% of the supply of the Ethereum tokens at the time.

Through an exploit, which was named *race to empty attack*, the attacker was able to drain about 30% of the funds, or 3,689,577 ETH, of the DAO. As a result, the value of the Ethereum token plummeted. The attacker supposedly wrote a letter, in which he states that the attack was only a clever loophole in the law of the DAO, referring to the "code is law" phrase from Lessig (1999). Parts of the Ethereum community agreed, and thought that the attacker was entitled to the "stolen" funds.

In response, ultimately through social influence and power by Vitalik Butterin and the Ethereum foundation, it was decided to perform a hard fork and effectively erase the events of The DAO. The majority of the miners adopted hard fork. However, some refused and continued the original blockchain in which the funds remain stolen, this version of the network is called Ethereum Classic and contains the events of The DAO in its blockchain record.

These events show how social influences and power still preside over the purportedly immutable blockchain.

### Build Finance DAO

On February 9, 2022 the token contract of Build Finance DAO was transferred from the DAO to an attacker, through a proposal that went unnoticed (Kelly, 2022). The Build Finance DAO was an investment DAO that funds projects. The attacker gained full control over the token contract, governance contract and treasury of the DAO. The token contract is the smart contract that controls the token and allows for new tokens to be minted. The attacker minted 1,107,600 BUILD tokens to drain the liquidity pools of two decentralized exchanges (BuildFinance, 2022). A liquidity pool is a token reserve that contains a pair of tokens in order to facilitate the exchange of the pair of tokens. Taking control of the tokens, resulted in the DAO losing the token contract and the loss of all funds from the treasury, an equivalent of $470,000 USD (Copeland, 2022).

Initially the attacker tried creating a proposal to transfer the assets to their address. However, the proposal was noticed and the community gathered the necessary voting power to counter the proposal. The attacker then transferred their tokens to another address, and tried again through a new proposal. This time, the attacker took care in order for the proposal to remain unnoticed. For example, the attacker disabled the Discord bot that announces to the community that a new proposal has been created. As such there were not enough counter votes, and the proposal was passed. Thus the attacker gained control over all the on-chain assets of the Build Finance DAO.

These events show how weaknesses in the governance system were exploited. No loopholes were used in this attack. Instead the attacker made sure that the malicious proposal went unnoticed and used the regular governance mechanisms of the DAO to transfer the assets to themselves. As such this is an exploit at the governance level of the DAO.

### 3.1.5 Summary

DAOs are a new kind of decentralized organization form that can offer transparency of its operation and governance. Its operational and governance protocol can be audited and its actions are recorded and enforced through a public ledger. The technological advancements of blockchain and smart contracts are directly responsible for the emergence of DAOs. Blockchain technology, supported by its consensus mechanism enable a trustful and immutable distributed ledger, that provides DAOs with accountability and trust. Smart contracts deployed on blockchain enable the governance and operational rules to be captured in code and executed according to the code, bringing the concept of *code is law* into reality (Lessig, 1999).

However, translating organizational governance to code is a complex process. Wang et al. (2019) describe a *semantic gap* between legal rules and smart contracts. Other challenges that DAOs face are the *security* concerns in regards of the technology, the problem of *upgradeability* of smart contracts *legal status* of DAO, as there are no legal provisions for a decentralized digital organization (Wang et al., 2019).

Furthermore, we note that DAOs can be exploited through weaknesses of the code at the smart contract level, but also at the governance level, through how the governance model of the DAO is set up. Chapter 5.3 further discusses the challenges of DAOs.

## 3.2 Open Source Software Governance

OSS governance is a well-researched subject as OSS presented a new form for software development and its governance. Researchers have focused on different aspects of governance such as motivations, role progression or coordination of tasks. In this section, a general overview is presented on prior research of OSS Governance.

As OSS projects generally involve voluntary contributions by independent individuals and the work is publicly available, governance in OSS is unlike traditional organizations. Typically the motivations of people are not necessarily monetary, they are often not tied by contracts, have no formal obligations or are not bound by an organizational hierarchy. As some projects grow, their development is formalized through a non-profit foundation (e.g., the Linux Foundation or Apache Foundation). In such cases, people are employed to work on the projects. In more recent years adoption from commercial companies has increased. Commercial companies are recognizing the value of OSS and are dedicating employees and resources to the development of OSS. Microsoft for example, a company whose executives had expressed themselves negatively about OSS in the past, have turned around and become a top contributor to OSS (Asay, 2017). Andersen-Gott, Ghinea, and Bygstad (2012) point towards a shift in how companies view OSS. In their research, companies have all expressed a moral obligation to open source, besides the benefits of cost reduction, innovation and new revenue streams through sales of complementary services.

Over time, the perception of OSS has shifted and the driving actors behind them as well. Riehle (2007) makes a distinction between community and commercial open source. Community OSS is developed by a community of individual volunteers. The community decides what changes are accepted in the source code and decisions are made by the community, rather than a company. Riehle (2007) defines commercial open source as software that is owned and developed by for-profit entities. The company decides on the changes in the code base and what is developed next.

### Governance definition

The development process of OSS differs from software development within companies, therefore a different kind of governance applies. Research on OSS governance has focused on different areas of governance(e.g. governance processes or governance structures). According to Midha and Bhattacherjee (2012) "*the basic intent of governance is to establish and consistently manage policies, procedures, and decision rights for efficient and effective functioning of the members and working efforts of a community of users within and outside an organization*". Markus (2007) adapts the public sector governance definition of Lynn Jr, Heinrich, and Hill (2001) to form a definiton of OSS governance that is inclusive of the attributes of OSS governance that is discussed in literature. The definition of OSS governance as given by Markus (2007) is as follows:

> **OSS Governance definition:** "The means of achieving the direction, control, and coordination of wholly or partially autonomous individuals and organizations on behalf of an OSS development project to which they jointly contribute" (Markus, 2007).

### 3.2.1 Governance dimensions

#### Governance dimension matrix of Markus

Markus (2007) proposes a multidimensional model of OSS Governance. Markus (2007) identifies three general purposes to OSS Governance. Research in the OSS governance domain and governance dimensions in OSS can generally be attributed to one or more of the purposes.

- The first purpose is motivational. What incentivizes a developer to contribute their time and skills. Therefore governance mechanisms that affect this dimension solve a collective action dilemma.
- The second purpose involves the coordination of tasks through many independent individuals. Governance mechanisms that affect this dimension provide tools and techniques to manage development work in an OSS environment.
- The third purpose involves creating a positive organizational environment in the project. A positive organizational climate in OSS will positively impact its contributors and contribute to the success of the project.

Across these three purposes Markus (2007) identifies six dimensions of OSS governance.

- Ownership of assets - This dimension includes the intellectual property licenses (OSS licenses) and legal organizational structures (e.g., not-for-profit foundations).
- Chartering the project — This dimension refers to the mission and vision of the project and development roadmap for the project.
- Community management — This dimension refers to who can be involved, what roles community members may have and how they can change roles. We can also refer to this as participation management, role division and role advancement.
- Software development processes — This dimension refers to the operational tasks of development such as requirements elicitation, assignment of people to tasks, processes for managing software changes.
- Conflict resolution and rule changing — This dimension refers to the rules and procedures that are followed for resolving conflicts and changing rules.
- Use of information and tools - This dimension refers to how and which tools are utilized to communicate information and manage the repositories.

#### Governance dimensions of De Laat

Laat (2007) categorizes governance studies in three phases. During the first phase studies focused on the spontaneous innovation and development aspects of OSS and the altruistic motivations of contributors. During the second phase studies focused on the internal governance of OSS projects. As projects grow larger formal coordination and governance become a necessity. When projects grow even larger, the third phase of governance towards outside parties comes into play. Due to growth and interactions with other parties outside of OSS, legal challenges may arise, creating the necessity of a legal shell, in the form of foundations, to protect the project's interest.

Regarding the internal governance, Laat (2007) finds six categories of governance:

- Modularization - When OSS projects grow larger and the number of participants increases, projects are often split into different modules as a measure to coordinate the project and coordinate tasks with participants.
- Division of roles - A division of roles comes with a division of responsibilities, from user to developer to project owner. Each project may have their subdivision of these roles (e.g., committer or core developer) or project specific roles. The number of roles can be many as well. However, Laat (2007) argues that for the project to be effective, it is important that the roles and corresponding responsibilities are divided.
- Delegation of decision making - In OSS projects decisions have to be made at all levels. However, which level is allowed to make which decisions. Arrangements of decision making range from centralized to decentralized designs.
- Training and indoctrination - As projects grew larger, entry requirements were introduced at some projects. These requirements ensure the competence and motivations of new contributors. Some examples of requirements are proof of identity, proof of knowledge, demonstration of technical skills and proof of allegiance to OSS philosophy.
- Formalization - Formal tools in OSS, such as versioning systems or issue trackers, formalize the collaboration processes. Use of such tools are standardized in OSS and enables individual contributors to better perform their tasks.
- Autocracy/democracy - Leadership in OSS development projects ranges from autocratic to democratic forms. In many smaller OSS projects the founders stay as autocratic leaders. More democratic processes involve the election of core developers or leaders by the community.

The dimensions as proposed by De Laat and Markus show some similarities. E.g., there are similarities between the dimensions of *use of information and tools* of Markus and *formalization* of De Laat, or *community management* and *division of roles*, or *software development processes* and *delegation of decision making*, respecitvely. However, Markus and De Laat also highlight different dimensions. It shows that Markus and De Laat to some extent, agree on governance dimensions in OSS, while both also have an individual view of some aspects of governance.

### 3.2.2 Motivation

Much research has been dedicated to the motives of people who contribute towards OSS projects and work on their development (Markus, 2007). The general premise on why this is so interesting is that it is because in general work in OSS is unpaid and the work delivered is publicly available and free for anyone to use. However, this is only one picture of OSS development. In reality commercial companies contribute people, resources and funds towards OSS projects as well. In cases where OSS projects grow bigger, not for profit foundations are formed to manage the development of the project. These foundations do have financial means to hire people and pay for work. However, it remains interesting what motivates people to contribute to an OSS project, potentially without receiving financial compensation, while enabling anyone to make use of the work.

Many motivational reasons have been suggested e.g., altruism, need for accomplishment, status in the developer community or financial motivations (Midha and Bhattacherjee, 2012; Riehle, 2007).

Hertel (2007) found a mix of intrinsic and extrinsic motivations. Lakhani and Wolf (2003)'s survey found personal intellectual stimulation and improvement of skills, a sense of moral obligation to the open source community and a belief that software should be free, a private need for the software, or because they are involved through work related reasons or career concerns. Other reasons are expertise signaling or community reputation(Midha and Bhattacherjee, 2012). Rather than a distinction as intrinsic or extrinsic, a distinction can also be made in altruistic or egoistic motivations (Laat, 2007).

### 3.2.3 OSS license

The open source license for intellectual property protection is often seen as the essential differentiating characteristic of OSS (Markus, 2007). The license ensures that the software is free to use and dictates the terms of use and redistribution. There are many variations of OSS licenses each with their specific terms. The main distinction in these licenses are whether they incorporate copyleft, as in the General Public License (GPL) or not, as is the case with the MIT (Massachusetts Institute of Technology) license. GPL and MIT are two of the most widely used OSS licenses.

OSS that is distributed under the GPL, for example, allows the software to be modified and redistributed, under the condition that any derived software, that is redistributed, needs to be open sourced, publishing their source code, called copyleft. Any software that makes use of OSS under the GPL may not impose any licensing instructions on others (Franck and Jungwirth, 2003). The GPL license ensures that any derived software, that is redistributed, is open source as well. Different variations of OSS licenses exists and each imposes different terms of use and redistribution. The MIT License, for example, does not impose copyleft, software distributed under the MIT license is free to use and may be redistributed without disclosing the source code.

OSS licenses are the legal foundation that ensures that open source software is open source. Through copyright law the license dictates the terms of use and ensures that the software can not be used or redistributed in any form, without complying with the terms of the license.

### 3.2.4 Roles and role migration

As in traditional organizations, where a hierarchy and division of roles and responsibilities exists, naturally OSS communities also follow divisions in hierarchy and responsibilities according to factors such as demonstrated knowledge, time of involvement with the project and reputation in the community. However, within the OSS community, roles are often less strictly defined and members ascend and descend the organization hierarchy more fluidly and members often act in multiple overlapping roles (Jensen and Scacchi, 2007). The roles and responsibilities differ per OSS project, however simliarities can be found. For example, most large OSS communities are hierarchical and common roles can be found across projects.

#### Role division

Many different roles have been defined in OSS projects, common roles are in the range from observer, bug-reporter, developer, core-developer to project owner (Laat, 2007; Midha and Bhattacherjee, 2012; Lattemann and Stieglitz, 2005). Projects may have more specific differentiations in role, such as a differentiation from users (who only

use the software) and contributors (who also take part in discussions)(Laat, 2007). Depending on the project any number of roles can be used.

Crowston and Howison (2005) observes that members of OSSD projects gravitate towards central roles, for which they use the metaphor of an onion as seen in figure 3.1. At the core there are core developers or project leaders and over time active users get more involved and gradually become a developer and move towards becoming a core developer. These movements are referred to as role migration.

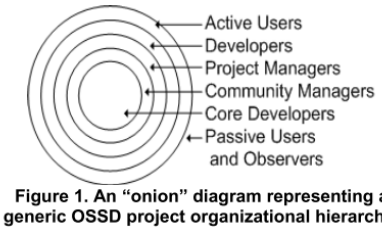


FIGURE 3.1: Onion model

#### Role migration

Role migration in OSS has its own characteristics due to the open nature of OSS. To become a core developer, an individual must acquire project-specific knowledge, demonstrate technical skills and earn the reputation of the community (Midha and Bhattacherjee, 2012). The progression of roles in a OSS community depends on the governance practices of the project. Jensen and Scacchi (2007) finds multiple accessible ways for users and observers to get actively involved with a project. These activities require a low degree of interaction with other community members, such as submitting bug reports, test cases, source code and so forth. For further role advancement Jensen and Scacchi (2007) finds four methods: (I) volunteering (II) earned/granted (III) appointed or assigned (IV) elected, see table 3.2.

| Role Acquisition Method | Description |
|---|---|
| Volunteering | Implicitly/explicitly volunteering for and performing a task. |
| Earned/Granted | An individual or body of authority grants rank to the community member. This may require that the community member apply for the position, or that s/he is nominated or sponsored by a higher ranking member, possibly involving a vote from the granting body. |
| Appointed/Assigned | An individual or body of authority appoints the community member to a position. |
| Elected | An individual is voted into a position by the community at large or a subcommittee. |

TABLE 3.2: Types of role advancement processes from Jensen and Scacchi (2007)

### 3.2.5 Participation and responsibility management

Midha and Bhattacherjee (2012) study the effect of participation management and responsibility management on the execution of maintenance tasks in open source

software communities.

As discussed in section about role migration, roles in OSS are usually scaled from community member, to bug reporter, to developer to core developer. The progression through roles is typically gradual and involves a process in which project-specific knowledge is acquired, technical skills are demonstrated and reputation is earned from the community. This is typically a gradual process and depends on the governance of the project. Some projects may have formal roles and strict protocols for appointments through roles, while in others this is not formalized and role advancement occurs in a more fluid manner.

**Enhancive and corrective maintenance** To explain how Midha and Bhattacherjee (2012) study the effect of responsibility and participation management on maintenance tasks, we first explain their differentiation between enhancive and corrective maintenance. Enhancive maintenance is adding new features and making improvements. Enhancive maintenance is associated with more visibility, completing such tasks may therefore reward the developer with more reputation. Corrective maintenance is associated with correcting errors and fixing bugs. Compared to enhancive maintenance these tasks may not have the same visibility and completing such tasks may require more knowledge of the project.

**Responsibility management** Responsibility management refers to the delegation of responsibilities for certain tasks to community members. Responsibility management is decomposed in a range from open to delegated responsibility. In open responsibility, it is open and anyone can pick up a task. In delegated responsibility tasks are specifically assigned to developers. The study finds that the time for enhancive maintenance decreases with open responsibility. While corrective maintenance benefits from more delegated responsiblity.

**Participation management** Participation management refers to the governance of who can be involved and in what capacity in an OSS project. It is a quality control practice that restricts unqualified observers to become developers or core developers. External participants who want to join the core development team have a strong motivation to quickly finish maintenance tasks in order to gain reputation. Also developers work more on enhancive tasks as it has more visibility and thus the reputation rewards are higher. This competitive nature improves turnaround time for enhancive tasks.

### 3.2.6 Summary

OSS governance consists of a multitude of mechanisms as each fulfils different purposes of governance. Markus (2007) has captured this in a multidimensional model, capturing the governance dimensions of *ownership of assets, project chartering, community management, software development processes, conflict resolution and rule changing* and *use of information and tools*. Laat (2007) presents his own set of dimensions for internal governance, of which some are similar to the dimensions of Markus and some are more distinctive. Laat (2007) presents the dimensions of *modularization, division of roles, delegation of decision making, training and indoctrination, formalization* and *autocracy/democracy*. Other researchers focus on specific aspects of OSS governance, such as motivations, OSS license, roles and role migration or operational management. The motivational aspect for instance is a much discussed aspect. Contributors to OSS

projects may contribute as part of their paid jobs or may do so on their own account. In general researchers distinguish between intrinsic and extrinsic motivations (Hertel, 2007) or altruistic and egoistic motivations (Laat, 2007). Regarding role structures in OSS, researchers find a pattern which is captured by the onion model, where core developers or project leaders are at the core of the project with roles such as regular developers or other contributors stand at the outer layers of the onion model (Crowston and Howison, 2005). Researchers also find that role migration in OSS is often more fluid than tradtional organizations and highly based on meritocracy and reputation (Midha and Bhattacherjee, 2012; Jensen and Meckling, 1976). Midha and Bhattacherjee (2012) have focused on the impact of responsibility management and participation management on tasks and found that different degrees of management may positively impact the time it takes to finish tasks in an OSS project.

## 3.3 DAO Governance

The governance of a DAO is defined by its smart contracts and made effective through the recording of its events and transactions on a blockchain. These form the basis through which governance of a DAO is achieved. In this section we will touch upon the governance mechanisms that enable a DAO.

Wang et al. (2019) present a DAO reference model that attempts to cover the full range of the DAO concept from the underlying technology to its public representation. The reference model can be seen in figure 3.2. It consists of five layers. The basic technology layer, covers the the underlying technologies that enable the DAO and support functions of the DAO. The governance operation layer concerns itself with mechanisms that support the operation and governance in matters of trust, allocation of resources and collaboration. The incentive mechanism layer concerns itself with different aspects of a token economy for incentivization. The organization form layer concerns itself with how the organization members are structured and how the structure forms or morphes. Lastly the manifestation layer is about how the DAO is presented to the world and what form it takes, i.e. Whether it is a platform, an organization or a (financial) system. By addressing the aspects of each layer, the model aims to provide a reference for all the considerations that need to be made for a DAO.

Concerning governance, the operation layer and incentive mechanism layer are most relevant. Interestingly enough, Wang et al. (2019) have not included voting in their governance operation layer, even though the aspect is highlighted in their case studies of the model. A possible reason could be that their model approaches the concept of DAO from a more architectual and technological perspective rather than from a governance point of view. In the rest of this chapter the governance mechanisms of DAO are explored. Wang et al. (2019)s model provides a reference overview of a DAO and shows how governance is positioned. In the rest of this chapter the governance aspects of voting, token economics on-chain/off-chain governance and forking are covered.

### 3.3.1 Voting

Voting stands at the core of DAO governance. Liu et al. (2020) even simplifies the activities of a DAO to essentially having members create proposals and vote on these proposals. As opposed to traditional organizations, where decision making is concentrated at the top, in DAOs, all shareholders can directly participate in the decision making through decentralized voting (Wright and De Filippi, 2015). Currently in DAOs, the general approach is that a proposal is submitted, after which the members of the DAO take a vote (Wang et al., 2019; El Faqir, Arroyo, and Hassan, 2020; Liu et al., 2020; Wright and De Filippi, 2015). The proposal and votes are recorded on the underlying blockchain. The result of the proposal may result in an action that is automatically executed by the DAO, e.g., promoting a member, accepting a new member, allocating funds, performing payment. The resulting actions are registered on the blockchain that ensures all parties of its execution.

The actions that are tied to the results of the proposals are defined in the smart contracts. The possible actions are only limited by the underlying technology and the programmers ability to program the smart contract. As DAO technology matures, the governance abilities of DAOs mature as well, expanding the applications for DAOs and moving governance away from off-chain and towards on-chain.

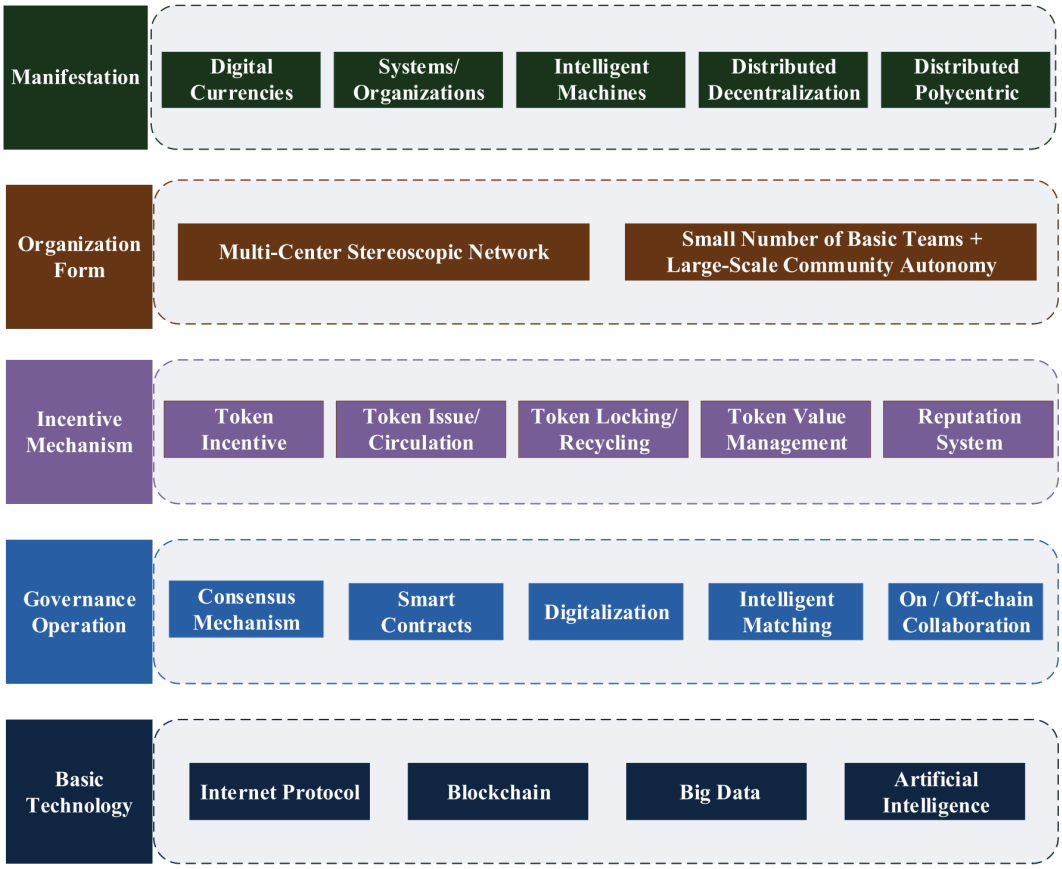


FIGURE 3.2: DAO reference model by Wang et al. (2019)

The underlying smart contracts may dictate what the conditions are for a proposal to be approved or rejected. It may set the quorum, i.e., what percentage of votes of the total possible votes need to be cast to approve a proposal. But there are also different models through which voting rights are allocated. A popular design is the one-token-one-vote design. However, this has the downside that it has centralizing characteristics of a plutocracy, or government by the wealthy (Reijers et al., 2018). As a consequence a plutocracy favors private interests over the common good.

In a pseudonymous public blockchain, a person interacts with the blockchain through his blockchain address. However, a user may have multiple addresses. This makes it susceptible to a Sybil attack. I.e., a person can create multiple addresses and may vote multiple times. While a solution may be to have users identify themselves using more traditional means (e.g. linking their drivers license to their blockchain address). A technical alternative is to link reputation scores to blockchain addresses. Swarm City - a blockchain project that aims to build a blockchain-based sharing economy platform - assigns reputation scores to blockchain addresses (Beck, Müller-Bloch, and King, 2018). Their users are able to earn reputation as an indicator of trust. In DAO frameworks, reputation is often used to determine a user's voting weight on proposals in a given organization (Filippi, Shimony, and Tenorio-Fornés, 2020). Reputation can not be transferred between users and are therefore non-fungible. A DAO may decide to award reputation points to a user, based on dynamic criteria, but may also remove reputation points. Other alternative voting and more complex designs, besides reputation voting are amongst others, quadratic voting, futarchy, liquid democracy and conviction voting (Kaal, 2021).

### 3.3.2 Token economics

Crypto-tokens play a major role in blockchain and they have many different use cases. In the most classic application, like Bitcoin, it is a currency. However, today crypto-tokens fulfil a wide variety of roles. "Some tokens are similar to currencies, others are more like securities, and others have properties that are entirely new" (Conley et al., 2017). In more modern blockchain application it has become a currency to pay for services from a blockchain network. It is widely used as a means to raise funds through intial coin offerings(ICO). Or it has a utility within the network e.g., in proof of stake(PoS) the token ownership plays a role in the consensus mechanism. Or tokens may even represent an ownership interest or voting right (Wright and De Filippi, 2015). As a result, generally crypto-tokens are differentiated between utility tokens and security tokens.

In a one-token-one-vote model larger shareholders have more voting power. Wang et al. (2019) describe three utilities that are generally embedded in crypto-tokens: 1. equity (value-added, long-term income), 2. property (representing the right to use, goods, or services) and 3. currency (circulating within a certain range. "Crypto-tokens are not exactly currency, and not exactly securities. They can incorporate aspects of both, and also have characteristics that are entirely new (Conley et al., 2017). In this section the attributes and characteristics of crypto-tokens and their possible applications for DAOs are explored.

In the governance of DAOs, tokens can be used to represent shareholdership. It can be a medium of exchange that incentivizes participants, or be used for voting. Additionally a DAO may also use it to raise funds. Tokens can be designed in very different ways and will impact the economic model that results form its design. Designing a token is complex as the use cases and utilities differ. Wang et al. (2019) have condensed the components of token engineering to 5 aspects; token incentive, token issue/circulation, token locking/recycling, token value management and reputation system. See figure 3.3. "A good token model integrates the monetary capital, human capital, and other capitals together, changes the relationship between people and organization, reduces the operation costs, and meanwhile satisfies the fund demand in the early stage of the project" (Wang et al., 2019).


FIGURE 3.3: DAO reference model incentive mechanism layer (Wang et al., 2019)

**Token incentive** Token incentive addresses how tokens are utilized and awarded. In Bitcoin for example, miners are rewarded bitcoins and are paid transaction fees for validating the blocks that contain the transactions. In a DAO the incentive could be to reward members for performing certain actions. In return tokens return a utility, to the token holders, i.e. governance rights. However, there is a duality to incentives. The incentive should enable for actors to improve their own utility, while at the same time, the actors' actions should benefit the DAO and its constituents (Kaal, 2021).

**Token circulation** In bitcoin all tokens are mined. However, it also possible to directly issue tokens and mint additional tokens, depending on how the token model is designed. By issuing tokens in an initial coin offering(ICO), funds can be raised to fund the activities and development of a blockchain network. Smart contracts may also dynamically issue tokens.

**Token value management** The value of a token depends on its supply and demand. The demand is derived from the utility that the token holds. A DAO can manage the value of a token by increasing its utility. Another method is to to affect the supply by increasing or decreasing the tokens in circulation. It may mint additional tokens to increase the supply of tokens or tokens can be removed from circulation by either locking or burning the tokens. The blockchain network Ripple decided to lock up a significant portion of their tokens into escrow accounts on the Ripple blockchain due to concerns that the company held too large of a portion of the currency. In fact it had held over 60% of the entire XRP supply. The tokens were locked in order to reduce concerns over possible market manipulation. However, the tokens were only locked, whereas burning removes the tokens out of circulation definitively. Tokens are burned by irreversibly sending them to a burn address. There is no corresponding private key to the burn address, which makes the coins definitively lost or burned. Burning is done quarterly in Binance Coin, the result is a decreased supply and possibly increased value. Perhaps this is somewhat comparable to stock buybacks, where publicly owned companies buy back their stocks from the open market.

**Reputation system** Tokens can also be part of a reputation system, where tokens are an indication of the trustworthiness of a user. In such a system reputation tokens can be earned by performing actions. Tokens can also be taken away when a user acts undesirably. In some blockchain systems, reputation tokens are non-fungible, meaning that they can not be transferred to other people and are only associated with the address that they are awarded to.

### 3.3.3 On-chain and off-chain governance

As organizations involve humans, they also involve the social interactions and rules of society. In traditional organizations formal rules exist in the form of written contracts, but the majority of governance happens through social interactions between the members of the organization. In DAOs a similar distinction can be made between on-chain and off-chain governance. Where on-chain governance comprises of "the rules and decision making processes that have been encoded directly into the underlying infrastructure of a blockchain-based system" (Reijers et al., 2018, p. 2). While off-chain governance comprises all other rules and decision making processes that are not encoded on the blockchain.

An example which illustrates the boundaries of on-chain and off-chain can be seen in the case of *The DAO*. *The DAO* was a decentralized venture capital fund, that was built using smart contracts on the Ethereum network (Jentzsch, 2016). It was encoded in smart contracts and investors could invest Ether - the cryptotoken of Ethereum - into *The DAO*. The governance of *The DAO* was encoded in its smart contracts, which can be seen as the on-chain governance. *The DAO* raised $250m USD worth of Ether, which amounted to about 14% of the total Ether supply. However, an attacker exploited a loophole in the smart contracts of *The DAO* and was able to

drain about 30% of its funds. The events that followed, show how traditional models of sociality were used to deal with the attack, thus in an off-chain manner, when on-chain governance is unable to do so.

The attack resulted in an existential crisis for the Ethereum network (DuPont, 2017). For the short term, to counteract, major exchanges shut down trading to prevent the attacker from converting the stolen Ether to traditional currencies. After a month of debate and considering different solutions, eventually it was decided to perform a hard fork. The hard fork would, roll back the ledger to a state in which the events of *The DAO* never happened. It would roll back the entire supposedly immutable ledger. An act that some argued as an act of deceit, as it violates the promise of immutability. And some, including, the attacker even argued that "code is law" - a slogan from Lessig (1999) - and therefore the attacker was entitled to the stolen funds.

These events are an illustration of an extreme case where on-chain governance ends and off-chain governance has taken over, even crossing the boundary and imposing on on-chain governance. This is not an every day event, and had heavily impacted the Ethereum network. Currently the governance of DAOs consists of a small part on-chain governance at the core, while most governance happens off-chain. This is because of the limitations of the current early state of DAO technology. As the technology matures, increased on-chain governance can be expected (Wang et al., 2019).

### 3.3.4 Forking

Beck, Müller-Bloch, and King (2018) describes the case of a blockchain project, called Swarm City. The project originates from the Arcade City project, because of a disagreement. As a result of the disagreement, a group from the project split off and forked the Arcade City project to form Swarm City. In this case of forking they copied the existing code and continued developing it as they saw fit. As a governance mechanism, forking in this case is used as a governance mechanism through which a dispute is settled. Another example is the case of Ethereum and the events surrounding *The DAO* DuPont, 2017. After the attack, the majority of the community decided to perform a hard fork, to roll back the events that had led to the attack. As if the attack had never happened. A part of the community disagreed, deciding not to erase the events of the attack and to continue with a blockchain in which the funds had been stolen. They split off from the project to continue under the name Ethereum Classic. Ultimately this form of forking translates to parties splitting up on disagreement and going their own ways. Although forking in a way is able to settle disputes, it results in a loss of opportunity and an economic loss (Kaal, 2021). Additionally it does not solve a dispute, but rather offers a suboptimal solution as parties go their own way, resulting in a loss for the ecosystem as a whole.

### 3.3.5 Summary

Governance in DAO projects can be categorized in on-chain and off-chain governance. Where on-chain governance consists of the formal governance that is facilitated and registered by the smart contracts of the DAO. While off-chain governance consist of all other governance rules and processes that are not encoded on the blockchain. Compared to governance in OSS, on-chain governance in DAOs is comparable to the formal tools that are used in OSS, as on-chain governance is essentially the formalized

governance. It is essentially the result of all governance in DAOs, on-chain and off-chain. While in OSS projects, formal tools are mostly used to support practical organizational matters. In DAOs we see that the formalized on-chain governance has taken a central role in governance.

Currently voting is the most prominent method through which DAOs facilitate decentralized decision making. Voting can occur with different voting mechanisms, depending on the applied protocol. Voting power can be allocated meritocratically, more centralized or more decentralized. In traditional OSS projects, decision making is generally more centralized towards project leaders as depicted in the onion model. DAO offers an opportunity to differentiate, by formally allowing for the community and all other stakeholders to have an influence in the decision making of the DAO.

Underpinning much of DAO, is its token model. Tokens have a variety of use cases and is often associated with an economic model. The token may be utilized as an incentive for participants, rewarding them for active contribution as part of a meritocratic system. Additionally in DAO it may represent a voting right, where the number of tokens that a person owns, represents their voting power, much like companies that distribute shares and have shareholders. The economic model of tokens concerns itself with how tokens are distributed and used, this may impact the value of the tokens, much like how companies manage their shares.

What has also become clear is that DAO technology offers a model for governance of organizations. However, just like traditional organizations, the governance of DAOs differs from DAO to DAO. Each DAO may utilize the governance mechanisms that DAO technology offers to suit their own governance needs, or even invent new ways of governance. DAO technology mostly offers tools and mechanisms through which governance can be done in a formalized, decentralized, autonomous and accountable manner.

# Chapter 4

# OSS governance

This chapter describes the process and presents the findings of the structured literature review of OSS governance. The process is as follows: firstly the literature was sourced, then filtered for relevancy through multiple iterations and finally analyzed and codified in Nvivo to extract the encountered governance concepts. Firstly the process of sourcing and filtering literature are described down below. After which this chapter presents the findings of the analysis.

## 4.1 Sourcing Scopus and Google Scholar

In order to find relevant literature, Scopus and Google Scholar were used, as Scopus provides higher quality results, while Google Scholar provides breadth to the results.

First Scopus was used to source for literature. Using Scopus, a combined search query, that allows for different variations of the query, was used to search for literature. It looks for literature that contains the words "*open source software governance*" in the title, or a variation of open source software, e.g., *oss* or *ossd*:

> **Scopus advanced search query:** TITLE(((open source software) OR oss OR ossd) AND governance)

This query was performed in May 2021 and resulted in 28 document results. Scopus allows for directly accessing the abstract and other metadata of articles on their platform. It makes for easy filtering of articles, before downloading the full article. Firstly the articles were filtered for inclusion based on their title, then on their abstract and finally based on their contents. If the article was not addressing the governance of OSS projects, it was not included. Based on the title 18 out of 28 articles were included and 10 excluded. Two examples of articles that were excluded based on their title are:

- *Implementing open source software governance in real software assurance processes*
- *Open source ejbca public key infrastructure for e-governance enabled software systems in rrcat*

Next the abstracts of the 18 remaining articles were read. 3 more articles were rejected, leaving a set of 15 articles. Most of the 13 documents that were rejected so far, were concerned with governance of the use of open source software in organizations or in a medical or laboratory environment. Instead of governance in open source software projects. Upon accessing the full document of these final 15 articles, one article was unavailable and another appeared to be in Korean, leaving a final set of 13 articles that were sourced through Scopus.

Having collected a set of 13 articles, Google Scholar was searched to provide additional results. Unlike Scopus, Google Scholar limits the use of advanced combined search queries using *AND* and *OR* operators. To conduct the same searches in Google Scholar, the query was split into three separate queries:

**Google Scholar queries:**
**1.** allintitle: open source software governance
**2.** allintitle: oss governance
**3.** allintitle: ossd governance

These queries were executed in May 2021 as well. Unlike Scopus, Google Scholar only offers the title, 3 lines of excerpt and a link to the article. Therefore the process here is slightly different. Papers are first evaluated on their title and accessibility. If the paper is accessible and has a title that indicates relevancy, the article is downloaded and saved for further examination based on abstract and content.

The first query resulted in a total of 83 search results, of which 30 were downloaded based on their title and availability. The second and third query produced six and one search result respectively. However, none were found to be relevant, leaving a total of 30 articles to be further examined. After examination, 4 of the 30 were excluded due to not being in English or the topic was irrelevant, leaving 26 articles.

Upon comparison of the articles found through Scopus and Google Scholar, 12 articles were found in both sources. Meaning that of the total of 13 articles from Scopus and 26 from Google Scholar, Scopus produced 1 addtional article and Google Scholar 14, for a total of 27 articles. Many of the additional articles found in Google Scholar were a thesis or dissertation, which are not included in the Scopus database.

The final step was the analysis and review of the full articles that were found through Scopus and Google Scholar. Mendeley was used to store and organize the found articles. After filtering the articles, they were loaded into Nvivo for analysis. During this stage, 2 more articles were identified through snowballing. While 6 were excluded. One article examined how firms may influence the governance of OSS projects, another was on how the use of OSS could be governed and the others did not provide any new contributions into the governance of OSS projects.

In Nvivo, the research papers were analyzed and the OSS Governance concepts were codified in an exploratory manner. I.e., the codes were created as governance concepts were encountered. After analyzing all papers, 165 codes were created. These codes contained governance concepts and ideas related to governance in OSS. Some of the codes were duplicates or concerned overlapping concepts. The duplicates were created as they were part of a larger concept or were approached from a different context. Upon revisiting all codes, we can summarise that researchers have assessed (I) different levels of analysis of OSS governance, assessed different (II) community types and their respective governance models, characterized (III) governance dimensions, determined (IV) what motivates participants to contribute and finally they provided insights into how governance is achieved, which is compiled into a list of (V) Governance mechanisms. In the following section these findings are presented.

## 4.2 OSS Governance literature analysis

In our analysis 16 papers were found that offered a contribution in understanding the internal governance of OSS projects. What mechanisms are at work, what dimensions and categorisations can be distinguished, the insights into structures and management of OSS projects and how those projects can be analyzed.

### 4.2.1 Levels of analysis

When analyzing OSS governance, governance can be studied from different viewpoints at different levels. Jensen and Scacchi (2010) for example, have studied the socio-technical interaction networks in OSS communities. Through their studies they conclude that OSS development is best understood as a set of socio-technical interactions where social and technical processes are tightly intertwined. According to them, the governance involved with these processes can be viewed through three levels of analysis, which they distinguish in micro, meso and macro levels. *The micro level* stands at the level of the individual participant and concerns (a) the actions, beliefs and motivations of OSS project participants and (b) the individual resources and artifacts that support the operation of the project such as communication, coordination or documentation. *The meso level* stands at the level of project teams and concerns the (a) patterns of cooperation, coordination, control, leadership, role migration and conflict resolution, and (b) internal social-technical networking. Governance mechanisms that Jensen and Scacchi (2010) have observed on the meso level are policies and guidelines, separation of concerns (modularization of the project), role structure and role advancement. *The macro level* focuses on the inter-project ecosystem level and is concerned with governance on a larger scope than the individual OSS project at the ecosystem level, concerning coordination, leadership, control and conflict resolution towards external actors or concerning an ecosystem of multiple OSS projects. Elements of governance at this level involve coordination, leadership and control, and conflict resolution.

They have also identified several social and technical governance mechanisms in their analysis of the NetBeans OSS community: (a) project and software system architecture, (b) mission/vision statement, (c) release plans and development roadmap, (d) community policies and guidelines, (e) issue tracking system (f) mailing lists and (g) private meetings. At the meso level, they identify (h) policies and guidelines and (i) modularization.

In their research, Laat (2007) follows the three waves of studies in OSS governance, where the first phase, *spontaneous governance* focused on the background and motivations of OSS community members, when the idea of hackers contributing free time was novel and predominant. The second wave or phase as Laat calls it, focused on the internal governance of projects, as these projects have developed a collection of tools to support their community and operations. The third wave of research focused on *governance towards outside parties*. As OSS projects grew larger, interactions with external parties increased, commercial companies also gained interest in OSS projects and legal interest of the project needed to be protected. As such, a need of governance towards outside parties grew as well and often foundations were formed to protect and further the interests of the OSS project. These phases of Laat are used by researchers as categorizations for OSS governance (DuPont, 2017).

### 4.2.2 Governance dimensions

In her research, Markus (2007) discusses the governance of OSS projects and whether governance is monolithic, multidimensional or configurational. The monolithic argument represents open source as a distinct organizational form. Such as the argument of how the bazaar style of software development, as characterized in OSS projects, differentiates from the classical cathedral style of software development (the bazaar and cathedral are further explained in the next section). The multidimensional argument considers diversity in certain aspects such as the OSS license, legal structure, or role structure. However, it does not consider the relationship between dimensions. Therefore, Markus (2007) proposes a configurational framework, where certain sets of configurations of governance may exist. In this framework Markus (2007) proposes six dimensions, see table 4.1.

In addition to the governance dimensions, she has also defined three purposes of governance in OSS projects. These are: solving coordination problems, solving collective action dilemmas and creating a better climate for contributors. However, Markus does mention that the theory of creating a better climate for contributors is not well developed. The other two purposes can also be described as incentivization and coordination.

| Dimension | Description |
|---|---|
| Ownership of assets | E.g., OSS licenses and formal legal organizational structures (foundations). |
| Chartering the project | E.g., mission and vision of the project and development roadmap for the project. |
| Community management | Who can be involved, what roles may community members have and how can they change roles. |
| Software development processes | Operational tasks of development, such as requirements elicitation, assignment of people to tasks and processes for managing software changes. |
| Conflict resolution | Rules and procedures that are followed for resolving conflicts and changing rules. |
| Use of information and tools | How and which tools are utilized to communicate information and manage the repositories. |

Table 4.1: Governance dimensions from Markus (2007)

### 4.2.3 Community types

Multiple authors have presented the case of the bazaar vs cathedral types of software development, that was originally presented by Raymond (1999). The bazaar characterizes the process of OSS development, where a bazaar is a lively unorganized place with haggling and discussion, much unlike the cathedral. The cathedral represents traditional forms of corporate software development, where the cathedral was designed meticulously and build over many years by unrecognized craftsman, where focus and recognition centers around the resulting standing cathedral. However as Germonprez et al. (2014) argues, nowadays it is less compelling of an metaphor and too simplistic as the dynamics of OSS governance have evolved.

Tullio and Staples (2013) have researched governance and control of OSS projects. They adapt control theory to governance of OSS projects. With a basis of control theory they extend the research of Markus (2007) to find governance configurations of OSS projects. In her work, Markus had proposed a multi-dimensional governance

model. She theorizes that different sets of configurations of governance could exist. Tullio and Staples have acted upon her suggestion.

Following up on the work of Markus, their analysis of 184 active OSS projects yielded three clusters of governance configurations, which they named: *open community*, *authoritarian community* and *defined community*. Table 4.2 shows the community types and the governance characteristics that were identified. It shows that the governance of OSS projects can be generally be categorized in these three community types with their respective characteristics in each of the governance dimensions.

| **Community types** | **Project goals** | **Decision making** | **Conflict resolution** | **Software development process** | **Rules regarding project information and use of tools** |
|---|---|---|---|---|---|
| Open community | Bottom-up: mostly suggested by project members | By project members | Few norms, weak compliance mechanisms, weak enforcement. | Undefined, with vague processes for managing software changes. | Use and management of project information and tools is clear. |
| Defined community | Mostly bottom-up | Decentralized management | Adressed and attended to when required. | Managed: software releases are supervised by release managers | Use of information and technical tools is clear and enforced. |
| Authoritarian community | Proposed by both project members and project administrators. | Decision making lies more with project administrators than project members | Unmanaged | Somwehat defined. | Unclear and not enforced. |

TABLE 4.2: Community types and characteristics of (Tullio and Staples, 2013)

Another study by De Noni, Ganzaroli, and Orsi (2013) conducted an exploratory analysis of 40 OSS projects. They analyzed the projects on the basis of the following variables: foundation, type of license, membership, changes to source code, subproject, release authority, leadership and decision making, access to the code and bug reporting. A range of two to four scores, were assigned to each variable and all projects were rated accordingly. In their analysis using the scoring table, they found four clusters with their own characterizing governance configurations: *open source-based*, *sponsor-based*, *tolerant dictator-based* and *collective*. In an earlier publication of this research, the collective governance configuration was named *reciprocity-based* (De Noni, Ganzaroli, and Orsi, 2011), but was since then renamed to *collective* by the authors. The community types and their governance configuration properties are shown in table 4.3.

| | **Open-source based** | **Sponsor-based** | **Tolerant dictator-based** | **Collective** |
|---|---|---|---|---|
| **License** | Pragmatic type. No requirement for users to share source code of derivative works. | Pragmatic type. | Radical type. Users have to share content of derivative work. | Radical type. |
| **Sub-projects** | Users can start sub-projects and claim copyright of sub-project. May require recognition of authorship and may prohibit commercial exploitation of trademarks and brand names | Not allowed to own copyrights on independent sub-projects | | |
| **Leadership** | Institutionalized, democratic and distributed | Institutionalized, autocratic and centralized | Individual, autocratic and centralized. | Collective, meritocratic and distributed. |
| **Foundation** | Foundation in place | Foundation or firm | | |
| **Power** | Power is distriubted among roles | Held by foundation, consortium of firms or single firm. | Leader is responsible for all the decisions related to software development and authorship. | Teams of peers collaborate in the management of critical activities. |
| **Institutional roles and bodies** | Roles and bodies are elected and regulated with clear rules. | Regulated and hierarchically appointed. | In larger communities the leader delegates responsibilities to persons of choice. | Meritocratic. |
| **Membership** | Open, regulated and managed. | Not open and regulated. | No formal mechanism for membership and accreditation. | No explicit rules, decisions are shared in the community. |

TABLE 4.3: Community types and governance configurations, adapted from De Noni, Ganzaroli, and Orsi (2013)

Germonprez et al. (2014) propose four governance types, as they find the analogy of the bazaar and cathedral too simplistic and no longer relevant. Their proposed governance models are: *adhocracy, bureaucracy, family or republic* and *meritocracy.* Adhocracy and family/republic stand for freedom and flexibility, while bureaucracy and meritocracy are focused on control and reward structures. Bureaucracies and families/republics tend to focus on inward reflection, while adhocracies and meritocracies pride themselves on outward achievements. Table 4.4 shows the governance characteristics of each governance structure that Germonprez et al. have identified.

The literature shows different kinds of groupings of governance. Authors have named these governance structures, governance configurations and community types. Tullio and Staples (2013) propose community types with their respective governance configurations as (a) *open*, (b) *defined* and (c) *authoritarian* communities. De Noni, Ganzaroli, and Orsi (2013) propose community types as (a) open-source based, (b) sponsor-based, (c) tolerant dictator-based and (d) collective communities. Germonprez et al. (2014) present governance structures as (a) adhocracy, (b) bureaucracy, (c) family/republic and (d) meritocracy. These classifications show similarities as the models make distinctions based on governance properties, which are often identical or similar. Generally we can see that these classifications, distinguish themselves in (I) the level of formalized governance; from undefined/open to defined governance. And (II) democratic to authoritarian governance.

| | **Characteristics** | **Focus** |
|---|---|---|
| Adhocracy | - Collectivism<br>- Anyone has the right and responsibility to make decisions and take subsequent actions<br>- Social group that share common values, demonstrate respect and help another function in the community. | Freedom and flexibility.<br>Outward achievement. |
| Bureaucracy | - Centered on rules, regulations and protocols.<br>- Hierarchical<br>- Inward focused | Controls and rewards.<br>Inward reflection. |
| Family/republic | - Power resides with the people<br>- Representative leaders | Freedom and flexibility.<br>Inward reflection. |
| Meritocracy | - Rewards are given to those who deliver.<br>- Leaders have rights and responsibility because of their intellect and accomplishment<br>- Competition is a key dynamic amongst members | Controls and rewards.<br>Outward achievement. |

TABLE 4.4: Governance structures, adapted from Germonprez et al. (2014)

### 4.2.4 Governance categorization through control theory

In their analysis of governance configurations, Tullio and Staples (2013) have incorporated an approach from control theory. In control theory a *controller* utilizes social and formal *control mechanisms* to align the behaviour of the *controllee* with the *controller*'s interest and to limit opportunistic behaviour. Four categories of control mechanisms have been conceptualized in control theory: outcome controls, behavior controls, clan control and self-control. Table 4.5 shows an overview of the control categories. Tullio and Staples have used control theory to classify governance metrics and shown that it can be used for analysis of governance configurations. Control theory provides another perspective on classifying governance mechanisms.

| **Category** | **Focus** | **Description** |
|---|---|---|
| Formal controls: | | |
| Outcome controls | Outcome targets | Involves defining specific interim or final outputs and assessing the performance of the controllee with respect to meeting the targets. |
| Behavior controls | Processes and procedures | Involves defining the procedures to accomplish project objectives and perform. |
| Informal controls: | | |
| Clan control | Social mechanisms | Involves mechanisms that create common goals, values, beliefs and expectations about acceptable behavior. |
| Self-control | Individual | Involves the controllee determining their own behavior. |

TABLE 4.5: Control theory categories Tullio and Staples, 2013

### 4.2.5 Motivations of participants

Many researchers have covered the topic of motivations of contributors, community members and other participants in OSS projects as the development dynamics are different from traditional commercial development efforts. In the literature distinctions are made between altruistic or intrinsic motivations against extrinsic or egoistic motivations (Hertel, 2007; Laat, 2007; De Noni, Ganzaroli, and Orsi, 2013). From the literature of OSS four main categories of motivations were compiled. (I) *Need driven*, stems from the fact that the contributor has a need for the software. (II) *Moral obligation*, stems from a moral sense of the contributor that they have a certain moral obligation towards contributing, e.g., alignment with the values of the project. (III) *Enjoyment*; a contributor may find enjoyment in contributing towards the project in various ways, such as finding intellectual stimulation or enjoyment as a creative process. And finally (IV) *economical* motivations that stems from costs and benefits. An overview of the motivations is given in table 4.6.

| Motivation | | Description | Described by |
|---|---|---|---|
| Need driven | | OSS participants join the community to satisfy a need. | (Shah, 2006) |
| | Need for private use | Contributors may need the software or parts of it for private use. | (Laat, 2007) |
| | Need for work | Contributors may need the software or parts of it for work. | (Laat, 2007) |
| Moral obligation | | A sense of moral obligation to the open source community, as contributors identify with a set of values that are believed to be fundamental for social development and well-being. | (Laat, 2007; De Noni, Ganzaroli, and Orsi, 2013) |
| | Reciprocity | A sense of obligation or a desire to conform to the norms of the community that drives contributors to give back to the project. | (Shah, 2006) |
| Enjoyment | | | |
| | Intellectual stimulation | Contributors enjoy the intellectual stimulation. | (Laat, 2007) |
| | Freedom | Enjoyment of the freedom in the OSS community in contrast to structured and managed day to day jobs. | (Shah, 2006; De Noni, Ganzaroli, and Orsi, 2013) |
| | Creativity/aesthetic appreciation | Contributors may find it a creative exercise and have an appreciation for the quality of software. | (Shah, 2006; De Noni, Ganzaroli, and Orsi, 2013) |
| Economic | | Monetary rewards, low opportunity costs etc. | (De Noni, Ganzaroli, and Orsi, 2013) |

TABLE 4.6: Motivations of OSS participants

### 4.2.6 OSS Governance Model

Research of OSS governance has provided different frameworks for understanding governance in OSS. Researchers have explored the various elements and mechanisms of governance in OSS. We observe different forms of classifications and approaches to OSS governance. Researchers have proposed governance dimensions, phases, typifications and analytical levels as frameworks to understand OSS governance. Table 4.7 presents a combined full overview of governance in OSS.

The OSS governance overview is the result of clustering and classifying the 165 codes. During this process, the governance dimensions of Markus (2007) appeared to provide an appropriate and general framework for classifying governance mechanisms. The governance mechanisms that Markus presents, are (I) ownership of assets, (II) chartering the project, (III) community management, (IV) software development processes, (V) conflict resolution and (VI) use of information and tools. In the literature we have seen that De Noni, Ganzaroli, and Orsi (2013) and Tullio and Staples (2013) have also used categorizations of governance. Overall the categorizations that they

make are mostly similar or can be adapted to the model of Markus. E.g., the governance mechanism described as *sub-projects* of De Noni, Ganzaroli, and Orsi can be categorized under the dimension ownership of assets. However in the model of Markus, dimensions such as decision making or leadership(that were categorized by De Noni, Ganzaroli, and Orsi and Tullio and Staples) are not specifically represented and neither do they fit appropriately under any of the other dimensions. Therefore this model was extended with a seventh dimension called (VII) leadership and decision making.

Table 4.7 is the result of clustering of the found mechanisms under seven governance dimensions. The table provides a summarizing description of what each mechanism entails and references to literature that describe these governance mechanisms.

TABLE 4.7: OSS governance mechanisms overview

| **Governance mechanism** | **Description** | **Author** |
|---|---|---|
| **Leadership and decision making:** | | |
| Leadership | Leadership structure and how it is established. This may range from autocratic to democratic designs, where leadership is self-appointed or elected. Leadership may also rest with an organization (company, institution or committtee). Institutionalization of leadership is attractive to those who prefer a more standardized and stable workplace, and less attractive to those who prefer the (creative) freedom in OSS development. Leadership may change over time into more autocratic or democratic forms. | De Laat 2007, Capra 2008, Jensen 2010, De Noni 2013, O'Maony 2007, Sadowski 2008. |
| Elections | Elections allow for the community or a subcommittee to elect the leaders. Some OSS projects employ yearly elections. In elected leadership, the technical contributions of the candidates may be less important than their organization building | Sadowski 2008, De Laat 2007, O'Mahony 2007, De Noni 2013 |
| Delegation of decision making | In OSS projects decisions have to be made about community matters, the project, architecture and design, code acceptance etc. Different levels of roles are entitled to make these decisions. The arrangements may vary from centralized to decentralized designs. | De Laat 2007, De Noni 2013 |
| Voting | Voting systems can be used for decision making processes, electing leaders, representatives or board members or conflict resolution. Some communities only require a subset of the community to participate in the decision making process. | Di Tullio 2013, Germonprez 2014, Mahony 2007 |
| **Ownership of assets:** | | |
| OSS License | The licensing agreement underpins OSS and dictates with which degree of freedom the OSS may be used, incorporated and (re)distributed. Licensing schemes may dictate that all derivative work needs to be open sourced under the same open source license(copyleft) or that the software is only freely available for non-commercial purposes. OSS Licenses can be characterized as: - Viral/recursive/copyleft: All derivative work must be released under the same OSS license.- Partially recursive: A recursive license with exceptions or less strict terms (e.g., LGPL).- Permissive/open license: Use of the software is allowed in commercial closed source derivative work.- Dual licensing: commercial users are required to pay a fee to get access to the source code, but is freely available for non-commercial purposes | De Noni 2013, Di Tullio 2013, De Laat 2007, Markus 2007 |
| Foundation | Foundations safeguard public accessibility and control of project management, project development and source code. It protects the project from liabilities and manages interactions with external parties. Governance elements of foundations in OSS are typically a board of directors, foundation bylaws, membership agreements and intellectual property rights. It handles donations and upholds copyright licenses, trademarks and brand names. | De Noni 2011, Di Tullio 2013, Markus 2007, De Laat 2007 |
| Code forking/sub-projects | Code forking refers to implementing the existing code bases and implementing it in a seperate project. Its meaning is not limited to a split in the community where both parties continue working on their own code base and are incompatible with eachother. It also includes sub-projects that are started. The right and possibility of code forking protects against planned osbsolence, vendor lock-in, unfavorable actions by project leaders through giving developers the option to continue their own version of the program and finally it increases innovative potential by freely allowing modifications. | Nyman 2013, De Noni 2013 |
| **Chartering the project:** | | |
| Mission and vision statement | Mission/vision statements are important as they are the core instructions for the way individuals and organizations will interact with the community as a whole. | Jensen 2010 |
| Release plans and roadmaps | Release plans and roadmaps steers the development of a project and provides a timeline. It is especially relevant in formally controlled OSS projects and commercial OSS. | Jensen 2010, Capra 2008 |
| **Community management:** | | |

**Table 4.7 continued from previous page**

| Governance mechanism | Description | Author |
|---|---|---|
| Membership | Formal or informal processes may be in place to oversee and vet who can be involved and in what capacity. As communities grows, the coordination and control increases in complexity. Having multiple accessible ways for users and observers to get actively involved with the project may help grow the community. | De Noni 2011, Midha 2012, Di Tullio 2013, Sadowski 2008, Jensen 2007 |
| Role advancement | In formalized communities members may need to go through a process of vetting and quality control to advance through roles. In others members may take on multiple roles while migrating through different role sets. Role migration may be much more fluid and informal. Roles may be acquired by (a) volunteering, (b) earning or granting it, this may involve applying for the position, (c) appointment/assignment and through (d) election. | Di Tullio 2013, Jensen 2010, Jensen 2007 |
| Divison of roles/role structure | A range of roles (e.g., observer, developer, core-developer, project owner) distributes and manages responsibilities. By defining roles and assigning responsibilities, it enhances coordination within a project. The number of roles may very from a small number (mostly three) up to a much larger number. Studies show that a minority (about 20%) produces most of the code contributions (about 80%). | De Laat 2007, Sadowski 2008 |
| Incentives and motivations | In an OSS project motivations of participants vary. Some are paid by companies to contribute, while others are contributing out of their own interest. The project and project governance may impact the interst of contributors and their willingness to contribute. Motivations are often characterized as altruistic or egoistic and external or intrinsic. Generally the motivations of contrbutors are need driven, economical, because of enjoyment or because of a sense of moral obligation. | De Noni 2013, Shah 2006, De Noni 2011, De Laat 2007 |
| Training and indoctrination | Contributors need to prove their knowledge, technical competences and alignment with the values of the project. | De Laat 2007 |
| Reputation | Reputation is important in network governance, because it relays information about prior behaviors and serves to deter opportunism. When members of the project perceive reputation as an imporant part of their identity, they are more likely to manage conflict. Additionaly it may be relevant in role advancement or leadership elections. | Sagers 2004 |
| Norms | Norms can be a tool of strong social pressure that disincentivizes opportunistic behavior and self-interest. In the Debian project, norms were even institutionalized into the Debian social contract(DSC). Norms are often informal and not explicitly stated, but could be represented by explicit values. | Di Tullio 2013, Sagers 2004, Sadowski 2008, De Noni 2013 |
| Collective sanctions | Collective sanctions are punishments enforced on individual entities who violate the norms, values or goals of the project. Sanctions include flaming, shunning, expulsion and more. | Sagers 2004, Markus 2007, Di Tullio 2013 |
| **Software development processes:** | | |
| Release management | The procedures and rules surrounding releases, managing what code and features are included in the releases. | De Noni 2013, De Laat 2007 |
| Modularization | Splitting the project in different modules manages the complexity, increasing decoupling, decreases interdependency and allows for community members to focus on specific modules of the project without affecting development of other modules, decreasing the coordination burden. Research also indicates that most developers should focus on a small number of projects/modules, while a small number should participate in more projects/modules. | De Laat 2007, Capra 2008, Jensen 2010, Lee 2017 |
| Responsibility management | The allocation of responsibilities for various tasks among community members or community roles. The level of management ranges from open(unmanaged) to delegated(managed) responsibility. Bug fixing tasks benefit from delegated responsibility, while enhancive tasks(new features/improvements) benefit from open responsibility. | Midha 2012 |
| Code control | Who is entitled to make decisions about inclusion of submitted code? Who is allowed to contribute to the code and participate in the development process? | De Laat 2007, De Noni 2013, Sagers 2004 |
| **Conflict resolution:** | | |

**Table 4.7 continued from previous page**

| **Governance mechanism** | **Description** | **Author** |
|---|---|---|
| Rules and procedures/policies and guidelines | They prevent conflict, facilitate coordination and ensure the quality of the project. Procedures may streamline testing, bug reporting or code acceptance. | Jensen 2010, Sagers 2004, De Laat 2007 |
| **Use of information and tools:** | | |
| Formal tools and procedures | Formal procedures and tools for development. Such as version control systems, issue trackers or release management procedures. | De Laat 2007 |
| Communication channels | Communication channels such as mailing lists or chats facilitate discussions, decision making and community involvement. Communication tools may range from free form discussions(e.g., chats) to structured discussions(e.g., scrum boards, bug tracking systems, wiki's) | Midha 2012, Jensen 2010 De Laat 2007, Sagers 2004, Capra 2008, Sadowski 2008 |
| Issue tracker | An issue tracker that tracks feature requests, bug reports and other work, allows developers coordinate work and users to report feedback. | Jensen 2010 |

# Chapter 5

# DAOs Governance and Challenges

This chapter describes the process of the multivocal literature review and analysis of the literature. The chapter then presents the findings of the literature review of DAO governance and challenges.

## 5.1 Literature search and analysis

A total of 19 suitable papers were identified on the topic of DAO and DAO governance. They were sourced through Google Scholar. Scopus provided fewer search results as the database only includes published articles. Google Scholar was deemed more suitable for the purpose of a multivocal literature review, as the process allows for the inclusion of gray literature. With google scholar, two search queries as we noticed that relevant literature was found through both queries.

**Google Scholar queries:**
**1.** allintitle: decentralized autonomous organization
**2.** allintitle: decentralized autonomous organizations

The queries were executed in July 2021. The first query yielded 49 search results and the second 67. A total of 31 papers were selected for further examination, based on the title, short preview of the abstract and availability. The papers were saved to Mendeley to store and organize them. After examining the full content of the 31 papers, 12 were rejected, because of language, duplicate content or relevance. Some of these duplicates are earlier versions or thesis versions of later published papers. With 12 papers rejected, 19 papers were deemed relevant for further analysis.

The papers were then loaded into Nvivo for analysis. The papers were analyzed for DAO concepts. In the literature we looked for (I) DAO governance concepts, (II) DAO challenges, (III) Definitions or characteristics of DAOs, (IV) DAO platforms or frameworks, (V) Legal designs and developments. The analysis of these papers resulted in 136 codes. 53 codes were found for governance concepts, 39 codes were assigned to challenges of DAOs, 16 codes for defining the concept of DAOs. The remaining codes were assigned to interesting findings such as legal solutions or DAO frameworks and applications.

The 53 codes under DAO governance were all visited, evaluated and transferred and summarized in a spreadsheet, to form an overview of governance mechanisms of DAOs. 29 codes were found to be appropriate descriptors of mechanisms for governance in a

DAO. The overview of governance in DAO was created by firstly filtering the codes, then summarizing and creating descriptions, and finally categorizing and clustering the codes. The process of these steps are described below.

**Filtering codes**
The codes were visited and reviewed for inclusion as a DAO governance mechanism. Most codes that were not included were not specific enough, did not entail a specific governance mechanism at the operational level of governance or were describing a characteristic of governance in a general manner. A few examples of codes that were not included are:
*Shared values* was discarded as it is more of a characteristic of a DAO community rather than a mechanism that is specific to, and employed by DAOs.
*Smart contracts* was discarded as it is an underlying facilitator of governance in DAO, but in itself does not define the operation of governance. The same argument applies to the code *consensus*, as this code is concerned with the consensus of the validity of the smart contracts and outcomes, however it is not relevant to governance at the operational level.
*Power* was discarded as it evaluated how stakeholders, investors and developers may exert influence over the project. This is not as much a specific governance mechanism but a broad description of various influences of actors in the governance.

**Summarizing codes**
The coded literature of each governance mechanism was then transferred into the spreadsheet. A description from the literature of the mechanism was added, to provide a description and explanation of the governance mechanism. For governance mechanisms where the content of the literature was sparse, additional literature and gray literature was sourced to provide a more complete description of the governance mechanism. Some of the codes were combined as they covered similar information. Resulting in the final 21 governance mechanisms.

During this process, the resulting governance mechanisms were clustered and categorized. This resulted in three main domains of governance mechanisms in DAO:

- Decision making
- Incentives
- Community

## 5.2 DAO governance

Grouping the governance mechanisms has lead to the creation of three domains: decision making, incentives and community. The literature on DAO governance generally focus on (I) the decision making process, including the voting mechanics, (II) the incentives for DAO members and the alignment of interests, and (III) topics regarding members and membership of the DAO. The governance mechanisms are classified under these three domains. Decision making has been split into sub-domains of proposals and voting. These are the primary method through which decisions are made in DAOs. Different aspects of proposal submissions and voting systems impact the manner in which governance is achieved, i.e., what voting system is employed or which members are allowed to submit proposals. Therefore decision making was split into proposals and voting.

### 5.2.1 Decision making

A subset of decision making in DAOs can be handled by smart contracts that algorithmically are able to decide what action to execute. However, currently the focus of DAO governance lies in how DAOs can facilitate human decision making as an alternative to the hierarchical decision making model of traditional organizations. Currently decentralized decision making in DAOs is achieved through human interaction with DAOs to form proposals and to vote on these proposals. The protocols and constraints of the governance system are dictated by the smart contracts. These include the creation and submission of proposals, voting mechanism and voting rights. Currently voting systems of DAOs are in their infancy and they mostly resemble a plutocracy (Kaal, 2021). An example hereof is the one-token-one vote model where tokens resemble transferable shares and give the owner the right of one vote. Other systems may provide a better alternative, when a plutocratic model is not desirable. Besides the voting system that largely dictates the distribution of power in a DAO, the constraints surrounding proposals and the submission thereof, need to be considered as well, as they influence the manner of decision making.

#### Proposals

Hsieh et al. (2018) makes a case on how Bitcoin functions as a DAO through its ecosystem. It hires miners, rewarding them for their work and has a decentralized development process through the Bitcoin Improvement Proposals(BIP). The BIP is a standard for proposing changes to the Bitcoin protocol. A BIP begins informally as a draft, they are first reviewed by BIP editors and miners then include a "yes" or "no" vote in their mined blocks during a polling period. Miners with more computing power, mine more blocks and cast more votes, therefore the voting power is proportional to the computing power of the miners.

Even though this is the process of development of the Bitcoin protocol with a formalized process in which submitted proposals go through an approval process, need to adhere to a set standard and meet the criteria, the BIPs are not binding and cannot be enforced. Even after the suggested improvement has been developed, it is up to the miners and community to adopt the changes. In this sense it is a decentralized process as miners have influence to vote on a BIP and the final adoption of an improvement is up to the community. However, it is only based on the agreement of all participants to adhere to this process. A DAO that has its decision making processes encoded in smart contracts, will have this process formalized and the outcomes of certain votes, such as a transfer of funds, can be enforced. Similarly to the BIP, other blockchain projects have formed their own improvement proposal protocols (i.e., Ethereum Improvement Proposals). This is one of the reasons that some do not recognize ecosystems such as Bitcoin as a DAO (Hassan and De Filippi, 2021). Additionally DAOs are generally understood to be supported by smart contracts deployed on top of blockchain networks.

In the BIP process several mechanisms are at work, it is a standardized process, not unlike an academic review process. Regarding the submission of proposals we can note that it follows a well-defined format, through which an editor reviews and approves the proposal before it moves to a vote.

The BIP process ensures that proposals are of high quality. Another mechanism to increase the quality and reduce the number of low quality proposals is attaching a monetary cost to the submission of a proposal (Kondova and Barba, 2019). This

incentivizes the proposer to ensure the quality of their proposal, and also prevents a network overload of proposals.

Kaal (2021) notes that arguments against on-chain governance remain strong, as it arguably removes the checks and balances that are in place in off-chain models. Moreover, he suggests that an off-chain governance system that finds an equilibrium between competing factors is in some cases better suited than an on-chain governance system. Some factors are better to be considered for off-chain governance, this includes: consensus among development team, initial roadmap, coin holder voting, established norms. Moreover, governance evolves over time, Rikken, Janssen, and Kwee (2019) suggest that different stages of governance require different coordination mechanisms. As such depending on the stage of the DAO, off-chain governance solutions can be better suited than on-chain governance solutions. A DAO therefore, needs to decide which decisions to conduct on-chain and which to conduct through off-chain methods.

### Voting

The voting systems currently in DAOs have not matured yet. Voting systems in DAOs mostly resemble a plutocratic model (Kaal, 2021). In a one token one vote model, much like shareholdership model, the weight of a vote of a DAO member is dependent on the number of tokens they hold. These tokens are fungible and can be freely exchanged. Similarly, the BIP process also resembles a plutocratic model, as the miners with the most computing power, have the most voting power.

Alternatively an one person one vote system does not hold up in a decentralized anonymous environment, as a vote can only be traced to an address, but not the person. This system is vulnerable to a Sybil attack in which an attacker casts a multitude of votes from individual addresses. Unless the DAO does not operate in a decentralized anonymous environment, a one person one vote system would be infeasible.

More mature voting mechanisms are slowly emerging. DAO platforms are starting to offer DAOs the possibility to choose from different voting systems, while others are developing their own voting systems. E.g., the Snapshot platform offers single choice voting, approval voting and quadratic voting amongst others and the Aragon platform has developed optimistic governance, in which proposals are passed by default unless challenged. Many more voting systems are possible and can be invented, in the literature the more complex voting mechanisms that were encountered are conviction voting, futarchy, liquid democracy quadratic voting and reputation based voting (Laat, 2007; El Faqir El Rhazoui, 2021; El Faqir, Arroyo, and Hassan, 2020; Beck, Müller-Bloch, and King, 2018). Below these voting systems are further described. Note that the descriptions of the systems are only a description of how they are envisioned or generally understood. A DAO can change, adapt or extend the rules of the voting systems to their needs.

#### Liquid democracy

Liquid democracy, also known as proxy voting or delegate voting. The system solves the participation problem, where participants may not have the time or knowledge to cast an informed vote for every proposal, leaving their voting power unexercised. A person (delegator) may delegate their vote to another person (delegate) to vote on their behalf. This may be limited to a specific proposal, a certain amount of time, or subject domain (Swan, 2015). A delegate may also further proxy their votes,

creating a directed network graph (Fan et al., 2020). A delegator may a rescind their delegation at any time. Under this system any participant may quickly gain the delegate votes from multiple members, gaining the power that is normally reserved to elected representatives. However they may also lose this power just as quickly. A potential problem here is stability and continuity, Swan (2015) suggests this could be resolved with agent reputation mechanisms.

**Quadratic voting**
With quadratic voting, voters may cast multiple votes. However, the cost of each consecutive vote, increases quadratically. The number of votes that they are able to cast is limited by their voting budget. The total cost of voting can be denoted as $c = v^2$, where $c$ represents the total cost, and $v$ the number of cast votes. Lalley and Weyl (2018) suggest quadratic voting as a solution to the *tyranny of the majority* problem. The tyranny of the majority problem stems from the one person one vote system that fails to account for the intensity of an individuals preference and the overall welfare of the whole system. It only accounts for the majority, neglecting the minority. However, without countermeasures, this system is vulnerable to a Sybil attack as an attacker can extend their influence through multiple addresses. With $n$ tokens an attacker can cast $n$ votes from $n$ different addresses, instead of the $\sqrt{n}$ votes that would otherwise be cast from one single address.

**Conviction voting**
In conviction voting DAO members can vote with the tokens that they own, however rather than voting with the full weight of their tokens, they allocate their tokens towards different proposals (El Faqir El Rhazoui, 2021). They can vote on different proposals with different amounts of tokens, limited by the number of tokens they own. If they want to vote on a proposal or increase their conviction, while already having allocated all tokens, they will need to reduce the allocated tokens from a different proposal, thus reduce the conviction thereof. A second mechanism of conviction voting is that proposals have to reach a dynamic equivalent of a quorum, i.e., gain enough conviction to pass a dynamic threshold that is based on the proportion of the DAO treasury funds that the proposal requests.

**Futarchy**
The futarchy system was originally proposed by Hanson (2013) and later introduced to the blockchain context by Buterin (2014). As Wright and De Filippi (2015) explains it, in the futarchy system, prediction markets are used to identify policies that are expected to yield the most positive outcomes. The system works by using the outcome of prediction markets for decision making. People may speculate amongst a number of proposals and place bets on the ones they expect to yield the best outcomes. This provides participants a financial incentive to participate in the governance process and to make educated decisions. Wright and De Filippi (2015) argues that the potential drawbacks of such a system, most likely outweighs the benefits. The mechanisms can be observed here is that there is a financial incentive, but also a potential loss, as the participants have a stake in the outcome. It will cost them their bet if their prediction fails, while those that are able to effectively predict the outcomes will be rewarded. Incentivizing participants to make educated decisions.

**Reputation based voting**
Kaal (2021) proposes his vision of a DAO governance system that is based on reputation, staking and an incentive mechanism that rewards participants with a salary based on their reputation. The incentive mechanism decouples the monetary value

and incentive of that otherwise come with a one tokens one vote design, from the governance power. Unlike fungible tokens, reputation is non-fungible(cannot be transferred), voting power therefore cannot be bought and only earned. The benefit here is that only active participants can have voting power, making it difficult for external actors to exert influence in the decision making. The second mechanism that Kaal proposes, is the staking mechanism. Voting occurs through the staking of ones reputation. The third mechanism is to reward members with a monthly salary in a currency that is not directly related to the DAO. The height of the salary is determined by the reputation of the member. The reputation system only allows for voting power to be gained through the efforts and expertise of the DAO member. Additionally DAO members are incentivized by an indirect economic gain, that does not translate to any power. However, this system could risk that the concerns of newer members are not heard or that, without balancing mechanisms, power could become centralized. As older members may have gathered more reputation and newer members may not have had the chance yet. Regarding the voting mechanism, two specific mechanisms can be observed here: reputation and staking.

### Mechanisms of voting systems

The voting system dictates the rules of voting. In the next part the mechanisms that were encountered in the previously mentioned voting systems are highlighted.

**Voting asset**
The voting asset is the object that represents a vote. In democracies, one person may represent one vote. In a company, a share represents a vote and a shareholder may hold many votes. In DAOs it is common to see token or reputation models. Tokens can be exchanged, are interchangeable and represent a single vote, while reputation is tied to an entity, cannot be exchanged and needs to be earned. These are most common to DAOs.

**Quorum**
The quorum is the percentage or number of votes that are needed for a vote to pass. It ensures that enough votes are exercised in order for the vote to be representative. If the quorum is not reached(e.g., not enough votes have been cast), then the outcome of the vote is discarded and the proposal does not pass. The threshold of the quorum may vary per proposal. In the conviction voting system, the quorum is set based on the amount of funds that the proposal requests.

**Voting cost/staking**
A vote may also require a certain cost from the voter. It could take away from their voting budget or be associated with a cost with monetary value. Adding a cost towards voting may incentivize the voter to make a more educated or thoughtful decision. There are also mechanisms that may reward voters depending on the outcome of the vote with a staking or betting mechanism.

**Delegation**
A voter may delegate their votes to a representative. The voter does not need to actively participate in all votes and educate themselves on the subject that is voted on. A DAO may set the rules surrounding delegation. I.e., who may votes be delegated to, how can delegated votes be retracted or can votes be delegated to different representatives.

**Reputation**
Instead of using tokens, votes can be cast using reputation-weighted voting. Reputation is represented by a non-fungible token that can not be exchanged with other people. Reputation can only be rewarded by the DAO. In this sense voting power can only be acquired by earning the reputation from the DAO, through e.g., active participation.

### 5.2.2 Incentives

Incentives ensure the alignment of interest of all parties. It ensures that the members of the DAO act in the best interest and benefit of the DAO, while at the same time improving their own utility (Kaal, 2021). Incentives may encourage certain actions, while discouraging others.

**Admission fee**
An admission fee, requires prospective members to pay a fee upon joining the DAO. It disinctivizes betrayal and defection, given the sunk cost associated with joining the DAO (Kaal, 2021). It would also deter malicious members from leaving and rejoining the DAO. Moreover, the mechanism increases the cost of certain attack vectors in which an attacker would utilize a multitude of accounts (i.e., Sybil attacks).

**Economic incentive**
A DAO can issue its own token, control the circulation, lock-in period, distribution and other aspects of their token model (Wang et al., 2019). The token can be used to reward investors or shareholders with voting power. Much like traditional model of shareholdership, tokenholders benefit from the token value appreciation, which is based on supply and demand. It is an economic incentive, that aligns the interest of the DAO members to act in a manner that increases the value of the DAO, subsequently increasing the demand and price of the DAO token. Kaal (2021) suggests that dilution of the total token supply by self-interested or biased central administrators is less likely, due to the fact that the total supply can be predetermined and capped in the code of the DAO. Braun, Häusle, and Karpischek (2021) suggests to reward DAO workers for completing tasks in fiat currency as a bounty system, while at the same time requiring the workers to put in collateral to ensure their optimal effort in completing the task.

**Reputation as incentive**
Rather than a token economic model, a DAO can also introduce a reputation system. Reputation can only be earned and is non-fungible (it cannot be replaced) and not exchangeable. Reputation could be earned by performing tasks (El Faqir, Arroyo, and Hassan, 2020), other methods of earning are possible as well. A reputation system offers a measure of trust, even more so in a pseudononymous environment (Beck, Müller-Bloch, and King, 2018). That in itself can be offer sufficient utility to warrant its use. A DAO can also choose to attach other utilities to the reputation. Kaal (2021) suggest to use reputation for voting, by staking the reputation on a vote. Additionally, Kaal (2021) suggests to provide DAO members with a monthly salary based on the reputation of a member, giving the reputation another utility. This also implicates that a member will sacrifice future salary upon the loss of reputation.

**Staking**
The mechanism of staking allows for participants to utilize their tokens or reputation in a mechanism that allows them to earn more. Kaal (2021) suggests that DAO members stake their reputation on a vote. The futarchy voting system utilizes a similar

mechanism by wherein DAO members are incentivized to vote for a certain outcome with their assets, with a potential future profit. Braun, Häusle, and Karpischek (2021) suggest to use staking as an incentive mechanism for DAO workers. DAO workers are to deposit a collateral, upon completion of their task, the stake is returned, otherwise it is used as compensation of losses. The staking mechanism can aid in the alignment of interests of the DAO members, by having them put in a stake towards a task or decision.

**Indirect economic incentive**
As earlier described in the reputation based voting section, Kaal (2021) suggests using a reputation system that also provides DAO members a monthly salary that is proportionate to their reputation. The currency of that salary should be of stable economic value, unlike a DAO token that appreciates and depreciates with the market supply and demand for the DAO token. This provides DAO members with a reward that is stable and of a predictable value. Additionally, it decouples the monetary incentive of the DAO members from the decision making and governance.

### 5.2.3 Community

The role that DAO members have, differs from DAO to DAO depending on the purpose of the DAO. Their role in the governance of DAOs may differ as well. A DAO may choose their own governance rules regarding governance of the members and community and what roles the members have.

**Membership identification**
As a DAO, registering and verifying the identity of members can save a DAO from the measures that otherwise have to be taken in a pseudonymous environment. In some use cases it may even be required. Diallo et al. (2018) propose a DAO system for government contracting. In this process, a government agency puts up a public tender, which allows companies to place bids for a contract. These tenders are a strict process that go through multiple pre-defined steps. In a DAO with government contracts, actors need to be verified before being allowed to participate in the DAO. Diallo et al. (2018) proposes a mechanism with an identity authority that issues a certificate of the identity signed with a public/private key pair. In other (financial) blockchain contexts, membership identification is also referred to as Know Your Customer (KYC). KYC originates from anti-laundering regulation that requires companies in the financial sector to know the identity of their customers. An additional effect of KYC protocols, is that it incentivize cooperation as actors are not operating in an anonymous environment (Kaal, 2021).

**Community monitoring**
The decentralized and transparent nature of a DAO enables the monitoring and auditing of the DAO and their fellow DAO members by the DAO members themselves. Kaal (2021) even sees this as a key element to DAO governance. In centralized systems, external monitoring and policing is practiced. However, within a DAO the members have a direct stake in the organization and typically have the best knowledge on how to assess other DAO members. As they have a personal stake, they are also incentivized to do so. Because of the tranparent nature of a DAO, they are also equipped to do so.

**Forking**
The term forking comes from the practice in OSS where a piece of existing code is copied and independently modified. In the context blockchain and DAOs, forking

has formed its own, more specific, meaning. As most blockchain projects are open source and also carry the property of immutability, code updates are also referred to as soft and hard forks. A soft fork is refers to a code upgrade to the blockchain that is backwards compatible and relatively easy to deploy. A hard fork on the other hand is not backwards compatible and requires all parties to upgrade to the new version. If not everyone agrees on the hard fork, it may be the case that two versions of the system continue operating. A hard fork can therefore also be a mechanism to resolve conflict (Beck, Müller-Bloch, and King, 2018). With forking as a mechanism for conflict resolution, both groups, with opposing views, adopt their own version of the blockchain and continue operating it. Bitcoin cash for example, was split from Bitcoin over a disagreement over changes to the Bitcoin protocol (Hsieh et al., 2018). However, as the proponents and opponents to the changes could not come to an agreement, this resulted in a social and economic loss for both chains that now continue to compete Kaal (2021). Similarly the Swarm City project was formed through a split from the Arcade City project. Beck, Müller-Bloch, and King (2018) shows that the project was forked as Swarm City individuals disagreed with decisions of Arcade City management and continued in a separate organization. For DAOs forking, although with its negative consequences, can be seen as an ultimate manner of settling a conflict.

### 5.2.4 DAO governance overview

In analyzing the codes in Nvivo, the encountered governance concepts in the literature could be categorized in three main categories. Decision making, incentives and community. Especially the voting systems and incentive design are a focal point in the literature. Table 5.1 shows an overview of the identified governance aspects that were discussed in this chapter.

Table 5.1: DAO governance mechanisms overview

| | | | |
|---|---|---|---|
| **Decision making** | | | |
| | **Proposals** | | |
| | | Proposal submission | A DAO may decide to limit the submission of proposals to certain members. A member may need a certain standing (i.e., amount of tokens or reputation) before being allowed to submit proposals, or perhaps they need to have acquired a certain role. | (Hsieh et al., 2018; DuPont, 2017) |
| | | Proposal approval | Proposals may be require approval (by a subcommittee) or a certain support threshold before it is voted on. | (Hsieh et al., 2018) |
| | | Proposal costs | A proposal may require collateral or may involve a cost to prevent an overload of proposals and increases quality of proposals. | (Kondova and Barba, 2019) |
| | | Proposal domains and on-chain vs off-chain | On-chain governance refers to all governance activities that are orchestrated through the DAO. Any governance that occurs through other channels, formal and informal, are off-chain. Despite the growth of on-chain governance solutions, not all theoretical governance models are currently possible on-chain. Reaching agreement can be more practical off-chain. Therefore a DAO can consider offloading some governance activities and decision making(i.e., membership approval, allocation of funds, code changes etc.) off-chain and only register its outcomes on-chain, or completely conduct the activity off-chain. | (Kaal, 2021; Wang et al., 2019; Reijers et al., 2018) |
| | | Improvemen protocol format | Proposals follow well-defined format and is reviewed in a standardized process, similar to academic journal review processes. Ideas and proposals are discussed in the community or in focus groups. Editors can then reject or approve them. After approval by the editors, the community holds the decision to adopt the proposal. Example: Bitcoin improvement protocol(BIP) | (Hsieh et al., 2018; Virovets and Obushnyi, 2021) |
| | **Voting** | | | |

**Table 5.1 continued from previous page**

| | | | |
|---|---|---|---|
| | One token one vote | In a one-token-one-vote design fungible tokens, that are exchangeable, are used to vote. Token holders are somewhat similar to shareholders as each token represents a vote and their power. As tokens can be bought and as larger token holders hold more power, this governance model is more susceptible to corruptive elements. | (Kaal, 2021; Riva, 2019) |
| | Conviction voting | Votes are cast with an amount of tokens. Members can support multiple proposals with different amounts of tokens. A member can't vote with more tokens/conviction than they own. Additionally conviction voting employs a dynamic threshold before a proposal passes. | (El Faqir El Rhazoui, 2021; Kaal, 2021) |
| | Futarchy | The idea of a futarchy governance system was orginally proposed by economist Robin Hanson. It utilizes prediction markets as a governance tool. It works similar to a stock market, where traders buy and sell stocks, based on the perceived value and future value of the stock. Participants may bet on the outcomes of a proposal, compelling them to research the proposal and make an educated decision. | (Kaal, 2021; Buterin, 2014; Wright and De Filippi, 2015; Swan, 2015) |
| | Liquid democracy | Liquid democracy is a combination of direct and representative democracy. Voters have the right to directly vote on a proposal, but also have the option to delegate their vote to someone to vote on their behalf. Allowing voters to exercise their votes to the fullest, without the need to actively participate in every vote and research each proposal. | (Kaal, 2021; Fan et al., 2020) |
| | Quadratic voting | Participants are allocated a voting budget to spend on voting. Votes can be cast on different outcomes depending on how strong the voter feels about it. However, the cost for each vote increases quadratically as $c = v^2$ where n is the numer of votes and c the cost that is deducted from the budget. | (Lalley and Weyl, 2018; Kaal, 2021) |
| | Reputation based voting | The weight of a vote is proportionate to the reputation score of the voter. The score may be awarded through a non-fungible token that is assigned to the blockchain address of the community member or the votes may be directly tallied to and associated with the address. A voter may earn reputation through performing activities for the DAO. As reputation can only be earned, voting power is purely meritocratically allocated. | (Kaal, 2021; Filippi, Shimony, and Tenorio-Fornés, 2020; El Faqir, Arroyo, and Hassan, 2020; Beck, Müller-Bloch, and King, 2018) |
| | Staking | Tokens or reputation is staked on the outcome of a proposal. Staking it on a losing outcome may lead to a direct loss of tokens or reputation or just a loss of opportunity. Kaal 2021 proposes staking of non-fungible reputation combined with a regular salary paid in fungible tokens, based on the reputation of a member (i.e.., higher reputation leads to higher salary). | (Kaal, 2021; Riva, 2019) |
| **Incentives** | | | |
| | Reputation | Members may be incentivized by gaining reputation. Reputation may represent reliability or scale of contributions. It could also translate into monetary value(salary) or voting power. The DAO needs to determine how reputation is awarded or deducted. Reputation should be non-fungible/non-transferrable. | (Kaal, 2021; Beck, Müller-Bloch, and King, 2018; El Faqir, Arroyo, and Hassan, 2020; Wang et al., 2019) |
| | Admission fee | A disincentive to betrayal and defection as there is a sunk cost associated with joining the DAO. It also disincentives leaving and rejoining. In a pseudonymous environment it also adds to the cost of joining under different pseudonyms and to the cost of a possible sybil attack. | (Kaal, 2021) |
| | Indirect economic incentive | DAO members can be reward with monetary value, based on other activities or standing in the DAO community. I.e., members are be paid (a regular salary) in traditional currencies or fungible stable tokens, based on their non-fungible reputation tokens. | (Kaal, 2021) |

**Table 5.1 continued from previous page**

| | | | |
|---|---|---|---|
| | Staking | Staking of funds or reputation can be used to align the incentives of the community members to the best outcome. With staking, funds or reputation are specifically set aside. Depending on the configuration of the staking mechanism, additional funds or reputation may be earned or even taken away. DAO members may stake their reputation or tokens towards a certain outcome and gain or lose reputation or tokens. | (Kaal, 2021; Braun, Häusle, and Karpischek, 2021) |
| | Fungible tokens/economic | Fungible tokens can be exchanged and therefore easily represent a monetary value. With tokens, their creation, ciruclation, utility, value management needs to be considered. In a DAO their utility may be a reward for performing actions such as voting and making proposals. Or in a token based voting system they represent shareholderhsip and are used to vote and represent voting power. A DAO could also reward workers with tokens or other currencies for completing tasks. | (Wang et al., 2019; Virovets and Obushnyi, 2021; Kaal, 2021; Braun, Häusle, and Karpischek, 2021) |
| **Community** | | | |
| | Member identification | In some applications formal identification of a DAO member may be necessary, on-chain and off-chain solutions may in some domains this is known as KYC(know your customer). | (Diallo et al., 2018; Kaal, 2021) |
| | Community monitoring and compliance | The DAO governance structure allows for information symmetry for all parties. Unlike centralized governance designs where governance is at most externally monitored and validated, audits and monitoring of governance and other DAO members by the community is inherent to DAO. | (Kaal, 2021) |
| | Forking | Forking usually refers to performing software changes through hard or soft forks (hard forks are not backwards compatible). It may also serve to settle disputes, by each party of the community adopting their own version of the DAO, which they believe is right. However, this results in a social and economic loss for the DAO as a whole. | (Hsieh et al., 2018; Kaal, 2021; Beck, Müller-Bloch, and King, 2018) |

## 5.3 Challenges

The concept of DAO is even younger than that of blockchain. As a field that is still growing and in the process of establishing itself, there are many challenges that are encountered. This research mainly concerns itself with the challenge of understanding governance in the context of OSS, which is only one of the many challenges. During the literature review other prominent challenges were encountered as well. Along the process of coding the governance concepts in Nvivo, the challenges that were mentioned in the literature were coded, resulting in 39 codes. Some of these codes are duplicates or can be condensed under a single challenge. Chapter 5.3 presents the most relevant challenges. As the scientific literature on challenges of DAOs is sparse, additional (gray) literature was also sourced to expand on the context of the challenges. The list of challenges that is presented here is not exhaustive, as new challenges will be encountered as the concept, understanding and technology of DAOs grows. However, these issues are relevant today and some of these may find some kind of answer in the near future, while others will always remain relevant.

Generally these challenges are internal and can be classified across three levels. They are generally impacting the infrastructure level, smart contract level or governance level. An exception to this is the regulatory uncertainty problem, this problem is an external factor. In the following sections the identified challenges are explained.

### 5.3.1 Security

The case of *The DAO* is the most notable event that highlight the security concerns of DAOs. The events show how vulnerabilities in the programming of the smart contracts have led to a loss of funds. Ultimately resulting in a rollback of the history of the blockchain network, which is something that goes against the immutable

principle of blockchain networks. However, these events were of such great impact, that the majority of the Ethereum community decided to collectively perform a rollback (DuPont, 2017). The ones that disagreed, continued the blockchain to form the Ethereum Classic network in which a rollback was never performed.

Cyber security is one of the main concerns of (Kaal, 2021). First and foremost, as DAOs rely on blockchain technology, DAOs inherit the security concerns of the underlying network. The network is essentially part of the infrastructure of a DAO. Cyber security concerns such as hacks, Sybil attacks or Denial of Service attacks that would affect the blockchain network, will affect the DAO. Additionally the network provides the DAO with the attribute of immutability. A 51% attack on the network would breach this property (Rikken, Janssen, and Kwee, 2019). The 51% attack refers to a scenario in which malicious entities gain a majority control of the network, enabling them to undo, alter or delete transactions or perform a double spend. The double spend refers to a single coin being spent twice, something a blockchain network should protect against as long as no single entity gains 51% control. This was long thought to be a theoretical problem, but has since witnessed in some smaller networks such as Ethereum Classic (Rikken, Janssen, and Kwee, 2019). Therefore it is essential to a DAO to select a reliable and robust network.

Furthermore, as seen in the case of the DAO, a loophole in the code of the smart contract was exploited to steal funds. A DAO is therefore only as secure as the code that is written in the smart contract. Therefore it is important for the smart contracts of a DAO to be secure, carefully written and properly reviewed. The more complex the smart contracts of a DAO, the more opportunities arise for weaknesses in the code (Rikken, Janssen, and Kwee, 2019).

In *A Survey on the Security of Blockchain Systems*, Li et al. (2020) have created a taxonomy of blockchain's risks, divided into nine categories and divided according to their influence level, namely blockchain 1.0 and blockchain 2.o. These terms refer to the waves of development of blockchain. Where as blockchain 1.0 was the wave of blockchain networks, mostly focused on cryptocurrencies. At the blockchain 2.0 wave, smart contracts were introduced to blockchains, enabling programs to be executed on the networks. These are now also referred to as an layer 1 and layer 2, representing an infrastructural and programmatic layer. Their taxonomy is presented in table 5.2. It shows the various main risks to blockchain. As blockchain security is not part of the focus of this study, we won't be investigating this further. The risk table is included as a reference and to highlight how blockchain risks transfers to DAOs as well.

| **Risk** | **Cause** | Range of Influence |
|---|---|---|
| 51% vulnerability | Consensus mechanism | Blockchain 1.0, 2.0 |
| Private key security | Public-key encryption scheme | |
| Criminal activity | Cryptocurrency application | |
| Double spending | Transaction verification mechanism | |
| Transaction privacy leakage | Transaction design flaw | |
| Criminal smart contracts | Smart contract application | Blockchain 2.0 |
| Vulnerabilities in smart contract | Program design flaw | |
| Under-optimized smart contract | Program writing flaw | |
| Under-priced operations | EVM design flaw | |

TABLE 5.2: Taxonomy of blockchain's risks (Li et al., 2020)

### 5.3.2 Immutability

Due to the immutable nature of blockchain, once a smart contract is deployed, it can not be changed. It will be difficult to alter the constructed code of a DAO once deployed (Kaal, 2021; Chohan, 2017). This has implications for practicality as it is difficult to make changes or upgrades, but also security. Whereas it is common in cyber security to take applications offline when under attack, stopping the underlying infrastructure from executing (Rikken, Janssen, and Kwee, 2019). For DAOs it will be difficult to respond to attacks that are based on vulnerabilities in the smart contracts. The smart contracts cannot be stopped from executing, nor can they be easily altered.

In the course of this research, during the case studies, we see that DAOs take a more practical approach to this problem. We see that DAOs migrate to different technical solutions as they see fit. They adopt technical solutions as necessary. The members of the DAO can decide to leave a voting system and move to another. Funds can move from one smart contract wallet to another, as long as the members of the DAO agree. However, these solutions are not often heavily integrated in the DAO. As such it remains relatively easy to move from contract to contract or solution to solution. If DAOs become more sophisticated and integrated, it may not be as easy to upgrade or make changes.

### 5.3.3 Network transaction throughput

The Ethereum network hosts the Ethereum Virutal Machine(EVM). This virtual machine enables for smart contracts to be hosted on the network and ensures that miners execute these smart contracts when they are triggered (Buterin et al., 2014). Miners are paid in Ether for executing the contracts, this fee is known as a gas fee. Generally the more sophisticated the contract, the higher the gas fees will be. Additionally there's a mechanism of supply and demand of computation power. There's a limited amount of computation power on the network, and miners are more likely to include transactions that offer a higher amount of gas fees (Mcshane, 2022). Due to the current limited transaction throughput of the Ethereum network and high demand, executing smart contracts can be costly. Limited network performance and high gas fees are one of the challenges that DAOs are currently facing (El Faqir El Rhazoui, 2021; Wang et al., 2019; Kaal, 2021). However, this limited throughput affect not only DAOs but the whole Ethereum network and is also relevant to other blockchain networks where congestion is a problem. Ethereum is working on upgrading the network to Ethereum 2.0 which includes better performance and is expected to lower the gas fees (Rene Millman, 2021).

While Ethereum has been in the process of upgrading to version 2.0, other blockchain networks have emerged, promising better performance and lower costs. Also, we can see that DAOs have adopted solutions that are not reliant on on-chain execution of ethereum smart contracts, such as Snapshot. An off-chain voting service that stores the votes on the decentralized, peer-to-peer storage network IPFS(InterPlanetary File System) (Hussey, 2021). IPFS is a peer-to-peer network for stroing and accessing files, websites, applications and data in a distributed file system (*what is ipfs?*). Files in IPFS are accessed by content addressing, instead of the location that they are stored in as is with the http protocol. The http address directs to the location where the file is stored in, the file at that location is then retrieved. With IPFS, a hash is created from the content, to create a content identifier or CID. This CID is used to fetch the content from the network. This CID also ensures that when the file changes, the CID changes as well. This means that a file at a CID address is not mutable, providing

a measure of immutability in its own manner. By relying on IPFS, Snapshot offers the ability to create and vote on proposals without requiring a gas fee. Additionally votes are signed by users and verifiable through IPFS.

### 5.3.4 Governance design

Besides the technical or legal challenges, governance design is a big challenge for DAOs. This includes centralization risk, incentive design and voting design.

Many DAOs have adopted a one-token-one-vote model, where tokens are freely exchangeable. This model allocates more power to token holders who have a significant share of the total supply of a given token. Ultimately this resembles a plutocracy where the token holders with the most tokens simply has the most influence. Arguably this model does not ensure a decentralized governance. A second problem that many DAOs face is poor voting participation. Not every DAO member is interested in participating and actively voting in every proposal of the DAO. Already in 2016 did *The DAO* had a problem of low voter turnout, reaching less than 1%, while having a quorum of 20% (Gómez, 2016). Vitalik Buterin, the Ethereum founder, even goes as far as to state that voting based on fungible tokens or coins is dangerous (Buterin, 2021). He explains that the problems involved with coin voting, even in the absence of attackers, mostly fall into three categories. We'll call these tokens coins as these are explicitly fungible tokens that can be exchanged and hold a monetary value.

(I) The first being, that small groups of wealthy participants are more effective at making decisions than large groups of small token holders. Small participants have less incentive to carefully vote as their vote is insignificant.
(II) The second reason is that coin based governance empowers the coin holders and their interests over that of other parts of the community. This leads to governance that focuses on increasing the price of the coin, over other interests. Even if that involves harmful rent extraction.
(III) The last reason is conflict of interest issues. If voting power is overly allocated to wealthy actors and as they are overly-empowered, the systems risks exposure to conflicts of interests of this elite group. E.g., individuals of this group may hold conflicting interests in other projects. Affecting their governance decisions in the DAO.

Kaal (2021) calls such simple voting mechanisms immature and calls for better designs. These problems as laid out by Buterin, are specific to coin voting. Such systems have been adopted by many DAOs or in blockchain governance. This thesis has also explored other voting mechanisms that aim to solve some of the challenges in voting system design. However, these problems with coin voting show how incentive design is intertwined with the design of the voting system. As such properly designing the incentives is part of the challenge for every DAO governance design and their voting mechanism designs. According to Kaal (2021) there's a duality to incentives that consists of *"a) incentives for actors to improve their own utility, while at the same time b) actors' actions benefit the entirety of the institution and its constituents for the long run"*. When designing the voting system, it is important to understand the duality of incentives, how that will affect the governance and to avoid centralizing effects.

### 5.3.5 Regulatory uncertainty

Regulatory uncertainty is currently one of the main concerns in the DAO landscape. Wang et al. (2019) argue that with the characteristics of decentralization, borderlessnes and anonymity, difficulties will arise in accountability. Without being legally registered, most DAOs operate in a legal gray area. Currently legislators are working out how to approach DAOs. Some provisions are being made for DAOs in legal frameworks. However, currently most DAOs have no official legal standing. This exposes DAOs to the risk of being labeled as a partnership or joint venture Kaal (2021). As a partnership or joint venture, members risk being held personally liable for the liabilities of the DAO.

Although legal entity types for organizations will differ per country, countries such as the U.S., The Netherlands or Switzerland have entity types that limit the liability of its members and types that do not offer limited liability. Without clarity on the legal situation of a DAO, the DAO risks exposing liability to its members. Kaal (2021) explains how DAOs could be seen as a partnership type entity. A partnership is an association of two or more persons as co-owners of a business for profit. In a partnership, partners are personally held liable for any debts, obligations, legal actions or any other liabilities that the organization faces. Under U.S. law, without a legal entity, DAOs could be treated as partnerships. If there is no legal entity involved, by default, partnership rules are applied to all interactions between parties that are trying to achieve a common goal. Without a clear legal representation, and with the legal uncertainties surrounding DAO, DAO members face the risk of being personally held liable.

In contrast, in a limited liability company (LLC), the LLC is the only entity that is liable for any liabilities. Some DAOs have established an LLC as a legal wrapper, allowing them to participate in contractual agreements and protecting against liabilities. One case of a DAO that has a registered legal representation is dOrg, a DAO that is a cooperative of developers for the development of DAOs. This DAO has registered as a Blockchain-Based LLC (BBLLC) in Vermont in 2019 and were the first to do so(Biggs, 2019). The BBLLC legal entity type was introduced by the state of Vermont in August 2018. At its core the BBLLC keeps the structure of an LLC, but it offers blockchain actors an enforceable legal framework, providing them with a legal personality (Riva, 2019). The number of registered BBLLCs is unclear and the only public mentioning that the researchers could find of a registered BBLLC is the case of dOrg. The researchers were also not able to consult the Vermont Business registration database, due to security reasons.

More recently, the state of Wyoming in the U.S. has passed a law that will recognize DAOs as a LLC. As of July 1, 2021 it is possible to register a company as a DAO in the state of Wyoming (DiCamillo, 2021). This is another legal recognition of DAOs as an organization form and further develops the standing of DAOs in the legislative landscape. Time will tell how DAOs regulatory and legislative landscape surrounding DAOs will ultimately develop.

# Chapter 6

# DAO Governance for OSS organizations

This chapter presents the DAO governance for OSS framework. It describes the process of creating the framework, presents the framework itself and provides context to the various layers and its governance aspects.

## 6.1 Creation of the framework

The framework was created based on the overviews of governance in OSS (table 4.7) and governance in DAOs (table 5.1). This is part of the creative process of artifact design of the DSR process (Hevner and Chatterjee, 2010). A first version of the framework was created by visiting each aspect of governance and questioning what considerations are there for the governance aspect and how is it relevant in the context of a DAO. The considerations were translated into questions in order to provide context to governance aspect and provoke thought.The initial model considered a distinction between off-chain governance, mostly focused on traditional OSS governance concerns and on-chain governance, mostly focused on the DAO governance. The initial model is included in appendix A for reference.

Ultimately it was decided that the questions were too specific and providing too much direction to the considerations. It will be more difficult for the model to be generalizable, especially as DAO technology and governance mechanisms are still being evolving. Therefore, the model was changed to a more generic form that only describes the governance aspect. The distinction between OSS and DAO sides was also abandoned, as the distinction was not always as consistent or clear. While other aspects were more of a duplicate on both sides. They only considered whether the governance aspect occurs on-chain and how. While this is more of a general consideration that is reflected across each layer of governance. The redesign of the framework also served to provide better clarity and overview of DAO governance for OSS. This redesign is also in line with the iterative and cyclical nature of design science research.

During the creation of the framework, it was noticed that the literature of DAO governance is primarily concerned with the decision making systems and incentive design. This stems from the novelty of DAO technology and the governance opportunities that it provides. In contrast, OSS governance has been well-researched and has a solid foundation in literature. Moreover, similar to DAOs, OSS development is grounded in the notion of decentralization. Therefore OSS governance is found to

be well-suited to complement the DAO for OSS governance framework, in the areas that DAO governance literature often overlooks.

**Dimensions of the framework**
The dimensions of the framework are mainly based on the identified dimensions of OSS governance in table 4.7, which are mainly inspired by (Markus, 2007), and our categorization of DAO governance concepts. The layers were formed by considering the importance of the dimensions towards DAO governance for OSS. Dimensions such as *use of information and tools* or *conflict resolution* were deemed not important enough in relation to DAO governance be included as a seperate dimension. Especially considering their relative importance compared to *decision making* and *incentives* in DAOs.

Ultimately 7 dimensions were included in the DAO for OSS Governance framework. Some of the OSS dimensions were restructured to better suit the considerations of a DAO, while also incorporating the main categorizations of DAO governance from table 5.1. (I) The **legal foundation** dimension was formed to include the OSS *ownership of assets* dimension and to consider the legal aspects and standing of DAOs. (II) The organization of **decision making** is an essential aspect of DAO governance. It consists of two sub-levels, *proposals* and *voting*. Furthermore, it incorporates the decision making aspect of the OSS *leadership and decision making* dimension. (III) **Leadership and role structure** was formed to represent the decentralized and flat hierarchical structure of DAOs. It takes on the leadership part of the *leadership and decision making* dimension, while incorporating the role structure aspects that are included in the OSS *community management* dimension. (IV) **Project chartering** was formed as a renaming of the OSS *chartering the project* dimension, to be more consistent with the other dimensions. In the DAO for OSS governance framework it represent higher level overarching decision making and steering of the project. (V) **Incentives** are especially relevant to DAO governance, as there are many alternative ways to incentivize members, and DAO needs to do so, as there is no strict hierarchy as in traditional organizations. In OSS governance incentives are only considered a part of *community management*. (VI) **Community management** remains from the OSS *community management* dimension. In a similar way, DAOs are surrounded by a community, who may also be members of the DAO. This dimension also stems from the DAO governance overview. (VII) The **Software development processes** dimension remains relevant in a DAO context and was included from the OSS *Software development processes*

**Governance aspects of the framework**
The governance concepts of the framework were created based on the question framework in appendix A and the concepts that were found in the literature and were synthesized into the overviews of governance in OSS (table 4.7) and governance in DAOs (table 5.1). Some of these aspects were directly included in the framework, as they were deemed relevant. Others were adapted to better suit the context or is more generalizable. Some of the aspects were excluded, or dropped, as they were deemed not relevant to the context and purpose of the *DAO for OSS governance framework*. Tables B.1 and B.2 in appendix B show how each of the governance aspects in the DAO governance overview and OSS governance overview are covered in the framework. The tables show for each governance aspect if they are included, adapted or excluded and provides a short explanation.

One governance aspect that was not codified in Nvivo is the *proposal outcome enforcement* aspect. During the literature analysis of DAO governance, we were focused


FIGURE 6.1: DAO for OSS governance framework

on looking for governance mechanisms concepts. However, the literature mostly discusses enforcement as a property of the smart contracts and autonomous aspect of DAO (Rikken, Janssen, and Kwee, 2019; El Faqir, Arroyo, and Hassan, 2020; Hsieh et al., 2018). Therefore it was not included as a governance concept. However, the manner and extent to which proposals are enforced, defines how autonomous a DAO is and may vary per DAO. Therefore we have included enforcement as *proposal outcome enforcement* in the proposals layer.

## 6.2 DAO for OSS governance framework

Figure 6.1 shows the DAO governance framework for OSS organizations. It consists of seven dimensions. Of which the decision making layer contains two main aspects of proposals and voting with their respective sub-aspects. This section will highlight each layer and present the considerations involved.

### 6.2.1 Legal foundation

This layer concerns legal aspects that lie at the foundation of the DAO. It consists of the OSS license, legal structure and ownership and control. These are defining matters that as much regard the legal identity of the DAO, as much as the open source nature of the DAO.

**OSS license**
For OSS projects, the copyright license is the fundamental legal mechanism that ensures that the software will be open source. Various licenses that generally range from permissive to restrictive designs on the use and redistribution of the software are available. Their main distinction is whether they incorporate the concept of copyleft.

**Legal structure**
Many OSS projects have adopted a foundation as the organization type to represent the project. However, a DAO is a different kind of organization. The current legal landscape has not matured yet to properly acknowledge DAOs. One of the main concerns is that current legal frameworks leave a gray area regarding liabilities, putting DAO members at risk. Currently DAO proponents are pushing for DAOs to be recognized as a type of LLC. What is clear is that in time DAOs need a legal shell or wrapper to represent and protect themselves and their members.

**Ownership and control**
Ownership and control of the project could potentially be arranged on-chain, so that only the DAO will have control over the source code and have direct ownership. Other creative solutions that do not rely on direct on-chain control over the source code, but rather indirectly, through legal means or cryptographical signing may be possible as well.

### 6.2.2 Decision making

For DAOs the system of decision making is central, whereas with traditional organizations, such as OSS foundations, it is often more straightforward with a hierarchy where decision making is mostly a top-down process. The OSS project side of governance is mostly concerned with which decisions are to be made on-chain and which are left off-chain. And how the outcomes of decisions, on- and off-chain are enforced and impacting the organization as a whole. It is also important to consider how off-chain decisions are made and whom are responsible for these decisions.

As for the DAO, the DAO side is focused on what process for decision making is used, as it considers power structure, fairness, the number of proposals, the quality of proposals, the ability of voters to assess the proposals or the willingness of voters to vote.

**On-chain decision domain**
On-chain decision making is one of the core elements of a DAO. As an OSS organization with human involvement and coordination, it is necessary to consider what kind of decisions are to be taken through the DAO and which are left to other off-chain means. Moreover, it may be more practical and feasible for DAOs to conduct parts of governance off-chain, while the DAO technology matures. It means setting the domain of which kinds of decisions which are to be taken on-chain. Over time the domain of decisions may change as governance and the level of formalized governance grows with an organization. The main question here to ask is, which kinds of decisions are taken on-chain and which are more practical or feasible to be left off-chain.

**Off-chain decision making processes**
Unlike the on-chain decision model, off-chain decision making defaults back to more traditional means of communication and decision making. In the analysis of different OSS community types, we have observed that OSS communities differentiate in their levels of formalized governance (De Noni, Ganzaroli, and Orsi, 2013; Tullio and Staples, 2013; Germonprez et al., 2014). From undefined to defined governance. A defined off-chain governance involves among other things, having defined processes, clear delegation of responsibilities and decision making, and formalizing the use of tools and procedures.

**Proposal outcome enforcement**
As the DAO has taken a vote to a proposal, the outcome of that proposal will have a certain consequence and impact. However, if the outcome of the proposal is not binding, then the governance of a DAO loses its meaning. The outcome of a proposal may be binding, because the DAO members have a common understanding and agreement that it is. However, the DAO then only relies on this common understanding and agreement, but does not have actual power of itself. It needs to be decided in which aspects, the DAO will have direct control and impact, in order to make the DAO central to the organization. The DAO could for example be in control of the funds of the organization and directly make payments as the result of a proposal, change membership policies, introduce or change smart contracts, or be in control of other assets and aspects of the DAO.

**Limitation on proposal submission**
A DAO may choose to raise a barrier to submitting a proposal. This measure may serve to reduce the number of submitted proposals, increase quality, or to simply reserve the submission of proposals to certain members. The DAO could simply require a payment to submitting a proposal, so that it becomes costly to submit many proposals. Another method is to require the submitter of a proposals to have a certain amount of tokens or reputation.

**Proposal approval**
Before a proposal is being voted on, a DAO can decide to require the proposal to be approved. This mechanism involves questions such as: Who approves the proposal, a committee or a percentage of the member of the DAO? Or what is the proposal judged on and what requirements does it need to pass before it is approved? And what happens if a proposal is rejected? This mechanism provides ensures that proposals adhere to a certain quality and standard.

**Voting system**
The voting system decides how votes are casts and ultimately allocates power and balances the power across the DAO members. The voting system can be of a simple design, such as the one toke one vote design, but can also utilize more complex mechanisms that require voters to bet on the outcome or put in a stake towards their vote. The configuration of the voting system ultimately influences the power balance, how much voting power an individual can have and can support or incentivize participants to make an educated vote for an optimal outcome.

**Distribution of voting power**
The distribution of voting power is concerned with how voting power is distributed amongst the DAO members. It involves the object that represents the vote or the total voting power. This could be a token or reputation, but can also take on other forms in other systems. If more voting power can be accumulated, we can consider

how it is accumulated. Can voting power simply be bought or can it be earned, or are both possible? Are there other methods to acquire voting power? Does voting power depreciate over time? Can voting power be lost or removed by the DAO?

**Delegation of votes**
Delegation of votes or proxy voting, allows a DAO member to delegate their vote to another member, so that that member can vote on their behalf. The DAO member can exercise their voting power, without the need to actively vote on and research each proposal. It is also possible to retract the delegated votes. Some considerations with delegation of votes are: can a DAO member delegate to different people for different proposals? And can a DAO member instantly retract their delegated votes and delegate to another member?

**Voting cost**
Voting design may include some form of a cost or a stake when voting. The main goal is to incentivize participants to make the best decision as they have put in a cost and are possibly rewarded. When introducing a cost, the cost can be credited to the voting budget or from the token holdings. In the case of quadratic voting, the cost per vote increases quadratically. This system makes it costly to cast many votes, but cheap to cast a single or few votes. The considerations here are whether there is a cost involved, from what kind of budget the cost is credited, if the cost of voting increases and whether there is an opportunity to gain a benefit from voting.

### 6.2.3 Leadership and role structure

Fundamentally a DAO has a decentralized power structure. However, it does not mean that all members are equal. Roles will remain as each individual participates in a different manner. As an OSS organization, developers or contributors are a natural role that emerges. As well as some form of a central group that are the main drivers behind the project. Leadership can therefore emerge naturally or be formally established. Additionally other hierarchical structures and roles may emerge as well. Among the considerations here are, how is leadership established and how are other roles acquired. Regarding power and influence, DAOs need to consider how roles and leadership relate to the governance of the DAO and how do they have influence and power on the decision making.

### 6.2.4 Project chartering

This layer concerns the planning and steering of the direction of the project. A clear mission and vision statement aids in aligning the values and goals of all stakeholders. Additionally long-term planning of the project (i.e., roadmaps and release plans) falls under this dimension as well. The main consideration here is who is able to participate in the chartering of the project? Additionally, are the DAO and all the members involved in this process and is this an on-chain registered process? Furthermore is there any ensurance that the project follows what is chartered?

### 6.2.5 Incentives

Incentives in blockchain and incentives in OSS projects have both been a topic of research. In OSS projects, people contribute for altruistic or intrinsic reasons or a combination of both. Whereas in blockchain token design decides how partipipants are rewarded for their effort in the form of tokens, incentivizing their participation and donation of resources or other assets. In a DAO for OSS projects, the incentives

of all stakeholders needs to be considered and can draw from these two fields. A DAO allows for a truly decentralized structure, unlike traditional OSS organizations in which there commonly are centralizing elements, even when the OSS nature allows for distributed development and external contributions. This dimension concerns the major topics of incentives for a DAO in an OSS context.

**Developers**
Developers of OSS project are often paid for their efforts or their contributions are of voluntary nature. Therefore it is important to consider how the DAO considers the incentives for development and to engage with a community for outside collaboration. The DAO could be employing developers or offering rewards for specific work, allowing anyone to take on the work. Additionally the DAO needs to consider how it will pay for development work; will this be done automatically from funds that are controlled by the DAO or will there be intermediaries involved or through what other method will the DAO pay for development work?

**DAO praticipation incentives**
Other stakeholders than developers that are DAO members will have other incentives to be a member of the DAO. It is important to consider their motivation to be a DAO member and to incentivize them to be an active member of the DAO. Without properly considering this aspect in the governance of the DAO, the DAO could risk having inactive members that do not exercise their voting power, reducing the effectiveness of the governance of the DAO.

**Token model**
Common in blockchain, is to utilize tokens. As for a DAO, it needs to consider how to adopt a token model and what utility it will provide. The utility ultimately gives the token a value and can therefore be used as an incentive for the DAO. Additionally DAOs can consider using the token in its governance. I.e., the case of a one token one vote design. Generally tokens are interchangeable and exchangeable. Designing the token model involves setting the issuance, circulation, distribution and utility amongst others (Wang et al., 2019).

**Reputation model**
Alternatively participants may also be incentivized by earning a reputation that is non-transferable, unlike tokens. The reputation can provide a certain utility, adding additional incentive to earning reputation. Without additional utility, the system can simply represent reputation, that can be used to indicate the standing of a DAO member or signal their trustworthiness. Considerations here are amongst others, how reputation can be earned, if reputation can be lost or depreciates and if there are additional utilities for reputation.

### 6.2.6 Community management

This layer consists of the joining process, vetting of new members, identity verification and conflict resolution and sanctions. An OSS project is traditionally surrounded by a community. As the project grows, it fosters a community that in return helps the project grow. A DAO presents an opportunity to directly involve the community in the development and governance of the project. This layer focuses on how a DAO may grow and involve a community. The DAO can define a joining process in order to select suitable members. During this process, candidate members can be vetted. They may need to prove their knowledge, technical competences and alignment with the values of the project. Additionally the DAO can consider the methods to attract

new members and accessible ways for people to get involved. In a pseudonymous blockchain environment, a DAO may also consider requiring a proof of identity. A second important consideration in the management of the community are the mechanisms that prevent or resolve conflicts. In traditional OSS governance, protocols, policies and guidelines prevent conflict, while sanctions deter from behaviour that is in conflict with the interests of the project.

### 6.2.7 Software development processes

This layer consist of task responsibility distribution, release procedures and code acceptance procedures. As OSS projects centers around the development of a project, a part of governance directly affect and enable the software development processes. This layer focuses on what procedures are in place to decide on what is developed and how new code is accepted, how responsibility for tasks are distributed and to what extent the DAO will directly govern the code base and manage the software development.

**Task responsibility distribution**
Traditionally in OSS projects, the management of responsibility for tasks range from open(unmanaged) to delegated(managed) responsibility. The DAO can consider if and how to delegate the relevant responsibilities.

**Releases and code acceptance**
The procedures for releases and code acceptance streamline these major events and increase quality. A DAO can define the steps of these procedures. As a DAO it can consider what steps would need some sort of involvement of the DAO (e.g., approval by a DAO member, committee or by a DAO vote). Additionally what steps are registered on-chain, or do these procedures occur completely off-chain?

# Chapter 7

# Case Studies

In this chapter we discuss the case studies that were performed to evaluate the DAO for OSS Governance framework that was shown in chapter 6. To evaluate this model, qualitative case studies were performed with four DAOs. They are SearchSECO, dOrg, Aragon Network DAO and Token Engineering Commons.

To evaluate the framework, case studies were performed by method of semi-structured interview. Questions were formed around the model to create a case study protocol that can be found in appendix C. These were in part inspired by the question model as shown in appendix A. The questions were created to represent the different governance concerns in the model and not to include a research bias from the researcher. Participants were provided the case study protocol and their consent was obtained through the informed consent sheet, as is included in the case study protocol in appendix C. In addition to the consent form, consent to publish the interview transcripts was gathered from the participants later, as the researchers originally did not plan to publish the transcripts. All case study participants have given their consent to publish the transcripts.

The goal of performing the case study is to validate the completeness of the framework and evaluate its usefulness. As in accordance with the Design Science Research Framework, this is the phase in which the created artifact is demonstrated and evaluated. The completeness of the framework is assessed by using the created framework to understand and model the complete governance of existing DAOs. After going through the framework, dimension by dimension, the interviewees are asked if any governance aspects of their DAO was not covered by the framework. To evaluate the usefulness of the framework, interviewees were asked if the case study gave them new insights or was in any other way useful to them. Additionally they were asked how they imagined the framework could be of use to others.

Participants that were selected, had to identify as a DAO and have some relationship with OSS. The DAOs that are included in the case studies, provide a range of DAOs with established governance models to DAOs that are starting and are still in the process of establishing their governance. The requirement of the DAO having a relationship with OSS is somewhat loose, as finding a DAO that is specifically focused on the development of a single product was more difficult. Besides the SecureSECO DAO, only one other suitable OSS driven DAO showed interest in our research. However, after initially agreeing to participate, this DAO was not able to find the time to complete the case study and is not included in the research output. All the interviewed DAOs are involved in the development of OSS projects, therefore they were deemed suitable to perform a case study with.

## 7.1 dOrg

dOrg is a collective of web3 engineers, designers and project managers organized in a DAO. They collaborate on projects to advance the web3 stack (DAOs, NFTs, Defi, dev tools, L2s). Their mission is to become the best service provider, workplace and example of what is possible to achieve with web3 technology (*dOrg Handbook*). Effectively they are a group of freelancers who mainly collaborate on client projects. Additionally the members are also active in the development, operations and governance of their DAO. The DAO was formed in 2019 and is registered as a Blockchain-Based LLC (BBLLC) in the state of Vermont in the United States of America. As of the time when the interview took place, the DAO has 55 active members. They operate using tools and platforms such as Discord for chatting, Discourse for internal forum, Snapshot for voting, Gnosis Safe for their treasury, Google Meet for meetings, and have their own ERC20 token(a standard for creating smart contracts on the Ethereum blockchain) to manage reputation.

This project was selected for a case study as they are a fully operational DAO with a mature governance model. In contrast to the focus of this study, they are not a DAO that is organized to drive development of an OSS project. However, they are involved in developing closed and open source software and do have their own OSS projects. As a DAO with an established clear governance model, they were deemed a suitable case study. The interview was held with a member of the organization, who had considerable knowledge about the internal operations of the DAO. Prior to the interview, the DAO and its governance were researched through the dOrg handbook (*dOrg Handbook*). The purpose hereof was to increase the quality of the interview and to help keep the length of the case study within the allocated time for the interview. The interview was conducted over a single 2-hour meeting.

During the interview with dOrg, all governance aspects were discussed. This resulted in a clear and complete overview of their governance model. Figure 7.1 shows the overview of the dOrg governance model as a result of the case study. This section further reports on the dOrg case study and is structured according to the governance dimensions of the framework.

### 7.1.1 Legal foundation

dOrg is the first DAO to be legally registered as a BBLLC in the state of Vermont (Biggs, 2019). Regarding the liability of the DAO and its members, the interviewee stated; *"being a LLC, everyone is a co-owner and contractor and so we use the limited liability of US corporate law"*. Later during the interview, the interviewee elaborated that the members, *"since they're contractors, they have their own business. ... Maybe it's specific to U.S. law, but every contractor has their own LLC, their own business and so they contract with dOrg"*. This legal construction grants the DAO a legal existence and some sort of legal compliance. While the members are protected from liabilities through their own Limited Liability Companies(LLC) as they interact with the dOrg LLC through their own LLCs. However, a DAO in its nature is borderless, therefore legal compliance internationally is also a matter for consideration for a DAO. The interviewee was unsure about this matter as he stated: *"I'm not exactly sure of the legal requirements for having contractors outside of the US. But I know our accounting team ensures that we conform to U.S. law"*.

dOrg primarily has client projects, but they also build tools and have their own projects internally. In the past, one of these internal projects, was spun out to become

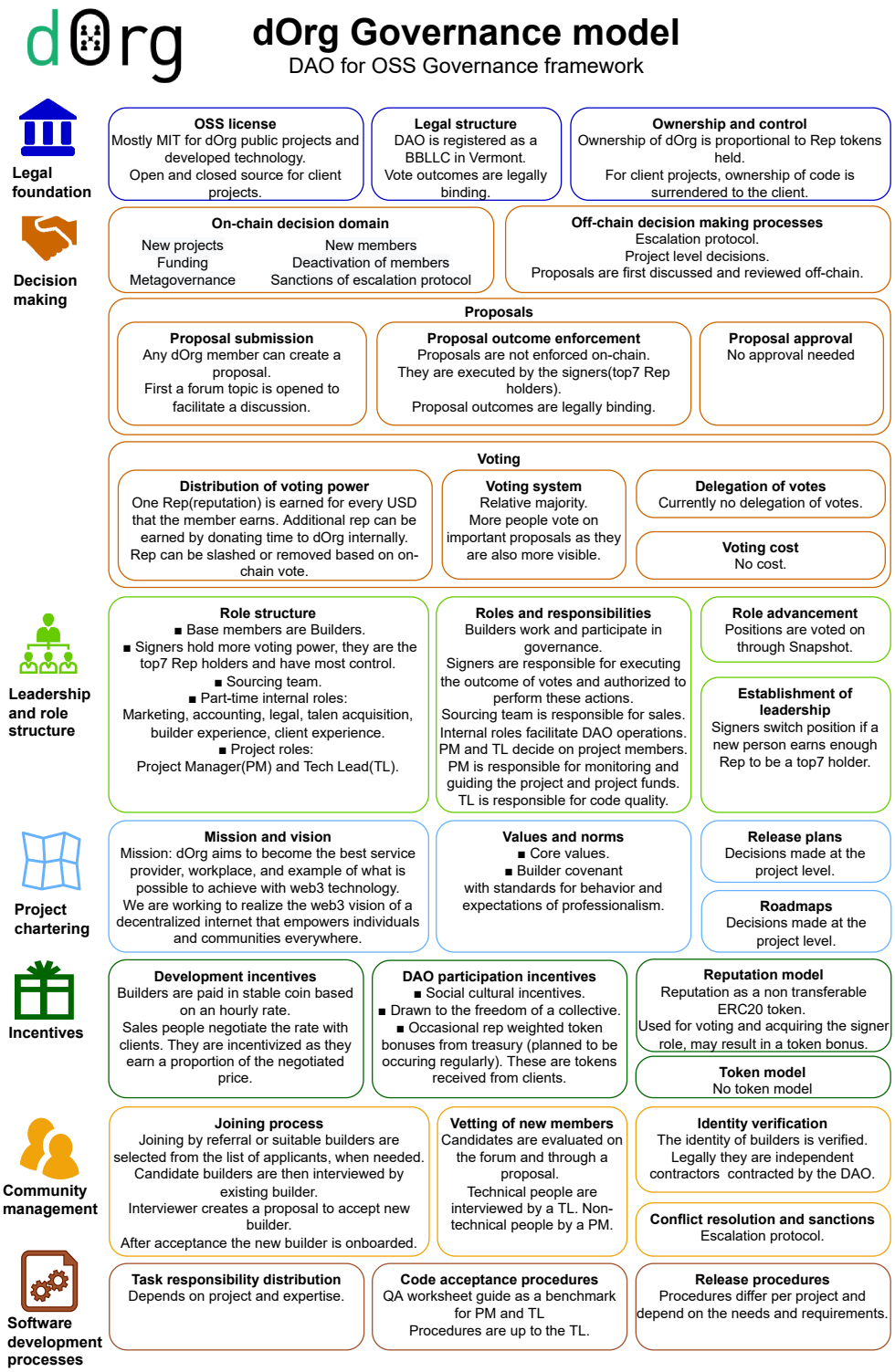


FIGURE 7.1: dOrg DAO for OSS Governance model

their own independent project. When asked about the licenses for the project, the interviewee replied: *"For the stuff we build, we prefer to use open source. Usually MIT just because if we build something we want anyone to be able to use it for any reason, or change it, or contribute to it. For the things we build for our clients on our behalf, usually these are also open source or closed source, depending on our clients preferences"*.

Regarding ownership and control over the DAO and the created source code. On client projects, the rights to the source code are surrendered to the client. With internal projects, they are open sourced. The interviewee was unsure if there are any legal provisions that members surrender the rights of their work to the DAO.

> "In terms of what we build overwhelmingly, we've just decided to do open source. I'm not sure if we have a legal agreements, or legal provision within our operating agreement. That's DAO members surrender all rights to dOrg. ... But I think it's the intention that we make all the stuff, we make internally, public..."

According to the interviewee, ownership of the DAO, by its members, is proportionate to the on-chain reputation of each member. As the interviewee stated: *"I'm not a lawyer. But what I do understand is that; the ownership of our LLC is proportionate to our on-chain reputation in dOrg"*.

### 7.1.2 Decision making

According to the interviewee, the amount of decisions taken on-chain is limited. They vote to approve proposals for client-projects, approving new builders (activation), deactivation of builders and meta-governance decisions. Proposals for client projects involves evaluating the project and deciding which members join the project. The reason for deactivation is mostly inactivity. According to the interviewee; *"That's how most people leave. They move on to other projects and other things and stuff. And so we have this inactivity threshold."*

Regarding the off-chain decision processes, the builder covenant defines the expectations of people's off-chain behaviour and the escalation protocol is setup to resolve conflict. There are also expectations from tech leads and project managers. And there are many project level decisions, which don't occur on-chain. As the interviewee states: *"Those don't need to go on chain. The team can work it out themselves. Usually they go on-chain, if it's some decision that we need more visibility through the DAO. Like meta governance especially..."* If there are important decisions these are taken on-chain; *"That's how we maintain our identity, right? If we have major decisions happening off-chain, then we might as well be a traditional corporation, right?"*

Regarding proposals, any member of dOrg can create a proposal. The process is to create a forum topic first, alert people and invite them for discussion before creating the proposal on Snapshot. There is no cost to create a proposal and there is no approval process before the proposal can be voted on. According to the interviewee, they don't have a large number of members, unlike other DAOs. Moreover, not every transaction needs to be voted on, as they have moved away from DAO Stack and gave every project their individual safe, so that *"the snapshot is like the higher level governance stuff and so people don't get noise anymore from local project decisions."* Therefore there is less of a need to put up a barrier to submitting proposals. The proposals are not automatically executed or enforced. The top 7 reputation holders, also called signers, are responsible for executing the outcome of proposals. These signers are the holders of the keys of the treasury. Even though, there is no enforcement of the outcome of proposals, as they are a BBLLC, the outcome of a proposal is a legally binding decision.

The voting system is a *reputation weighted relative majority system*, meaning that the option that receives most votes wins. And that there's no quorum required.

Reputation is a non transferable token, that is earned for every dollar that a member makes at dOrg. An alternative way to receive reputation, is to work on internal projects or operations, in which a member can decide the ratio of dollars to reputation compensated. Votes can not be delegated, however, the interviewee expressed: *"we hope in our app to be able to support delegation in the future."*

### 7.1.3 Leadership and role structure

dOrg formally has no leadership. However, they do have a signer role. These are *"the top 7 reputation holders in dOrg"*. They hold the keys to the treasury and therefore *"are owners of the treasury ... they sign and or propose or execute transactions from [the] treasury that result from [the] governance decisions on snapshot"*. It is possible for signers to opt-out of being a signer, as it involves these responsibilities. However, the interviewee was *"pretty sure no one has opted out."*

The reason given for why they have chosen to go with assigning the top 7 reputation holders the signer role is *"because these are our top reputation holders, meaning the people who have over time earned the most money from work with dOrg and also stayed ahead of the inflationary pressures. Like as new members join and other people are earning money ... But the idea being that they would have an incentive to not sabotage dOrg."* Additionally, it would require four of the seven signers to conspire against the DAO. These were the reasons given by the interviewee to this centralization of power in the DAO. To acquire the signer role, a member will have to become a top 7 reputation holder, which would lead to a change of the signer roles and a transfer of ownership of the treasury.

All members are called builders, even if they have other roles or are a signer. Regarding the other roles, dOrg has internal roles, or specialist roles, such as marketing, accounting, legal talent, acquisition, builder experience, client experience (*dOrg Handbook*). Other roles mentioned by the interviewee are, facilitators and a social media person. For project management, there are the tech lead(TL) and project manager(PM) roles. The PM and TL have influence over the members on a project team. They have the authority to *"ask builders to leave a client project. "The tech lead is ultimately responsible for the technical delivery, whereas the project manager is ultimately responsible for keeping the non technical aspects on track."* To acquire an internal role would be a *"governance decision"* that is voted on. Formally the tech lead and project manager roles are voted on, however it is more of an earned position, as *"that someone has established a track record and we feel they either deserve tech lead project manager, badge, because they can handle that responsibility"*. Another team in dOrg is the sourcing team. They are essentially the *"sales team, that negotiates with the client about budget and scope or the engagement"*. They receive a commission based on the rate that they negotiate with the client and are in that way incentivized to negotiate a price as high as they are able to.

Although there are different defined roles in the DAO, according to the interviewee, these are only loosely defined. They aim to adhere to the model of a collective. Although they do have *"some specialists"*, they don't have *"constricting roles for people"*.

### 7.1.4 Project Chartering

dOrg have listed their core values and a builder covenant in their public handbook (*dOrg Handbook*). The builder covenant consists of a list of *standards* and a list of

*expectations of professionalism.*

The builder covenant did not exist until they encountered *"internal challenges and disputes"* and discovered that they had not laid out the expectations of behaviour for their members. That is when the DAO started drafting the builder covenant and it was ultimately approved through an on-chain vote. This is regarded as a meta-governance decision. Regarding changes to the covenant or mission/vision, the interviewee replied that small changes would likely be handled informally. However, if someone wants to change the *"fundamental values or change the direction of dOrg. Usually that is ultimately an on-chain decision"*.

When discussing release plans or roadmaps, it was became clear that there is no broad roadmap or release plan for the DAO. They exist at the project level and there are some plans for the DAO. However, these plans are internal projects and *"subject to change"*. Regarding development of the DAO, the interviewee said: *"I think our plans long term are just around improving our operations and potentially spinning out product ideas"*. These governance aspects in the DAO for OSS governance framework, are more specific to a DAO that is driven by the development of an OSS product. dOrg is a services DAO and not a product development DAO, therefore these aspects are less relevant and explains the absence of release plans and roadmaps for the DAO.

### 7.1.5 Incentives

The primary incentive for development efforts, is a compensation based on an hourly rate. Members are mostly paid in stable coins. The hourly rate is negotiated by the sales team, who receive a commission based on the lumpsum that they negotiate. According to the interviewee, the rate varies by client project, but is pretty good, especially for members who don't live in a western country with a high cost of living. As the interviewee expressed:

> "One thing we decided we really hate that some big corporations do is location depending compensation and so we just say like if you're a senior engineer you're going to get paid probably like a US rate for a senior engineer. Even if you're like an incredibly low cost country."

Other incentives are social cultural incentives, people have a lot of freedom, according to the interviewee, *"there's not a ladder climbing thing. You're not trying to become director of dOrg or something."* In an e-mail conversation that followed the interview, the interviewee requested the addition of reputation weighted token bonuses to the model. Excerpts of the e-mail conversation, and a full explanation, hereof can be found in appendix E.10. dOrg plans to distribute these reputation-weighted bonuses on a regular basis. They are tokens that dOrg has received from clients, and which have been added to the treasury as 10% of all received funds from client projects go to the treasury. These tokens are distributed to the members as a bonus. The amount that is received, is based on the amount of reputation held by the member. A square root of the reputation was used to determine the proportion of the bonus that each member receives.

As was discussed earlier in the decision making section, a non transferable token is used to distribute reputation. Reputation is received for internal work or for every dollar that the member earns at dOrg. The utility of this reputation token, is that it grants voting rights, it may result in the member becoming a signer and may result in a higher bonus.

The interviewee did note that they have some difficulty incentivizing senior members to stay involved in the organization. Those members may find their own interests or other projects, that they would rather move on to. Additionally, crypto projects can offer very high levels of compensation for skilled people. The interviewee states that they're *"hoping to find some way to incentivize some of those super senior people to stick around and not just leave for crazy money."*

### 7.1.6 Community management

Unlike OSS projects, where a community may form around the OSS product itself, dOrg is a closed organization, which can't be freely participated in. In fact, currently they are *"incredibly selective, in terms of who can join"*. To join, dOrg, a person can fill in the *builder interest form* to signal interest. Sometimes, when needed, salespeople may select someone from the list of candidates, that they want to activate. New members can also be introduced as a personal referral by an existing member. They will be interviewed by a tech lead or a project manager. After which feedback of the interview is posted on the forum, followed by deliberation by the members. If the candidate passes the following Snapshot proposal, they are activated and on-boarded. The identity of every member is verified, as members are a contractor from their own companies. dOrg verifies their information to be compliant with the law and for tax purposes.

Regarding potential conflict, and the processes for conflict resolution and sanctions; in dOrg *"ultimately things come down to the escalation protocol"*. For instance, if members "fundamentally don't agree" with project managers, the matter would be handled according to the escalation protocol, which in the last step would lead to an on-chain vote.

### 7.1.7 Software development processes

Similarly to the roadmaps and release plans, little is defined in this dimension as dOrg is not involved with a single main project. Instead, they are involved in many (client) software projects. As the interviewee said, the *"tech lead is responsible for the technical delivery of a project, and so ultimately the technical side."* The code acceptance procedures are therefore decided by the tech lead at each project. Regarding the release procedures the interviewee states: "the release process is appropriate to that project. Depending on the needs of the team, [and] the needs of the client." This is very logical; as the needs, requirements, team members and stakeholders differ per project, these governance aspects will also differ per project. However, they do have a QA worksheet for their project manager and tech leads, that sets a baseline for these aspects. As the interviewee explained: *"So one thing is ... we started with this QA worksheet guide. These are sort of our best practices that we want our project manager and tech lead... Make sure these [things] are getting covered and these are sort of our baseline."*

### 7.1.8 Summarizing remarks

At the end of the interview, the interviewee concluded that *"I feel like we're covering a lot of things pretty well, and yeah. So like that was an insight, because sometimes it seems being in a collective, things are a little messy sometimes. But we're hitting our base is pretty well"*. Looking at the governance overview in figure 7.1, we can indeed assess that every aspect of governance has been addressed.

Most notably about dOrg is that they have registered as a BBLLC in Vermont, and as such are a legally compliant entity that does not operate in a legal gray area. Their incentive designs work well for their organization, as it mainly compensates their builders in stable coin and separates the governance utility from the monetary incentive. This also ensures that governance power can not be gained in a simple manner, such as simply buying the tokens.

Interestingly they have also moved away from the on-chain DAO framework, DAO Stack. Instead, they have taken their voting to Snapshot and their treasury to Gnosis Safe. Essentially reducing their cost of gas fees. Additionally they have given every project their own treasury, so that project level finances and decisions are separated from the DAO-wide decisions. In this way they have provided an answer for themselves to some of the main challenges of DAOs. dOrg has created an effective governance design (chapter 5.3.4) and solved their problem of high gas fees (chapter 5.3.3). However, as a result, it can also be debated to what degree they remain an autonomous organization as their decision making is not enforced through smart contracts.

## 7.2 Aragon

The Aragon Network DAO was launched on 20 October 2021. However, the related Aragon Association was started in 2016 (Baker, 2020). Through an Initial Coin Offering in 2017, they raised, at the time, an equivalent of $25 million (Cuende, 2017). According to Etherscan, a blockchain explorer tool, there are about 12000 addresses that held Aragon tokens (ANT tokens) at the time of the interview (*Etherscan Aragon Network Token*). If each address would represent a member, there are about 12000 members.

According to the interviewee, formally the purpose of the DAO has not been formulated. The interviewee did share his perspective on the purpose of the DAO; *"It should be a tool to decrease the dependency of the prospective network on the current core team. In the beginning it would be a tool to enable the current core team to proactively push more and more of the work towards participants of the network towards a community of interested."*

The interview was held with a member of the *executive sub-DAO*. This interview was conducted over the course of one hour. Prior to the interview, the Aragon Network DAO Charter was researched to have a better understanding of the governance of the DAO. All governance aspects were covered in the interview. Although it was less deeply discussed unlike the other case studies, due to the time constraint. The Aragon DAO was selected for a case study, as the related organization is one of the oldest, largest and most well-known organizations that is working on advancing DAOs. As such, they were deemed interesting to see how their governance has formed and to gain insight into their experiences.

For their governance, they currently rely on tools provided by the Aragon platform, such as Aragon Voice and Aragon Govern. Voice is their gasless voting solution and Govern is their optimistic governance framework through which all proposals are passed by default, unless challenged and resolved through Aragon Court. Aragon Court is an arbitration system that allows for the evaluation of challenged proposals by human judges. These are two of their many products. However, curious enough the interviewee disclosed that these solutions were *"suboptimal"*. Other communication tools that they use are Notion, a forum, and they have a Discord server.

Figure 7.2 shows the governance model of Aragon as a result of the case study. This chapter further reports on the Aragon case study and is structured according to the governance dimensions of the framework.

### 7.2.1 Legal foundation

The charter of the Aragon Network DAO contains a section that explicitly states "the Aragon Network is not intended to have legal personality" (Aragon, 2021, Section 2.2e). The interviewee, brought some nuance to that statement, bringing in that they are not *"ideologically opposed to ... [when it] makes sense, there could be a legal wrapper"*. As *"the space around legal wrappers is rapidly evolving"*.

Earlier in the interview, the interviewee indicated that there's disagreement within the DAO about the charter. This disagreement explains how the charter may not entirely match the interviewees answers in this interview or the sentiment of a broader part of the community. The interviewee stated that *"the charter is not a reflection of how Aragon perceives as an optimal design"*.

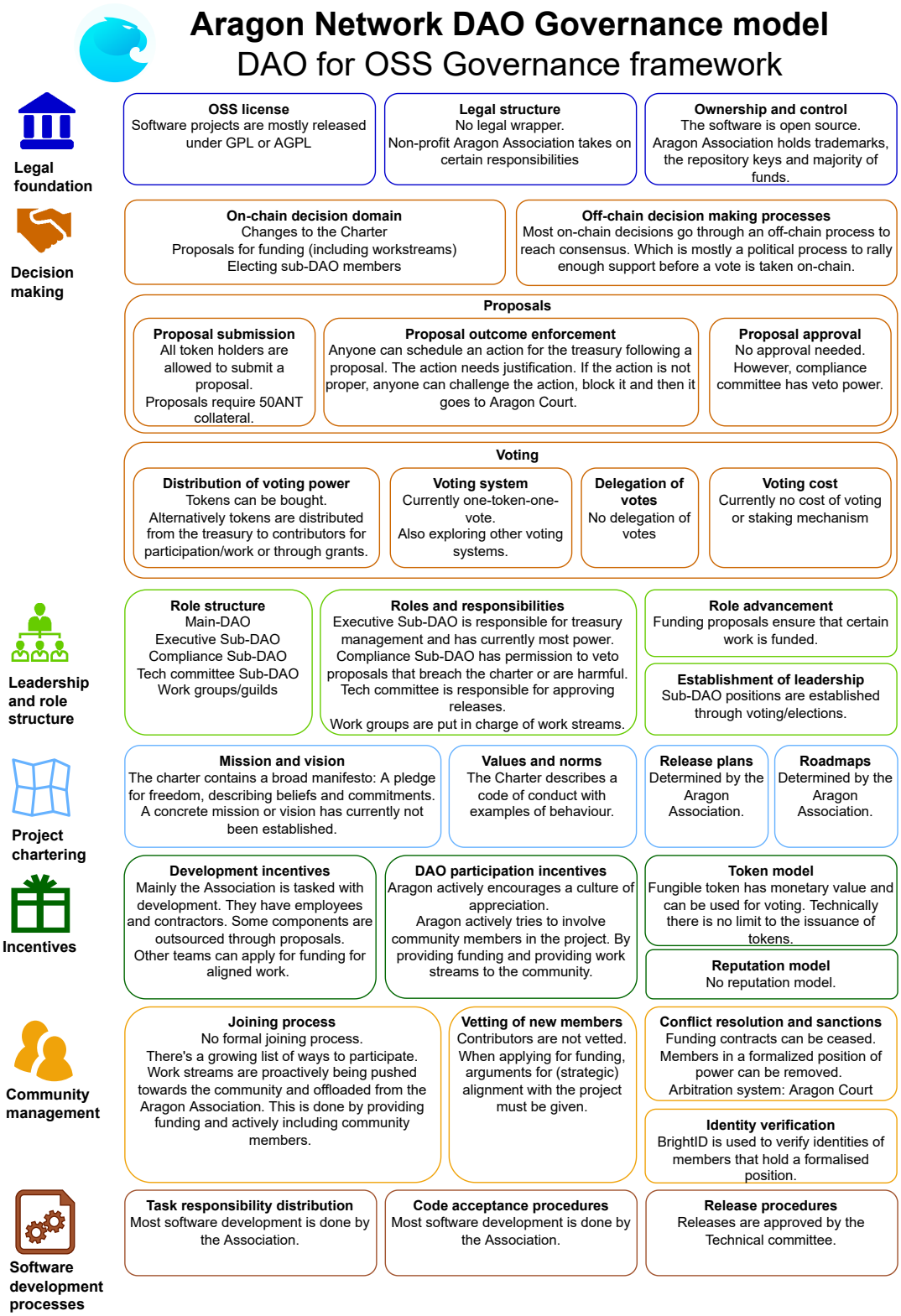


FIGURE 7.2: Aragon DAO for OSS Governance model

Regarding liabilities of the members, the interviewee stated that it is somewhat unclear. However, some of the liabilities are transferred to the compliance sub-DAO, as *"basically anything [proposals] from which potential legal liabilities could arise ... the compliance committee have the power to veto that"* . The charter states; "the

Compliance Committee members assume full legal responsibility for the approval of any illegal, unlawful, criminal or fraudulent proposal" (Aragon, 2021, Section 6.4b).

Regarding the OSS license, the interviewee was not aware of the OSS licenses. The GitHub page of the Aragon organization shows GPL-3.0 or AGPL-3.0 for most of their popular projects, such as AragonOS, Aragon-CLI or client, while some repositories are licensed with MIT, such as ui and use-wallet (*Aragon Github*).

Regarding ownership, according to the interviewee the software is open source. However, the Aragon Association holds ownership on the brands (i.e., trademarks), is a steward of the treasury and holds the keys to the repositories. According to the interviewee the association *"will [in the future] transition those assets into the DAO"*.

### 7.2.2 Decision making

According to the interviewee, the *"main DAO has free reign over the budget"*. Currently, the main DAO only holds control over the treasury, as *"other assets haven't been transferred away from the association"*. Additionally changes to the charter, also requires an on-chain vote. Control over the treasury, means that DAO members can create proposals for funding for various purposes.

Any token holder can create a proposal. The proposal is posted to the forum, allowing for deliberation and feedback. According to the interviewee, this is the stage for *"off-chain negotiation and politics"*. Everyone on the forum can disagree, but *"if you have someone in your back pocket that has a lot of tokens, they can overrule that disagreement"*. Before a proposal is executed, the compliance committee has the power to veto the proposal if the proposal is not in accordance the charter.

The interviewee disclosed that creating a proposal requires 50 ANT as a spam filter. The 50 ANT is taken as a collateral for the duration of the voting period. If the proposal is challenged through Aragon Court, this collateral is slashed depending on the outcome of the Aragon Court process (Aragon, 2021, Section 5.5b).

With the optimistic governance design in Aragon Govern, anyone can schedule an action to transfer money from the treasury. The only requirement here, is that the action has to be justified, e.g., through a proposal. *"If that action is not proper, anyone can actually challenge it and block it"*. After which the action is reviewed through the Aragon Court system.

Voting power is represented by the ANT tokens. A DAO member can generally buy ANT tokens or receive them as compensation for doing *"productive work for the network"*. The voting system is currently 1 token 1 vote, although the interviewee expressed their interest in other voting systems such as conviction voting.

### 7.2.3 Leadership and role structure

The Aragon Network DAO consists of the main DAO, the executive sub-DAO, the compliance sub-DAO and the tech committee sub-DAO. Additionally there are various workstreams that are delegated to different teams. According to the interviewee, this is *"a direction the whole [DAO] space is going. ... Various competent and experienced groups taking up workstreams and having relative autonomy within"*. The interviewee thought the executive sub-DAO in its current state, to be *"a bit too powerful"*. However, over time that power will dissipate as workstreams emerge. Work and power will be pushed towards teams that take ownership of the workstreams.

The workstreams appears to be one of their solution to the problem, that they call voting-fatigue. It refers to the problem in which voters are not interested in voting every day on various topics that are irrelevant to them. Instead less important and operational decisions, are delegated and left to the discretion of an autonomous team. Bringing focus to more important decisions in the main DAO.

These teams are selected through a proposal and are provided with funding. In that regard the interviewee sees the process of delegating workstreams to teams as a funding proposal.

The members of the sub-DAOs are elected. However, the interviewee noted that only *"0.1% voted on the members of the members of the executive subdao"*. And that basically any person that has the backing of a person with many tokens, could take control over such a decision and have themselves elected.

Regarding the organizational structure of the DAO, there is an external element as well. Besides the Aragon Network DAO, there's a committee in the Aragon Association that currently is the *steward* of the treasury that holds all tangible assets of the Aragon Network. The Aragon Association is *"the operational unit, which does most of the productive work on the network"*. Development work, is mostly handled by the Association. According to the interviewee, they are planning to transfer the treasury to the DAO over the course of the next three years. However, *"currently the DAO only has a small portion of that budget"*.

### 7.2.4 Project chartering

The Aragon Network DAO charter contains a manifesto titled; The Aragon Manifesto: A pledge to fight for freedom. However, it is a broad statement that does not go into much detail of what the purpose of the DAO concretely is, other than working towards certain ideals. The interviewee agrees; *"it is pretty broad"* and stated that specifying a better structured mission and vision has been overlooked. Adding a mission or vision to the charter, would require a change to the charter through an on-chain vote. Changing the charter requires a 0.5% quorum (Aragon, 2021, Section 2.2f). However, according to the interviewee, the current charter was enacted while only receiving 0.2%. The interviewee states that *"most people don't care enough to show up to vote"*. This shows the participation problem that the DAO has.

According to the interviewee, the release plans and roadmaps are *"supplied by the Aragon Association"*.

### 7.2.5 Incentives

Development is mostly handled by the Aragon Association which has employees and contractors. Some components are outsourced to teams outside of the association. These people are *"incentivized through funding proposals"*. Teams can apply for funding to do related work.

According the interviewee, people are also attracted to the Aragon brand. As *"Aragon has been one of the first projects in the DAO space"*. The interviewee explains that this attracts a lot of people. Especially those who are new to the DAO space. Intrinsic motivation is *to want to better the world*, as the interviewee stated. Aragon tries to foster a culture of appreciation and recognition.

In regards of attracting a community, the interviewee notes that the DAO is proactively trying to attract a community. One example is when they structured a tech support guild in which community members are handling support tickets and are being compensated for that. Providing a financial incentive or reward for the participation of community members.

Regarding the ANT token model, it is a transferable token that can be freely bought and sold. It is used as a governance token, but also as a means for funding projects and rewarding community members. Etherscan shows a 43,029,810 tokens in circulation at a current token price of $7.40 (*Etherscan Aragon Network Token*). According to the interviewee the tokens are controlled by a meter contract through which new tokens could be minted by the committee that controls the pool of assets. The community and the market response are what would prevent the committee from freely minting additional tokens. The utility of the tokens, besides the monetary value, is that it allows holders to vote and *there's a right to work*. You can become juror on the forum of the arbitration system. *"you have to stake ANT to be able to be part of that pool of jurors that get elected to vote on things within the arbitration system"*. The interviewee also stated that tokens are not burned or taken out of circulation. There's also no reputation system in place.

### 7.2.6 Community management

At the start of the interview, when discussing the number of members, the interviewee stated that it is in the spirit of a permissionless system to consider all tokenholders, a DAO member. As the interviewee stated: *"In the spirit of permissionless system, it makes sense to give everyone an opportunity to participate and become a member by just purchasing tokens. Obviously the more tokens you hold, the more interest you have"*. Theoretically you could be a contributor without holding tokens. However, according to the interviewee, a contributor would then *"become a member as part of the compensation is paid in tokens"*.

According to the interviewee there is growing list of ways to participate in the DAO. However, it is not a structured effort. Similarly to how the tech support guild was formed, by giving the work to community members and providing them with funding, *"the association is proactively pushing work to the community"*. Workstreams are pushed to the community, if a community member wants take up the work, they provide an argument to why they should take up the work and are then provided with a budget and the autonomy to handle the workstream.

As it is a permisionless system, token holders are not vetted or required to show alignment with the project. However, if someone applies for funding, they need the funding proposal to provide a justification for the strategic alignment of their proposal. In the words of the interviewee: *"We don't want the association to be the single chokehold of power. You can do something different, but you need to explain why you are doing it"*.

Currently there are no protocols other than the arbitration system to handle conflict. However, according to the interviewee, there's a team that is developing a system for *"conflict resolution before the need of arbitration"*. Tokens cannot be taken away from members, however, a person that is in a position of formalized power can be removed. As an example given by the interviewee: "if you applied for a budget to lead a workstream. It's not like, we're not going to pay you for the work done, unless that work is actively malicious. But the DAO can choose to cease the contract".

### 7.2.7 Software development processes

Software development currently mainly occurs through the association.

The tech committee sub-DAO approves releases and deploys accepted proposals that contains new code (Aragon, 2021, Section 5.1c). The tech committee also has the authority to remove proposals that do not meet technical quality standards. According to the interviewee, the keys to the repositories will be in time transferred to the technical committee.

### 7.2.8 Summarizing remarks

The interviewee reflects and acknowledges that *"there are a lot of things that we're[the DAO] not currently doing, but we're thinking of, but that you're [the interviewer] touching upon"*. At the start and ending of the interview, the interviewee expressed the sentiment that they are aware that several governance aspects have not been well defined. Something notable here is that their token holds significant value, with many token holders. Despite that, they have a great difficulty in voter turnout with turnouts of 0.2%. Perhaps it is because of that significant value and large number of token holders, that their turnout is low. As people are mostly interested in the token value, but not the governance. With the Aragon DAO we see two controlling mechanisms on proposals; there is the compliance sub-DAO with veto power and the court system allows for arbitration. Regarding software development, that aspect of the DAO is centralized in the Aragon Association, despite the software being open source software. Another thing is that they require a collateral of 50 ANT for posting proposals as a spam filter. Especially in a permissionless system, anyone could freely create proposals without such a mechanism. Curiously enough, they have also decoupled the execution of funding proposals from the outcome of votes. Instead, a person needs to schedule an on-chain action for the treasury, which can in turn be challenged. From the interview it looks like the DAO is still very centralized around the association and that large token holders can easily change the outcome of a vote. However, they are trying to rely less on the association and actively push workstreams towards the community in a decentralizing effort.

## 7.3 SecureSECO

The SecureSECO initiative aims to make the worldwide software ecosystem a safer place through empirical software engineering research. Currently there are about 25 members involved with the project. The project consists of sub-projects such as TrustSECO and SearchSECO (Hou, Farshidi, and Jansen, 2021; Jansen et al., 2020). These sub-projects work towards creating a distributed ledger and a decentralized system that fills this ledger with information regarding source code. I.e., the ledger contains information about trust facts of software packages, reproducible builds, a hash-based index of abstract representation of code and more. This rich database presents many practical applications such as identifying identical code, providing software provenance data, identifying vulnerabilities, understanding the trustability of a software package and presents many research opportunities.

This case study was selected as this study originates from the wishes of the SecureSECO initiative to better understand DAO governance for OSS projects through emperical research. As such, this case study fits the paradigm of action research. "The research informs practice, and practice informs research synergestically" (Avison et al., 1999). SecureSECO is an OSS project that will have impact on the entire worldwide software ecosystem, it is therefore well suited to be organized as a DAO, granting software users, creators and other stakeholders the opportunity to participate in the SecureSECO system and help build and expand it. Hou, Farshidi, and Jansen (2021) have chosen Distributed Ledger Technology(DLT) for the TrustSECO project "as it enables the provision of trust knowledge as a "commons"". They argue that trust in the software ecosystem, is a digital commons, and should therefore be managed by the ecosystem. DAOs fulfil this vision.

The interview was conducted over a 2-hour video meeting with four interviewees. During the interview we followed the interview protocol. The SecureSECO DAO is still in the process of formalizing itself. A larger community, besides the team, has not been formed yet and a product has also not been released yet. Therefore this DAO is still orientating and would be using the DAO for OSS governance framework to understand DAO for OSS governance and to understand what aspects they will need to work on to establish themselves. This interview also shows some debate and uncertainty over the answers given as many governance aspects have not been established yet.

SecureSECO uses Whatsapp as the primary method of communication within the project. It recognizes that it may need to have a public chat in due time. The public platforms are a website, secureseco.org and a Github page. The DAO will be organized using the Snapshot platform for voting and the Aragon stack to organize other on-chain matters.

Figure 7.3 shows the governance model of SecureSECO as a result of the case study. This section further reports on the SecureSECO case study and is structured according to the governance dimensions of the framework.

### 7.3.1 Legal foundation

The SecureSECO DAO will be heavily intertwined with a stichting, the Dutch organization form for a foundation. The foundation has not been established yet, as together with establishing the formalized DAO, it is one of the big challenges. One of the interviewees states: *"And this is one of my big challenges. How do we sort of*

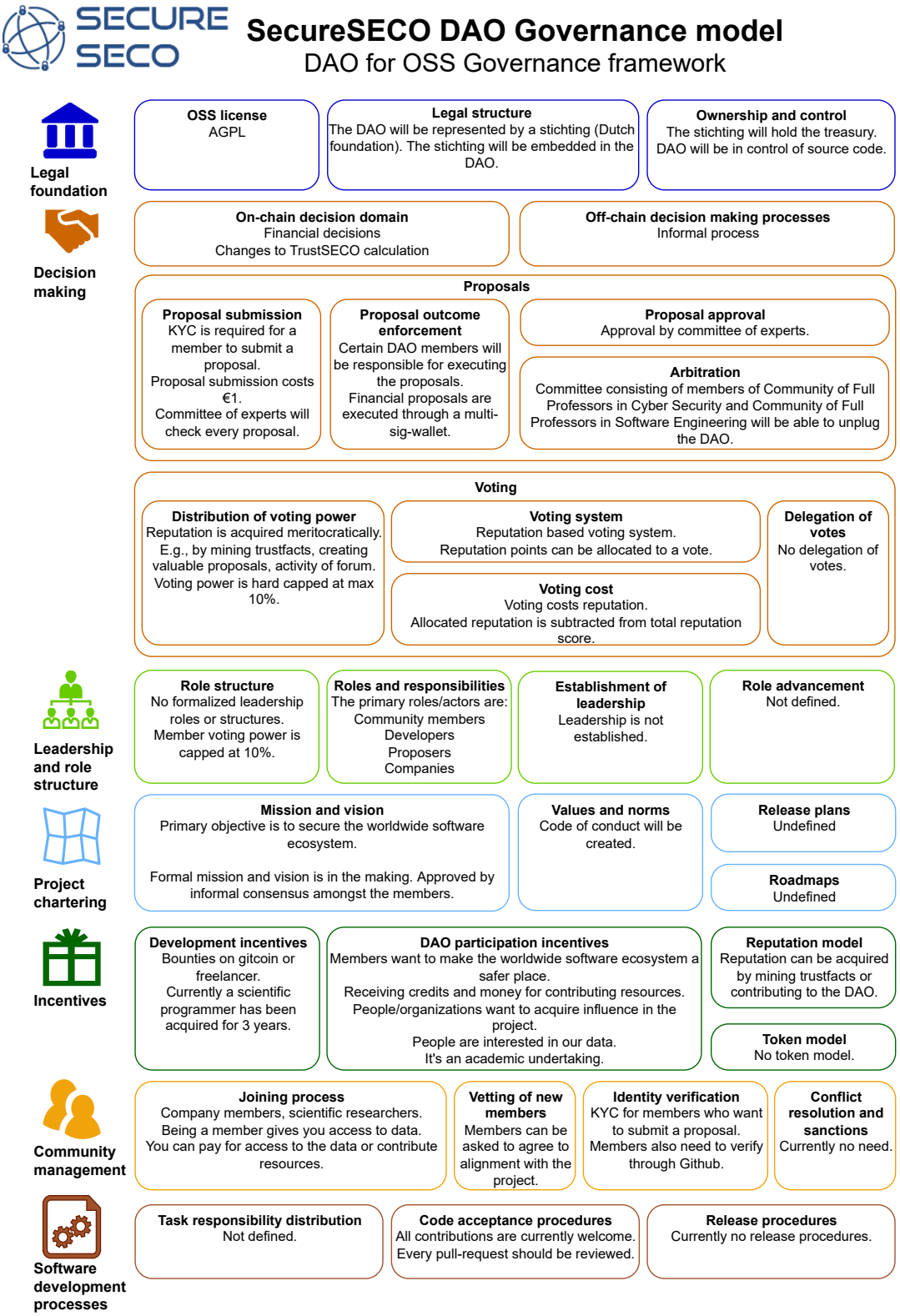


FIGURE 7.3: SecureSECO DAO for OSS Governance model

*embed the rules of the DAO in the foundation so that they're really connected forever that they can't be disconnected somehow."*

The created software will be released under AGPL. And the DAO will be in direct control over the source code. I.e., it will be able to decide on pull-requests.

### 7.3.2 Decision making

When discussing the decision making domains of the DAO, not much seems to have been defined. Most decisions are taken informally. For the on-chain decisions, money related decisions and changes to the SecureSECO systems, such as changing the TrustSECO trust score calculation, seemed to be the primary decision domains for the DAO. The interviewees noted concerns over voting participation. I.e., whether enough people are motivated and interested to vote on the decisions. Therefore there are some considerations to use a form of optimistic voting. As explained by the interviewees: *"So if you three people say yes and nobody else objects then that's yes"*.

Regarding the enforcement of proposals, it remained unclear how money related proposals would be enforced. However, the use of multi-signature wallets, that require two or more private keys or persons to sign a transaction, seemed appealing to the project. However, concerns were raised hat a small group of people would be in theory able to do anything with the wallet. For proposals that need manual execution, the proposal will include the names of the people who are to be responsible for the execution of that proposal.

Regarding proposals, they can only be submitted by whitelisted members who have undergone a KYC process. The assumption here seemed to be that mostly companies were going to make proposals in the DAO. The interviewees were slightly unsure on this decision, as it is a high barrier and an expensive process. However, they were happy that it would provide a measure of safety and compliance with money laundering expectations. Submitting a proposal requires a fee. The initial proposal was for it to be €0.02-€2.00. However there was some debate that a small fee could just as well be a €100. The debate was not settled. After submitting the proposal, the proposal is then checked by a committee of experts and gets listed on the voting platform Snapshot. However, the members of this committee or the criteria for acceptance were not defined. There was also a suggestion to check the quality of a proposal automatically. However, this was deemed infeasible.

Regarding voting, it will be a reputation based system. Reputation is acquired based on ones activity in the DAO. This could be for example, activity in the forums or creating proposals. Alternatively reputation could be earned by mining for trustfacts for the TrustSECO system, or by providing resources for the system. During the interview it was suggested that reputation can be seen as a voting budget. A voter can allocate a certain amount of reputation towards a vote and this amount is then *burned*. I.e., deducted from the reputation score. The reason given for this burning mechanism is to keep the DAO leveled. Keeping in mind the position of new entrants. More details on this idea reputation burning mechanism were not further discussed. After this, followed a short discussion on vote delegation. Initially, one interviewee proposed to include delegation in the voting system. However, another interviewee strongly disagreed. And it was agreed upon, not to include a method of delegation of votes. When asked if there would be some kind of staking or betting mechanism, one of the interviewees voiced there opinion to keep it simple.

### 7.3.3 Leadership and role structure

When asked if there would be any formalized leadership roles, the interviewees answered that they did not want any formalized leadership roles and it would not be in the spirit of the project. The most entrepreneurial active member will gain the most votes and most power; a meritocratic system. Additionally that power will be capped at a maximum of 10% so there will always be at least 10 very influential people. When asked about other community roles, the answer was that it will be very open. The main distinction would be roughly: community members, contributors, developers. Defining these roles will remain a gray, likely undefined, area. As for the roles that companies will play in the DAO, they will be contributing in a particular way.

### 7.3.4 Project chartering

When asked about the vision or mission of the DAO, it reminded the interviewees that they did not have one yet and that they should start writing the mission and vision statement. The document will lay out about five core principles that SecureSECO should be doing and adhere to. If the DAO deviates from this, the committee of full professors will have the power to unplug the DAO.

This will be a committee consisting of 10 members from two communities in the Netherlands. They are the Community of Full Professors in Software Engineering and Community of Full Professors in Cyber Security. These committee members are prohibited to become members of the DAO. The committee will have the power to unplug the DAO. Unplugging the DAO means that the DAO is abandoned, leaving the foundation in place and all the funds go back to the foundation account. The foundation can then reinvent the DAO to make it work again. When discussing this further, the interviewees showed doubt if this committee with unplugging power would still be necessary if there would be a multi-signature wallet.

When asked about the process for determining the release plans and project roadmaps. The interviewees replied it is very ad hoc. Any member can currently propose a feature, but ultimately it is mostly the primary researcher, who is also providing most of the funding for the DAO, who decides. In the future, when there are more money flows, this would be done through the DAO and for instance, Gitcoin, a platform to connect builders to OSS projects and fund them.

### 7.3.5 Incentives

The project intents for development in the future, to be mostly done through bounties on platforms such as freelancer.com or Gitcoin. Currently a scientific programmer has been acquired who will be contributing towards the software as well. However, development efforts will mainly be incentivized through bounties. Currently the development efforts are still limited.

Regarding the intrinsic and extrinsic motivations of participants in the DAO. The primary intrinsic motivation is to make the worldwide software ecosystem a safer place. Additionally this is an academic undertaking that utilizes an emperical software engineering research approach. Extrinsically, participants will be able to gain credits, thus money, for contributing resources, i.e., credits can be received as a reward for mining. And people want to gain influence to increase the rating of their software products.

The interviewees expressed that they do not want to introduce a token and jokingly said that they intend to use the euro token. It would require 50 lawyers to launch a token. Those expenses are better put towards securing the worldwide software ecosystem, stated one of the interviewees. A reputation model, however, will be used in the governance of the DAO, as was discussed earlier in the decision making section. Reputation can be earned in a meritocratic manner, by active participation in the DAO or by mining for the system. The only utility of the reputation is that it grants governance rights. There was a short consideration whether the DAO or the committee would be able to remove reputation. However, it remained unclear how such a mechanism would work. Instead of removing reputation an inflationary mechanism, that would deflate the value of reputation over time, was brought up as well. However, no further decisions were made here.

### 7.3.6 Community management

When discussing what would attract new members, the interviewees brought up that the primary reason would be the value of the data. If people want access to the SearchSECO or TrutSECO data, they will have to pay for it or become an active member, provide data themselves and receive credits to pay for the data again. The interviewees expect software engineer researchers and large companies to be interested in the data. When asked about how a community could form themselves around the project, the interviewees agreed that they needed a public chat. Formally becoming a member involves a KYC process. However, during the part in which decision making was discussed, KYC was only supposed to be a requirement for submitting a proposal as was later again confirmed by another interviewee. When asked what constitutes being a member, the interviewees replied: *"It basically gives you access to the data, without having to pay for it with money. You have to pay for it with your own data and resources."* From this we can conclude that membership constitutes having governance rights and that can only be earned on a meritocratic basis.

When asked if members needed to undergo a vetting process, proving their knowledge, technical competences or alignment with the project. The interviewees answered that they could ask members to agree to the charter. Regarding verification of the identity of the members, there will be a verification of a GitHub account and a KYC procedure for members that want to submit a proposal. Regarding conflict resolution, after some discussion, it was concluded that it was currently not needed and would be thought of when the need arises.

### 7.3.7 Software development processes

When asked how development task responsibilities would be distributed, the interviewees replied: *"I don't think they're really distributed. I think it's carrots, so if somebody wants to work for carrots. We pay them in carrots. Voor niets gaat de zon op, as we say in Dutch, so nothing is free in life. And if somebody wants to volunteer for the project. And do contributions, great, awesome. If it doesn't happen, it doesn't happen."* Regarding code acceptance, any contribution is currently welcome. The project is not yet in a stage where these procedures have been established. However, the interviewees do note, that pull-requests should be reviewed and if those contain a large feature addition or major changes, it should be voted on. Regarding release procedures, there is nothing defined there.

### 7.3.8 Summarizing remarks

As has become clear in the interview, the SecureSECO DAO has not been formalized yet. Many governance decisions were still ideas, and were being discussed. As such, this interview was more of an exercise, learning about the governance considerations in a DAO, and less of establishing the governance model as is, as was the case with the other case studies. The case study reminded the interviewees that some aspects, such as the mission/vision statement, had to be addressed.

To summarize the main governance ideas from this interview; the DAO is to be heavily intertwined with the foundation. A committee, consisting of members of the Community of Full Professors in Software Engineering and the Community of Full Professors in Cyber Security will hold a certain controlling power, that ensures that the DAO does not deviate from its intended purpose. A prominent fear here, is that an attacking group could gain controlling power. The attack vector of main concern here is the sybil attack. The decision making will be occur through a reputation based voting, as it should be a meritoctatic system. However, centralizing tendencies in the governance is another concern. The interviewees don't want participants to be able to gain disproportionate influence, also in regards of new entrants. Therefore there are ideas such as hard capping voting power at 10%, burning reputation when its used in voting or inflationary mechanisms.

## 7.4 Token Engineering Commons

The purpose of the Token Engineering Commons(TEC) is to *"advance token engineering"*. They fund open source software projects, research and education that relates to token engineering. It is called a commons as they consider token engineering to be public good. The Token Engineering Commons started around July 2020 when they started working on the cultural build. The cultural build is the social foundation of the DAO and is formed around the 8 design principles of Elinor Ostrom's Governing the Commons (*The Cultural Build*). The DAO then went on to a period of building and to finally launch the official TEC token in January 2022. The process of launching the token and formalizing the DAO, was called the Hatch. At the time of the Hatch, the DAO had 271 members. These are the people who had received praise from the praise system.

The TEC was included as a case study, primarily, as they are a larger DAO with a mature governance system. Additionally they are also involved in the field of token engineering, which to an extent involves software engineering and incentive design. Therefore they were deemed as an interesting case study that could also provide knowledgeable feedback on DAO governance.

The interview was conducted with two members of the Stewards Working Group, who both had considerable knowledge of the history and operations of the DAO. The interview was conducted over a 2-hour and 1-hour interview as there was much to discuss. This resulted in a detailed overview of the governance model of the TEC and its many governance aspects and considerations.

During the interview the interviewees show how important the culture is to their DAO. How many governance aspects are consciously build around the cultural build. And how the cultural build forms the basis for their DAO to be a sustainable commons in the form of a DAO.

The TEC uses 1hive Gardens as their DAO platform, as the Gardens platform was the first to support conviction voting. They have highly customized their Garden template to a commons type and introduced the augmented bonding curve (ABC). In addition to the gardens, they also use Snapshot and Tokenlog for a part of their governance. As multiple governance processes, tools and voting systems are utilized, they have named it polycentric governance. The DAO runs on the xDai blockchain. For their communications, they have Discord, Telegram, a forum, Twitter and Medium. Coordination occurs through GitHub with ZenHub as a management layer on top.

Figure 7.4 shows the governance model of the TEC as a result of the case study. This section further reports on the TEC case study and is structured according to the governance dimensions of the framework.

### 7.4.1 Legal Foundation

The TEC DAO is not represented by a legal entity or legal wrapper. However, the Commons Stack, the organization from which the TEC was started, is represented by a Swiss foundation. This Commons Stack Association, has a *"slush fund that provides up to 10,000 Swiss francs in legal defense for anyone participating in good faith in the TEC, who find themselves charged with something for participating in the TEC"*. The TEC themselves do create and release software, according to the interviewee these are released under GPLv3.

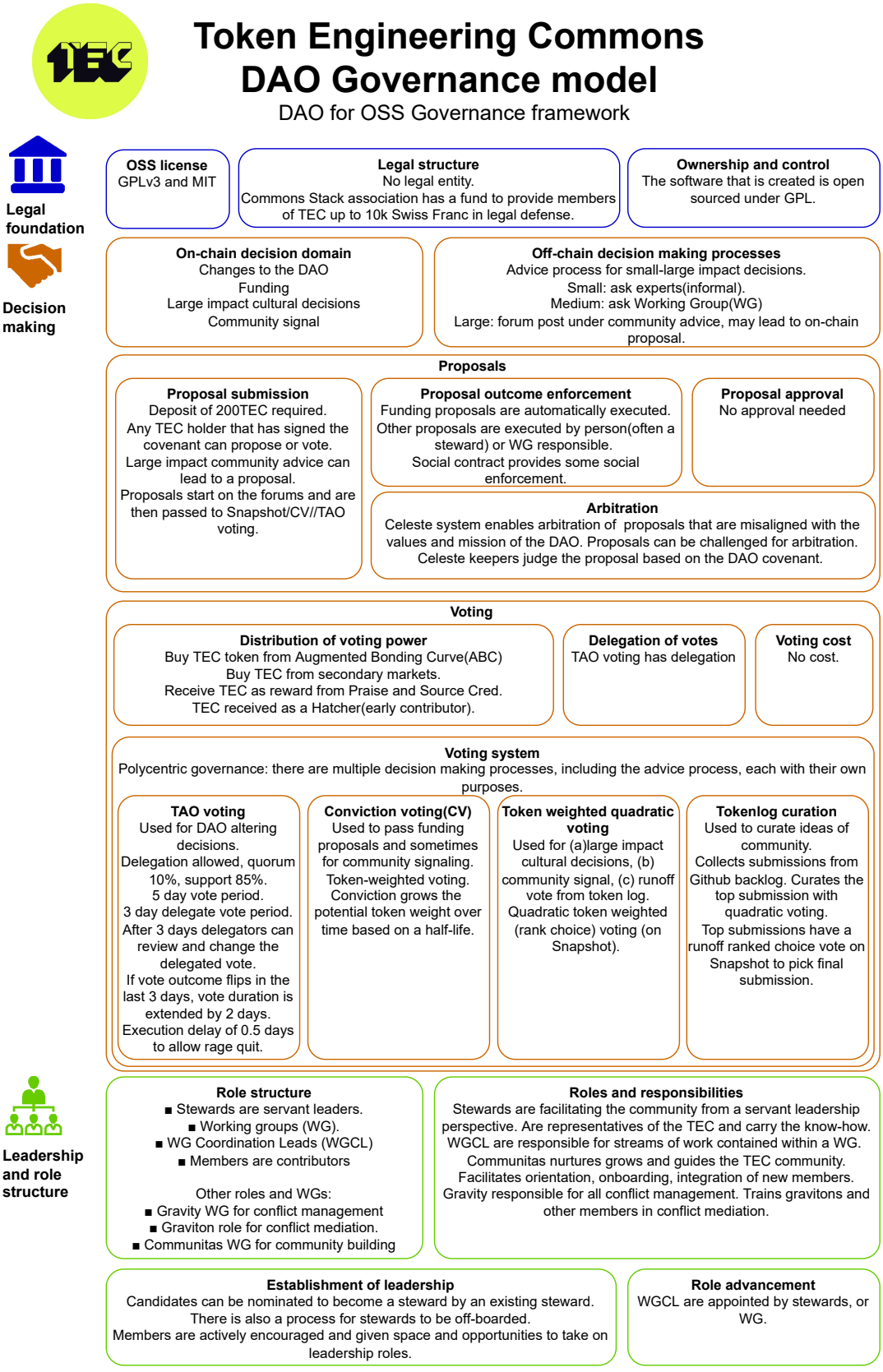


FIGURE 7.4: Token Engineering Commons DAO for OSS Governance model

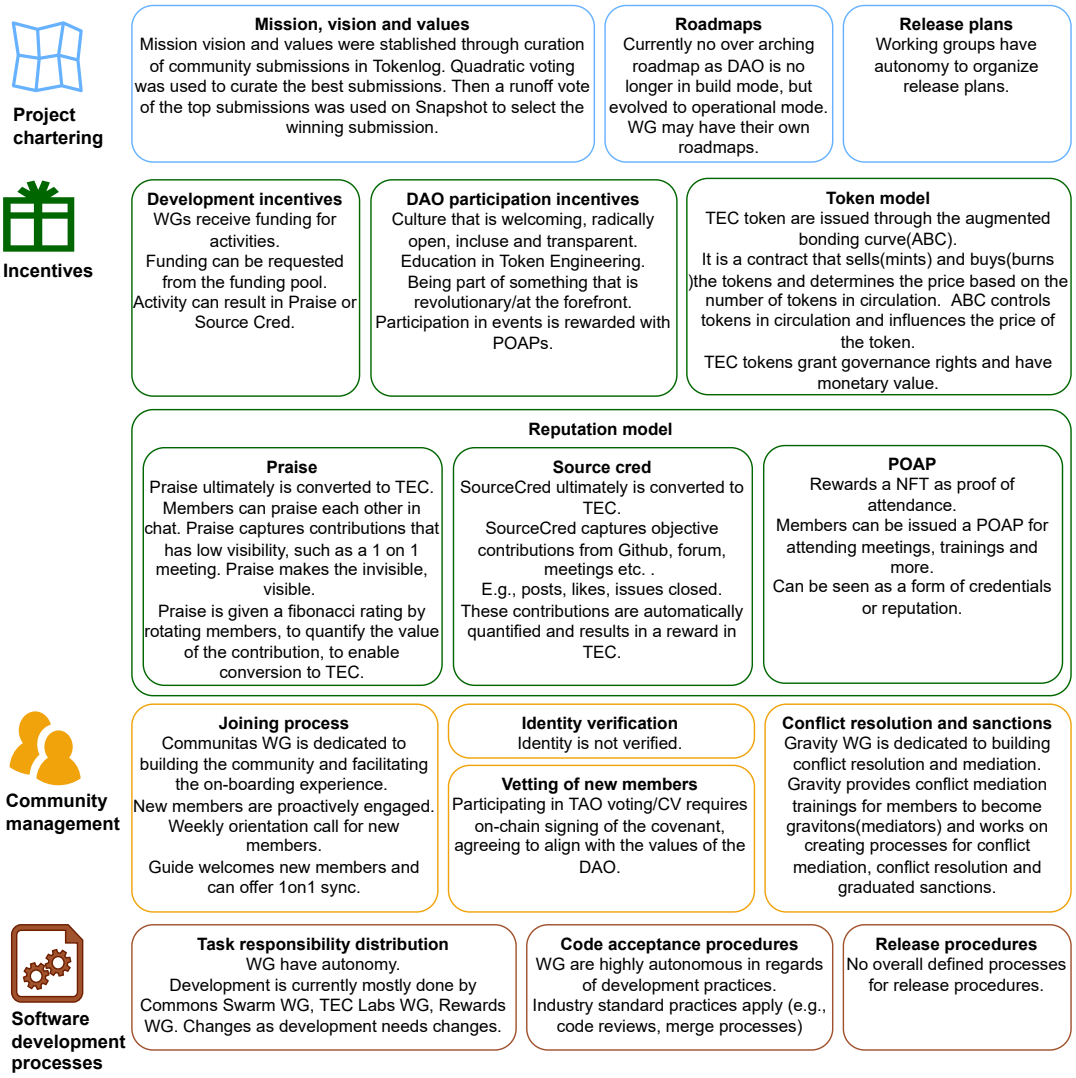


FIGURE 7.4: Token Engineering Commons DAO for OSS Governance model

### 7.4.2 Decision making

The TEC DAO has multiple processes defined for decision making. For this reason they call their system polycentric governance. One of the interviewee noted: *"we call it the polycentric governance because all of these modules are decision making systems, not necessarily voting systems. Most of them are voting systems, but [also] decision making processes"*. It consists of the advice process for off-chain decision making. As for on-chain decision making, there are multiple tools and systems. The Gardens facilitates conviction voting and TAO voting and additionally Snapshot and Tokenlog are used. Each system has their own specific purpose. The off-chain decision making processes have been formalized through the advice process. It consists of small to large impact decisions.

Advice process:

- Small impact decision: Ask an expert.
- Medium impact decision: Seek advice from a working group.

- Large impact decision: it's most likely that the whole community will be affected more than a large group. For this, you post on the forum under advice process. Sometimes, it can be solved, and sometimes it leads to a proposal, especially if it needs funding.

The Snapshot system has three use cases: *"large impact cultural decisions, community signal, to understand in what direction to go and runoff vote from token log"*. As one interviewee explained, there are *"a lot of other things that the decision is not so easy, that it would be great to have a vote that still doesn't have to ignite anything on-chain or to send funds to anyone, but still has an important cultural component"*. For example, the covenant was voted on through Snapshot. It allows the community to signal their agreement with the proposed covenant. This decision does not have any direct or tangible effect. Another example given by one of the interviewees is the decision for the TEC to do an initial buy of the TEC tokens right after the token launch. This allows the TEC to buy tokens at the lowest price possible, using its own funds. The voting system that is used on snapshot is quadratic token weighted voting.

Token log is a curation tool as it ranks issues on GitHub. It allows a community to vote on the importance of issues using quadratic ranked choice voting. Thus curating priority list of issues. The TEC has used Tokenlog to curate community submissions for their mission, vision and values, after which a runoff vote of the top submissions was held on Snapshot.

Conviction voting on the Gardens platform, is mainly used to decide on funding proposals. These proposals can request money from common pool. In conviction voting, voters do not vote yes or no. Instead they support a certain funding proposal by allocating and locking an amount of their tokens for a certain time. As time passes and the tokens are locked, their support and thus conviction grows. In the TEC implementation, a vote has a conviction growth. It represents the amount of time it takes for a vote to reach 50% of its potential voting power. With a conviction growth time of 3 days, a vote allocation of 100 tokens, would result in a conviction of 50 after 3 days. After 6 days, it would gain an additional 50% of the remaining potential conviction, resulting in a total conviction of 75 (Laurenluz, 2021). Currently conviction growth is set to 7 days. Conviction voting is a system in which voting power consists of a combination of the amount of tokens and the amount of time that those tokens are allocated. Tokens that are used to support one proposal, can not be used to support another. A funding proposal is passed after it has gained enough conviction to reach a certain threshold. This threshold is determined by the amount of funds that are requested. The minimum conviction is set to 4.0%, i.e., any funding proposal requires 4.0% of the actively voting tokens to pass. The spending limit is set to 11.0%, i.e., a single proposal can request a maximum of 11.0% of the common pool (Bends, 2021).

TAO voting is the voting system that is used for proposals that alter any parts of the DAO. E.g, smart contracts or altering or stopping the ABC. According to the interviewees TAO voting shares the Gardens platform and interface. In TAO voting, voters have the ability to delegate their votes and review the vote that is cast by the delegate. The current parameters of TAO voting are set to a vote duration of 5 days, during which voters can vote on the proposal. Delegates, have 3 days to use their delegated voting power, to vote on a proposal. After these 3 days delegators are able to review the delegated vote, and may change it. If the vote outcome changes during the last 3 days, the voting period will be extended by 2 days. After the vote

has passed, an execution delay of 0.5 days, gives any member who disagrees, the opportunity to rage quit (Bends, 2021). Rage quit refers to exiting the DAO and selling all tokens. One of the interviewees stated, regarding the voting duration: *"It's important that it's longer than in other types of voting just because it's like God Mode, it can change anything in the DAO"*. The TAO voting requires a quorum of 10% and a support of 85% for a proposal to be accepted.

Submitting a Gardens proposal requires a deposit of 200 TEC. Proposals do not require approval. Voting power can be acquired with TEC tokens. The tokens can be received through the reward system, bought through the ABC or bought on secondary markets. Hatchers, members who have contributed to the DAO before the official launch, received a one time reward in TEC for their work prior to the official launch.

Regarding enforcement, funding proposals are automatically executed once they receive their required support. With TAO voting, changing things, such as permissions, would require a person to execute the proposal. According to an interviewee, the community would vote to allow a certain person or a working group (WG) to execute the change. In the case of the initial buy of the TEC tokens for the DAO, according to the interviewee *"that was one of the Stewards who just took on that responsibility to do that"*. And as a result of the transparent nature of the TEC DAO, *"it's sort of very easy to see that, that work got done"*.

A proposal that is created in the Garden can be challenged through the Celeste arbitration system. As explained by one interviewee; Celeste *"is an arbitration tool for if a proposal is misaligned with the value or the mission of the the DAO, then people can challenge that proposal using Celeste"*. By staking a certain amount of Honey and TEC, a person can become a Celeste judge. A challenged proposal is only judged on its alignment with with the covenant. When a proposal is judged, the voting period freezes.

### 7.4.3 Leadership and role structure

All DAO members are a contributor, even if they hold other roles or responsibilites. The TEC DAO currently consists of 12 working groups (WG). The primary representatives and facilitators of the DAO are the Stewards. In addition to the Stewards, there are Working Group Coordination Leads(WGCL) who support coordination of the WGs. There are several WGs that have a focus on facilitating the DAO internally, while others are advancing projects of the DAO.

The Stewards are the informal leaders of the TEC. As one of the interviewee explains; *"I think it's something culturally that we've bumped up against because we actually don't want the Stewards to be seen as the leaders to tell people what to do and what to work on"*. This is reflected by how one of the characteristics of a Steward is to be a *servant leader*. The other two traits are to be active and present, and in the know. From a cultural perspective, the TEC sees the Stewards as *"people who are carrying the knowledge, have experience and know how things get done"*. One interviewee provided the analogy of the *"Stewards being the connectors of multiple fractals"*.

The Steward role can be obtained by nomination by another Steward. If the candidate accepts the position, they are onboarded through an onboarding process. The TEC has also defined an offboarding process. When they were in the process of proposing funding for the Stewards, as a compensation, they realized they needed a well justified process for offboarding. As it would not be fair to compensate inactive Stewards equally to those who are active. The offboarding process also makes it easy for a

Steward to offboard themselves. As one interviewee explained: *"It made things so much more clear ... that there is an expectation. As well as a possibility to exit if it's no longer a role you feel like you want to energize".*

Although the interviewees shared that the TEC is non hierarchical, they wanted to express that they are pro leadership. Meaning that anyone who wants to become a leader, is given the space to do so. As explained by one of the interviewees: *"we encourage that a lot and offer a lot of guidance for people to feel comfortable to become leaders and I think this is an important understanding too, that without support like a democracy can only exist if there is intentional space holding and opening up the space because. It's very easy to become intimidated by an overload of information and by people that you don't know, so we can't expect that people would just naturally jump into a leadership role".*

The working groups as explained by one of the interviewees, is a group that has an objective that is mostly independent from the other working groups. It is its own workstream and they primarily focus on achieving that. From a traditional organizational perspective, *"they're different divisions".* Some working groups will have a WGCL in addition to a Steward. The WGCL are primarily tasked with the organizational detail of the WG. They are appointed by a Steward or by the WG.

In addition to this structure, there is the Gravity WG. They focus on conflict management in the DAO. They have created Graviton training courses, which allow members to become Gravitons, i.e., conflict mediators. These courses are around 8 to 10 weeks and cover topics such as nonviolent communication, mediation, role playing and leadership. From these trainings the Graviton or conflict mediator role emerges in the DAO. *"The idea is not just to have this one working group that can respond immediately when there's a conflict".* The interviewees shared that the Graviton trainings were very successful as conflicts within DAOs happens a lot. And *"many DAOs don't know how to handle conflict and don't have a way to address it".* According to the interviewees other DAOs have requested for gravity to become involved in their DAO.

### 7.4.4 Project Chartering

The TEC has defined a mission, vision and values (*Mission, Vision and Values*). During the interview, the interviewees shared the process to determine the mission, vision and values of the DAO. Initially they held a miro session with many token engineers. However, they found it to be a *"clunky process"* as they did not have a defined decision making process to determine the mission, vision and values. As a result they decided that they first needed to create this process.

They used Tokenlog for this process and they worked with Tokenlog to introduce quadratic voting in the tool. As described on the Tokenlog GitHub page, Tokenlog is "a governance tool to create token-weighted backlogs. It allows projects to continuously gather feedback from their token holders in order to help plan and prioritize their work. It allows token holders to actively signal which items matter to them rather than just vote on single proposals" (*WSLYVH/tokenlog: Token-weighted backlog(s)*). Using Tokenlog submissions for mission, vision and values were gathered from the community. A submission needed to consist of all three, for consistency. People were also allowed to fork submissions and submit a modified version. Tokenlog was used to curate the top submissions. The top submissions were then selected for a runoff vote on Snapshot, to decide on the final mission vision and values statements.

Using this process, the TEC was able to curate the ideas of all community members and actively involve the community members in this process.

Regarding roadmaps and release plans, the interviewees shared that they currently don't have an overarching umbrella roadmap. During the time until the launch of the DAO, they had roadmaps as they were building the DAO. Currently the DAO is more in operational mode. One interviewee shared that they think it would be ideal to create a new roadmap. As the interviewee worded that they are currently mostly reacting to the context that they're in, and the context keeps changing. Despite that there's no overarching roadmap, some WGs have their own roadmaps or are forming one. They have the autonomy to determine their roadmaps. As the interviewee stated: *"Individual working groups, where it makes sense for them to have a road map will have a road map. But not all of them will anymore."*

### 7.4.5 Incentives

During the interview, the incentives for development efforts were not specifically discussed. However, during interview it became clear that the Commons Swarm WG does most development of the DAO. As one of the interviewees explains: *"The people that have actively developed code up until now has mostly been the commons swarm, which is a working group in the TEC, but it's really a collaboration between commons stack and one hive"*. Additionally there are other WGs that develop code as well, such as the Rewards WG. The TEC labs WG was mentioned as creating models and simulations. One interviewee also disclosed that the Commons Swarm and Parameters WGs are being retired now, as they have achieved their goal. During the interview, it also became clear that the WGs receive their individual funding from the DAO. From this we can surmise that development incentives includes funding through WGs. Additionally contributions are logged through the SourceCred and Praise systems. Through these systems, contributions translate to a reward in TEC.

One of the main motivations for people to contribute to the DAO appears to be the open culture. As one interviewee describes it, there's a particularly unique culture in the TEC, which one of the motivations for participation. The interviewee describes the way the organization is organized as *"something new"*. Together with the culture that is *"welcoming, radically open, inclusive, transparent"*, many community members are attracted to these factors. Another reason mentioned by the interviewees is the feeling of being part of a something that is revolutionary and the feeling of being at the forefront of something.

Educational incentives is another motivation for people to contribute to the DAO. As the mission of the DAO is to further the field of token engineering. According to an interviewee, the DAO provides a great learning opportunity and many have learned so much that they would be well equipped in this field for a more traditional job in crypto.

Another incentive for people to contribute are the reward system that uses SourceCred and Praise. Currently a dashboard is being built for the reward system. It rewards members for their contributions that are captured through the SourceCred and Praise systems. SourceCred captures the objective contributions, such as likes, posts on the forum, time in meetings or closing GitHub Issues. *"All of these things that don't need a human giving value to them."* Set parameters are defined on how each of these are valued. These contributions are then automatically quantified for each member. The Praise system in contrast, is setup to identify hidden or invisible work. Contributions

that have a more subjective value. The interviewees gave the example that nobody in the DAO would know about the case study interview that we were having. It could not be rewarded, unless the participants of the interview would praise each other. To demonstrate, the interviewee send a message in Discord: *"!praise @JosephS for the long 2-hour discussion with [name of interviewee] and myself about governance in the TEC for his thesis project!"*. The praise system registers such messages that are started with !praise. During a quantification process, the registered praises are regularly given an arbitrary value by rotating members. These members are called Quantifiers. Together with SourceCred, these systems capture the subjective and objective contributions of community members. In turn these SourceCred and Praise scores determine how rewards(TEC tokens) are distributed between the people that have received SourceCred or Praise.

In addition to the SourceCred and Praise systems, the TEC also utilizes the Proof of Attendance Protocol (POAP). POAPs are NFTs that members may receive as sort of *"badges of accomplishments"*. These are NFTs that are issued to the blockchain address of a certain person and can be seen in a dashboard. One of the interviewees showed that they had different POAPS; one for being a TEC Steward in 2021, one for being a Hatcher, one for attending a *params party*, but also individual badges for completing each of the Graviton courses. As such, these POAPs can serve as credentials as it shows a proof that someone has acquired a skill. In a way it is also a measure of reputation. One interviewee also stated that they are considering methods to use POAPs to incentivize participation in the onboarding experience. Such as "do a forum post and you get a POAP". According to the interviewee this could be used to incentivize engagement and participation.

Regarding the token model, as discussed previously, the token is used as a reward for DAO members. It holds monetary value and provides the holder with governance rights. Previously the augmented bonding(ABC) curve was mentioned, but not explained. In this part the ABC is explained as it is part of the token model. Essentially the ABC is the smart contract that regulates the tokens in circulation and highly influences the price of the token. The TEC tokens do not have a fixed amount of tokens in circulation, additionally it cannot be freely minted. Instead, the TEC tokens can be bought from the ABC and in return, sold to the ABC. Tokens can be bought by sending an amount of wxDAI tokens to the contract address. wxDAI is essentially a stable coin, 1 wxDAI roughly equals 1 US Dollar. In return, the ABC will mint new TEC tokens, and send those to the address from which it received wxDAI. The ABC determines the price of the TEC token, based on the amount of tokens that it has already minted. Logically, the more tokens it mints the higher the price of the token will be. This represents the curve that the price of the token is bonded to. TEC tokens can also be returned and sold to the contract, upon which it will burn the tokens and return wxDAI, that it had previously received when selling tokens. Additionally it will also lower the price of the tokens, as there are now fewer tokens in circulation. A second mechanism of the ABC it takes a tribute. When someone buys or sells TEC tokens, it takes a percentage of the wxDAI tokens from the buy or sale and sends it towards the Common pool treasury. The funds in the Common pool can be used by the TEC for funding. TEC can also be traded on secondary markets which won't influence the price set by the ABC. However, the ABC influences the price at the secondary markets, as tokens can always be sold or bought at the price that is set by the ABC. This mechanism theoretically ensures infinite liquidity of the token, as the token can always be bought and sold (Natesuits, 2021).

### 7.4.6 Community management

One almost existential question in this section here is what constitutes being a member, before it can be answered how a person becomes a member. In the TEC technically, *"if you buy tokens, you're part of the DAO"*. One interviewee suggests here that the DAO and the active community are two different things. As a person can be a token holder, without participating in the DAO, while others may be active without holding any tokens. The interviewee states here that there is no formal process for a new member to join the DAO. The DAO is open to anyone and all *"meetings are open to anyone"*. Anyone can buy tokens. The other interviewee offered the suggestion that anyone that received Praise, can be considered a member.

Despite the fact that there is no formal process that new members go through to join the DAO, the DAO has the Communitas WG, who are tasked with facilitating the community and welcoming and onboarding new members. As one interviewee explained: *"their main objectives are to create social cohesion in the existing community"*. The Communitas WG has a role, called guides, to welcome new members. Every week there's an orientation call and a community call. People who join the discord server are invited to join the orientation call and are invited to have a *"one on one sync with one of the guides"*. Another practice that was shared, in regards to new members, is that when new members join a call, they are actively included. It may be intimidating for them to speak in an unknown environment. Therefore they have introduced the practice to acknowledge the presence of someone new, ask them to introduce themselves and to proactively give them space to participate in the call.

New members don't have to prove their knowledge, technical competences or alignment with the values of the project. However, when joining the Discord server, a bot will ask you to agree with certain things. Additionally, when token holders want to participate in the voting in the Gardens, they have to sign the covenant through an on-chain transaction. They can only allocate their tokens towards votes when they have signed the covenant. In this way members are asked for their alignment with the values of the DAO. The identity of the members is, according to the interviewees, intentionally not verified.

Regarding conflict resolution, as discussed earlier, the Gravity working group is tasked with this aspect of the DAO. They offer conflict mediation in case of conflict, provide Graviton training courses for people to become Gravitons, or for member that are simply interested. These trainings are around 8 to 10 weeks each, and cover topics such as nonviolent communication, mediation, role playing, leadership. After completing a training, participants are awarded a POAP that proofs that they have completed the training. In their experience, the Gravity WG has been very succesful as many DAOs experience conflicts. According to the interviewees, other DAOs have requested Gravity to become involved in their DAOs. In addition to this work, the WG is currently working on defining graduated sanctions.

### 7.4.7 Software development processes

According to the interviewees there are several WGs that do software development. Some WGs that were mentioned are the Commons Swarm WG, the Rewards WG and TEC Labs WG. The WGs are given a high level of autonomy. The WGs have a GitHub repository for allocating work to people. According one interviewee, the WGs mostly follow standard procedures in software development, such as having a code reviewer or a merge process. As the interviewee explained: *"I've seen a few different*

*groups who use what you would expect"*. However, there's not anything overall defined from the DAO in regards of software development processes.

### 7.4.8 Summarizing remarks

It is evident that the culture, cultural build, and Ostroms 8 principles, are at the foundation of the TEC DAO. The build and principles are encountered in many of the governance dimensions that were discussed in the interview. The DAO aims for a culture that is radically open, inclusive and transparent. It is noteable how various WGs are specifically tasked with internal governance aspects such as focusing on handling and preventing conflicts or facilitating the community. Noticeably the DAO also has an arbitration mechanism that is able to overrule proposals that are not in line with the charter of the DAO. Essentially it is a human control mechanism that limits the autonomy of the DAO. The combination of SourceCred and Praise to capture subjective and objective contributions. Through Praise and SourceCred, DAO members are rewarded for their contributions in TEC tokens. The leadership form also highly stems from the culture of the DAO, which is especially reflected in the servant leadership ideal.

During the interview, we also discussed what constitutes being a DAO. When does a DAO start existing? Is it when a token is issued, or does the DAO already start existing *"when there is a community building the technical and cultural builds to arrive at the token issuance"*. The interviewees also noted that there was a building phase, in which they were focused on building the DAO, and how they have now arrived at an operational phase. Often they were building the tools that they needed as the tools did not exist. An analogy offered by one of the interviewees as a comment to their building phase: *"building the airplane as you jump off a cliff"*. As many things that they were doing haven't been done before.

Furthermore, one of the interviewees shared a thought on whether it makes sense to separate on-chain and off-chain processes. *"I've been thinking more and more about how much importance kind of we give on-chain in our narratives and maybe it's just the execution type. What would be other ways to describe decision making if it didn't have that division and how does that affect the way we relate with governance? Do we find things that are off chain less important?"*

This DAO has been consciously building their governance and the tools needed to support it. Instead of focusing on the technological possibilities that a DAO offers, they started from a social foundation through their cultural build.

## 7.5 Framework evaluation

This section bundles the feedback that was gathered from the four case studies. Table 7.1 shows a summary of the evaluations that were gathered. In the following sections each evaluation criterion is highlighted.

| | dOrg | Aragon | SecureSECO | Token Engineering Commons |
|---|---|---|---|---|
| **New insights from the framework** | No new insights, but it was an insight that dOrg has a well covered governance model. | A good way of structuring things. Useful at the higher level governance dimensions. Some governance aspects, the interviewee had not previously actively thought about. | Understanding what aspect are missing or how far some aspects have progressed. | No new insights, but did provide clarity. |
| **Usefulness of the framework** | Self-evaluation tool. To evaluate and research other DAOs. To identify trends, see what works and what doesn't. | Tally of completeness | As a maturity model or checklist. | (I) Useful for analysis to compare DAOs. (II) Help in the onboarding process. (III) Help people to understand DAO governance structures. (IV) Help new DAOs as a checklist of governance aspects. |
| **When to use the framework in a DAO's lifecycle.** | When the DAO is starting or as a midpoint evaluation. | Progressive decentralization stage | A yearly assessment. | Something to track the evolution of the DAO during the growth of the DAO. Seeing the governance aspects as checkboxes. |
| **Completeness and suggestions** | Not missing anything, framework seems high-level enough to be applicable to different kinds of DAOs. | The framework is complete, no gaping holes. | Perhaps the model can show differentiation between philosophical and practical governance aspects. | Suggestion to include some of Elinor Ostroms 8 principles, especially monitoring. Additionally the framework is missing the aspect of governing finances. |

Table 7.1: Evaluation overview

### 7.5.1 New insights

The first question in the evaluation of the framework, is whether the framework and the case study had provided the interviewees with any new insights. The TEC and dOrg interviewees responded that it did not really provide any new insights regarding DAO Governance.

The dOrg interviewee stated that it felt like they were covering the governance aspects pretty well. He explained that *"sometimes it seems being in a collective, things are a little messy sometimes"*. The case study made the interviewee realize that they have a well defined and complete governance model. The case study and framework have indeed shown that they have a well covered governance model. The interviewee found this to be an insight that was gained from the case study.

One TEC interviewee responded that it provided clarity, mapping out the governance aspects *"nicely"*. The other interviewee found it to be well organized and that a governance overview as a result of the framework, could help in the onboarding process.

The Aragon interviewee found the framework *"a good way of structuring things"*. The interviewee noted that they did not have much knowledge on the project chartering

and software development process aspects. The interviewee explained that these are aspect that he hadn't actively thought about.

For SecureSECO, the case study interview resulted in one of the interviewees learning about multi-signature wallets. This was a result of the case study interview, rather than the framework. However, the process of going through the framework allowed for sharing this knowledge. The framework mainly triggered the interviewees to understand what aspects of governance are missing, or how far they have progressed. For example, it made the interviewee realize that they should start writing the project charter. Regarding this, the interviewee commented: *"I mean of course I knew that it [writing the charter] would have to happen at some point, but this apparently, now it feels like a good time"*. Additionally it made the interviewees think more deeply about governance mechanisms and theorize on how they would work.

From the case studies and created governance overviews, we can see that dOrg and the TEC have the most complete governance model. As such they were also the ones to state that the model did not really provide any new insights in regards of learning about DAO governance. Here we may conclude that DAOs with a mature and complete governance model have not learned anything new in the subject of DAO governance.

### 7.5.2 Usefulness and utility

The second question in the evalution was to determine in what ways the interviewees thought the framework to be useful.

The TEC interviewees suggested multiple ways for the framework to be used.

- (I) It may be used to *"compare and contrast, it provides a framework to be able to compare [different DAOs] on specific points"*. In this way it facilitates analysis.
- (II) It can be used to help in the onboarding process, provide clarity on the governance of the DAO to the community members.
- (III) *"It helps people who are not used to how DAOs are structured see how DAOs are structured"*. It would help them to understand how governance in a DAO is structured.
- (IV) It can be helpful for DAOs that are starting, providing them with a checklist of governance aspects that they should consider.

The dOrg interviewee shared that the framework is useful. He thought; "it's a great way to review your DAO basis". It can be used as self-evaluation for DAOs to *"to see where they're at"*, i.e., how mature their governance model is and what aspects have been covered and which haven't. In addition to self-evaluation the interviewee suggested it could in the same way be used for others to evaluate DAOs, *"see what are the trends, what works, what doesn't"*.

The Aragon interviewee also found the framework to be useful. More specifically, the interviewee found the framework to be most useful at the dimensional level, e.g., proposals, voting, leadership and role structure etc. For the interviewee, the framework helps keep a tally of completeness. It helps the interviewee make a conscious choice on handling the governance aspects. I.e., to decide for each governance aspect, whether it is something they have considered, decided to do or not to do, decided to do it later or that a governance aspect actually should receive priority. As the

interviewee explained; *"It doesn't mean oh we have to resolve of all those things, but you have to be aware [of the governance considerations]"*.

SecureSECO offered the feedback that the framework is *"super useful"* and can be used as a checklist. As the interviewee commented; *"It's so handy to have it. As there are so many things we didn't really think about yet, or that were mentioned in passing. ... And in that sense I think I'm going to keep this on my desktop somewhere so that I can always go back to it when I'm looking for problems"*. The interviewee also shared that in a way it could be seen as a maturity model.

### 7.5.3 When to use the framework in a DAO lifecycle

The dOrg interviewee responded that it could be used at the beginning, when the DAO is starting and thinking about the governance considerations. The interviewee also shared that it could be used as a midpoint check, to perform an evaluation of the governance of the DAO.

The Aragon interviewee found the framework to be somewhat overwhelming. As such, he responded that the framework should be used fairly late in the life cycle. The interviewee explains that a DAO at the idea stage has to think of many things and focus on other things, instead of focusing on all elements of the governance framework. The interviewee also shared their idea of a DAO life cycle. It starts with a community, that wants to pursue a common goal. The DAO starts when there is an idea, and a community around the idea. A complete DAO is when the DAO has on-chain assets. According to the interviewee a DAO consists of these three elements; common goal, people and on-chain assets. The interviewee argues that the framework should be used when these have been established and the DAO is evolving and thinking about decentralization. The interviewee called this the progressive decentralization stage.

A TEC interviewee replied that the framework could be something that is not just used at a single stage, but can track the growth of a DAO. A DAO could see the governance aspects as checkboxes. The interviewee also suggested that the next step could be to add health measures for each of the governance aspects.

A SecureSECO interviewee responded that the framework should be looked at every year. By assessing governance through the framework regularly, the exercise reminds the DAO of the concerns that arise from the framework. The interviewee shared that they found forming a DAO to be daunting, and shared this analogy; *"I'm more looking at a Mount Everest and thinking: I'm not worried yet about climbing the top. I'm only worried about, you know how do I even get up to a 100 meters"*. However, they did not find it overwhelming and were motivated to work on the DAO.

### 7.5.4 Completeness of the framework and suggestions for changes

The questions for feedback, were split into two questions. Firstly, the interviewees were asked if thought there were any elements of governance that are missing from the framework, or if they thought the framework to be complete. Secondly, they were asked if they had any other suggestions for changes to the framework.

**The Aragon interviewee** thought the framework to be complete. He did not think there were any *"gaping holes"*.

**The dOrg interviewee** thought the framework was not missing anything and had no suggestions for changes. He did note that there are many DAO mechanisms and

many DAOs with different focuses. The framework worked well to capture their governance model as a services DAO. He was unsure if the framework would work for all types of DAOs and if other DAOs may need other questions. However, the interviewee also noted that the framework could be high-level enough to be applicable to different kinds of DAOs.

In response to the feedback, the framework was not meant to capture the governance of all kinds of DAOs as it is focused on OSS DAOs. Through the case studies we see that it captures the governance aspects of the DAOs well. Most of the governance aspects are not specific to OSS DAOs and can generally be applied to all DAOs. A more generic version of this framework could be created, to support all DAOs. However, that would require more research and a different research approach. Moreover, it was not the goal of this study to create a general DAO governance framework. Instead, it approaches DAO governance from the OSS perspective and finds the mechanisms through which DAO governance can be applied in an OSS project context.

**The SecureSECO interviewees** wondered if the framework could somehow differentiate between practical aspects and more philosophical aspects. Additionally they wondered if there weren't some kind of templates of governance configurations. The interviewee wondered if for example, the concept of meritocracy would be able to determine many of the governance aspects.

In response to the feedback, some of the governance aspects in the framework are indeed of a more fundamental nature, while others are more practical. This is especially evident in the parts that deal with software development. The more fundamental governance aspects often also affect practical aspects of the DAO. We believe this distinction not to be clear enough for all aspects and to be significant enough. However, we understand the idea to add another structural layer to the framework. Similarly as the first few versions of the framework contained a distinction of on-chain and off-chain governance considerations, see appendix A. This model was deemed not consistent enough and too specific. As a result, it was later abandoned to create a more abstract version of the framework.

**The TEC interviewees** suggested that some of the 8 principles for managing a commons from Elinor Ostrom, could be added (Ostrom, 1990). Specifically the interviewee mentioned monitoring. To ensure *"congruence between appropriation and provision"*, to keep the DAO in an equilibrium. The other interviewee added that they were missing the aspect of governance of funding. More specifically, considerations such as how are funds governed, how are decisions taken around compensation. The interviewee thought this aspect to be large enough to warrant a specific place in the framework.

In response to the feedback, the literature search criteria did not yield the work of Ostrom, therefore it was not included. We have found that some of the DAO literature did make mention of Ostroms work such as Wang et al. (2019) and El Faqir El Rhazoui (2021). The work of Markus (2007) - who suggested 6 governance dimensions, and whose work underpins this research - also draws from the work of Ostrom. For future work, the framework could be improved by considering the work from Ostrom. Regarding the financial aspect, it is somewhat covered through the decision making and incentives section. The incentive section also contains the token model, which often represents the financial model of a DAO. If the financial model of the DAO were to be added to the framework, it would actually be an overview of the entire DAO, incorporating its business model. This study was focused on DAO

governance from an OSS perspective. Researching the financial aspects of DAOs is not in the scope of this research. However, we recognize it could be a valuable addition to the framework.

# Chapter 8

# Discussion

This study has produced a framework for understanding DAO governance for OSS. It captures various governance aspects and considerations across seven dimensions. The framework was created through a structured and iterative process and was based on existing literature on OSS and DAO governance. In alignment with DSR guidelines, the framework was then evaluated through a multiple case study (Hevner and Chatterjee, 2010). This chapter discusses the findings of this study. It presents an evaluation of the framework, points of discussion found throughout the study, the limitations of the research and future work that emerged during this study. Additionally, it also presents an argument of how this study of DAO governance for OSS differentiates from the Blockchain Governance framework of Pelt et al. (2021), who in part followed a similar approach.

## 8.1 Discussion of framework

For most interviewees, the framework did not provide them with new insights. Overall, they were of the various governance aspects in DAOs. For some interviewees, the framework reminded them of the importance of some of the governance aspects. The interviewees all responded positively as the framework provided clarity and structure to all the various governance aspects of DAOs. The interviewees all thought the framework to be useful and mentioned five different use cases for the framework:

1. The framework can be used to **research and analyze** DAOs. Furthermore, it can be used to compare the DAOs and identify the trends in governance. Enabling researchers to identify what governance mechanisms are used in practice and which are most effective.
2. The framework can be used as a **checklist** for DAOs to track how far their governance has progressed. Using the framework to assess the state of their governance, they can identify and track which governance aspects need addressing.
3. The framework can be used as a **maturity model**.
4. The framework can **educate** people on DAO governance and increase their understanding of DAO governance structures.
5. The governance model of a DAO, as a result of applying the framework, can be used in the **onboarding** process for new members to gain an overview of the governance structure of the DAO.

The interviewees had various opinions on when to use the framework in the life cycle of a DAO. Some thought it would be useful in the early phases of a DAO. A compelling example is the SecureSECO DAO. They are a DAO that is in the process of formalization and they found the framework to be useful. Their opinion was that it should be used every year to be reminded of the importance of all the governance aspects and to be reminded of the considerations involved. The dOrg interviewee thought it good as a midpoint check and at the beginning of a DAO. In contrast, Aragon thought the framework to be too overwhelming for a beginning DAO. Instead, they suggested for it to be used at the *progressive decentralization stage*. Whereas the TEC interviewees thought it to be something that DAOs continuously use to track their governance growth as they continue to build the DAO.

**Arbitration mechanism**
The Aragon and TEC case studies revealed that these two DAOs had a similar arbitration system. The arbitration system allows for proposals to be challenged. DAO members can challenge a proposal, after which impartial judges of the arbitration system judge it. The proposal is judged based on its alignment with the charter of the DAO. This system allows for human intervention in the event that proposals are created that are not in the best interest of the DAO and its members. A DAO that automatically execute payments based on the outcome of a proposal, may risk that funds are stolen through an oversight in the governance system and smart contracts. The Aragon DAO, for example, is very susceptible to a single individual that holds a lot of tokens who pushes proposals through in their favour. Because of the permissionless nature and their low voter participation. In theory such an individual could relatively easily drain the funds of the DAO or execute other harmful decisions for the DAO. They only need to acquire enough tokens. The arbitration system prevents such scenario's. In case of the dOrg DAO, the DAO does not have automatic execution of the funding proposals. Instead the treasury keys are held by the top 7 reputation holders. Similarly to the TEC and Aragon, The SecureSECO DAO, has expressed similar wishes to have a committee that holds a certain power to ensure a proper course of the DAO. The interviewees did not find this aspect to be missing from the model. However, we can conclude that an arbitration mechanism should be considered to be included in the framework.

**Financial layer**
In the TEC interviewee, one interviewee suggested that the model was missing the financial aspect of governance and that the financial aspect is distinct and important enough to be a separate section in the framework. However, the financial model of the DAO was not part of the focus of this study. The study was primarily scoped at governance of the community and governance of the software product and its development. The resulting governance framework, provides an extensive overview of a DAO. Adding the financial aspects would complement and further complete the overview of a DAO. As it was not part of the scope of this study, it provides an excellent opportunity to be included in future work.

## 8.2 Further discussion

**On-chain off-chain debate**
Prior to the case studies, the assumption was made that DAO decision making was achieved through on-chain voting. This was mostly true for many DAOs. However, with high gas prices on the Ethereum blockchain, off-chain voting solutions such as

Snapshot have emerged. Blockchain provides legitimacy to the votes as a public immutable ledger. Snapshot as an off-chain voting solution, provides a measure of legitimacy by storing the votes on ipfs. As such the line that this framework draws between on-chain and off-chain processes becomes less clear. The TEC interviewee shared their thoughts on whether it made sense to focus as much on the differentiation between on-chain and off-chain. The on-chain focus is mostly brought on by the technological possibilities that DAOs and blockchain bring. However, from a purely governance perspective, it may not have the same importance and another division criterion may make more sense.

**DAOs defined and life cycle**

An existential question for DAOs that emerged in multiple interviews is; what constitutes the existence of a DAO? Or when does a DAO start existing? This pertains to the life cycle of a DAO and to how one interprets the definition of a DAO. The definition of a DAO that this research adopts - "A DAO is a blockchain-based system that enables people to coordinate and govern themselves mediated by a set of self-executing rules deployed on a public blockchain and whose governance is decentralised" Hassan and De Filippi, 2021 - does not include the nuances of DAOs forming themselves. As one TEC interviewee asked, when does a DAO start existing? *"Does the existence of a DAO start when a token is issued?"* Or does it start when there is a community building the DAO? The interviewee was of the opinion that the DAO already starts when the community forms. The Aragon interviewee had a similar opinion and shared their view of a DAO life cycle:

> *"The moment you have a discord server or telegram group with a community that wants to pursue a common goal. That is when the DAO starts. So you have the idea, Then you have the community around the idea. This is the moment when you're already sort of a DAO. The moment when you have on-chain assets, that's a complete DAO. It's a common objective, idea, or pursuit, a collection of people and On chain assets. Those three elements are inside the journey of a DAO."* (Aragon interviewee)

Strictly adhering to the definition of a DAO, a DAO is only formed when they have deployed a set of smart contracts that have a function in the governance of the DAO. There has been much debate about the definition of a DAO and many definitions have been proposed (Hassan and De Filippi, 2021). In addition to the definition of a DAO, a defined life cycle and a maturity model may bring further clarity to identifying and categorizing DAOs. As the dOrg interviewee noted; *"Everybody wants to start a DAO, but not everybody wants to actually be decentralized and autonomous. People need to have some way of knowing what kind of DAO are they? How DAO-y are they actually?"*. The interviewee here refers to the fact that many DAOs have been created in the past few years. However, of many DAOs, it remains debatable to what degree they are a DAO, given their level of *decentralization*. In addition to the level of decentralization, the factor of autonomy defines a DAO as well. In the case of dOrg, the DAO has a higher level of decentralization, while the level of autonomy is lower. The autonomous part of the word *DAO*, is represented by the self-executing smart contracts of a DAO. Currently, in practice in DAOs, this aspect is mostly represented by the automatic transfer of funds, after a funding proposal is passed. In the case of dOrg, all proposal outcomes are manually executed by the top 7 reputation holders. The dOrg interviewee shared one explanation, namely that getting automation or the autonomous part is hard and expensive.

A DAO maturity model that incorporates the resulting OSS Governance framework of this study, that additionally defines metrics for DAOs on their level of decentralization and autonomy may result in an even more extensive framework to research and understand DAOs.

## 8.3 Differentiation from the blockchain governance framework

Pelt et al. (2021) have proposed the Blockchain Governance(BG) framework. It consists of questions that are categorized across 6 dimensions and 3 layers. The layers are distinguished by off-chain community, off-chain development and on-chain protocol. They have conducted similar work, by analyzing OSS governance and Blockchain governance to form a governance framework. As the topic of blockchain is closely related to DAOs, this section provides an argument to the differentiation of blockchain governance and DAO governance, and how the DAO for OSS governance framework distinguishes itself from the BG framework.

Firstly, DAO governance and blockchain governance are distinct fields. Whereas indeed, public blockchains are decentralized systems that are to some extent governed decentralized. Especially in the case of Bitcoin this is true. On the Bitcoin network, miners vote on improvement proposals with their mining power and choose whether to adopt the improvement proposal (Hsieh et al., 2018). Furthermore, in the same way that smart contracts are transparent and often open source, Pelt et al. makes the case that many large Blockchain projects are developed and released as OSS. Additionally, DAOs are built on top of blockchain networks and are therefore closely related to blockchain technology. However, this is as far as the similarities go. Blockchain governance does not rely on the autonomous execution of smart contracts. Whereas for DAOs, this is a key property. Van Pelt only mentions smart contracts twice and not in relation to governance. Furthermore, blockchain governance is concerned with governance of the network. Whereas the concept of DAOs can be applied to many organizational contexts. In this research it is applied to the context of OSS projects, which remains broader than blockchain networks.

Secondly, Pelt et al. have analyzed a similar body of OSS governance literature. Most of the references and concepts of OSS governance of Pelt et al. are included in this research as well. However, this study has gone one step further by synthesizing all governance mechanisms into the OSS governance overview in table 4.7.

Thirdly, the DAO for OSS governance framework has a different application context and a higher level of abstraction than then BG framework. The BG framework focuses on the governance of a blockchain network and includes specific aspects that apply to that context. E.g., the BG framework includes aspects such as the consensus mechanism or network participation. Furthermore, the BG framework consists of specific questions across three layers that distinguish between on-chain and off-chain. In DAO governance we found the on-chain and off-chain distinction not clear enough and inconsistent across the dimensions. Therefore this distinction was abandoned.

These three reasons present a case to how the context and application of the two frameworks differs and how the frameworks can not be interchanged. Even though similar work was performed and both frameworks are grounded in the OSS governance literature.

## 8.4 Validity

In this section we discuss the validity of this study and any threats towards it. This discussion denotes the trustworthiness of the results and to what extent the results the results are true are not influenced by the subjective point of view of the researcher. Runeson and Höst (2009) describes four aspects of validity: *construct validity, internal validity, external validity and reliability*. Here we will discuss each of these aspects individually and present threats to its validity.

### 8.4.1 Construct validity

Construct validity refers to the degree to which the study measures what is intended to be measured. This study has resulted in the creation of the DAO for OSS governance framework and an evaluation thereof. The framework aims to bring understanding to the governance models of DAOs. The study adheres to the DSR guidelines and evaluates the framework through four case studies. The process and intermediate results, were documented to support traceability, e.g., the initial version of the framework in appendix A. Furthermore the case studies were conducted by the primary researcher, therefore the interpretations of the case study protocol was constant across the various case studies and any misinterpretations of the questions by the interviewees could be corrected to obtain the intended information.

### 8.4.2 Internal validity

Internal validity is concerned with the extent to which a study demonstrates a causal relationship between a presumed cause and effect. Through the four case studies - in which the framework was used to model the governance model of the participating DAO - the framework was validated for completeness. However, the case studies may not have evaluated the aspects regarding OSS development processes well enough. Most DAOs had little or no defined processes or rules regarding the management of the software and development processes. We identify two possible explanations; firstly, these DAOs were not suitable to evaluate these aspects of the framework. Namely, they were not focused enough on the OSS product development or they were not mature enough to have defined processes there. The second explanation relates to the maturity of DAOs as well but in regards to the maturity of DAOs overall. Perhaps DAOs are too young and currently more focused on building their DAOs and exploring governance mechanisms, that managing the software product and development process, is of a lower priority as they adopt industry standard procedures.

### 8.4.3 External validity

External validity refers to whether the results can be applied to other contexts i.e., generalized. The framework was validated and evaluated through four case studies. To mitigate threats to external validity, we ensured that there was sufficient differentiation in the DAOs that were selected for a case study. The DAOs varied in maturity, maturity in governance, purpose and type. Therefore, this framework has demonstrated its external validity and is generalizable to other OSS product-driven DAOs. Additionally, the variation in the case studies ensured to avoid saturation of the evaluation data. However, in regards to other types of DAOs, as one interviewee pondered, whether this framework would be applicable to other types of DAOs, that serve different purposes, e.g., investment DAOs or protocol DAOs. The interviewee

concluded, that the framework was high-level enough. However, those DAOs extend beyond the scope of this research. To what extent it is applicable to other types of DAOs remains unvalidated. The framework could serve in further research as input for a general DAO governance model.

### 8.4.4 Reliability

Reliability refers to the extent to which the data and analysis that are conducted in a study are dependent on the specific researchers in addition to the degree of decision traceability. This study mitigates the threats to reliability to an extent by utilizing a structured approach and by employing standardized research methods and adhering to their guidelines. This research primarily follows the DSR guidelines. Sourcing the literature was done through a predefined search string with strict inclusion and exclusion criteria. This mitigates inclusion and exclusion bias. Furthermore, the use of Nvivo to extract, codify and group OSS and DAO governance concepts and mechanisms further structured the process of creating the framework and mitigates research bias. Through an iterative process, in line with the DSR process, governance concepts were identified to be included and structured in the framework. This part of the process was to some extent susceptible to research bias. However, artifact design is inherently a creative process (Hevner and Chatterjee, 2010). The threat to research bias is significantly reduced by building on top of the existing literature and using Nvivo to code the encountered governance concepts. Additionally, to support tractability,an intermediate version of the framework is included in appendix A to further document the decision process.

Furthermore, the case study interview protocol was created by the primary researcher to evaluate and validate the framework. The questions there were formulated by the primary researcher and were partly inspired by the created questions in the first iteration of the framework as included in appendix A. The case study protocol was then peer-reviewed by a fellow researcher. The protocol, along with the peer-review improve the validity of the case studies (Runeson and Höst, 2009). These procedures mitigate the threat to reliability as much as possible.

## 8.5 Limitations

Despite the fact that the framework received positive feedback on its usefulness, its ease of use was not validated. The case studies were conducted by the researcher who also created the framework. To evaluate the ease of use of the framework would require further validation.

Furthermore, the governance aspects of the framework regarding software development were not as well validated as the other aspects. The DAOs that were interviewed were not highly involved in the software development processes. In the case studies, these processes were largely left undefined and the development teams mostly had a high level of autonomy to make decisions and create long-term plans. Mostly those development teams do follow industry-standard practices, however, this was not because of the involvement of the DAO. For further validation, ideally, further case studies would be performed with DAOs with a mature governance model, whose main purpose is to organize the development of a single OSS project or product. The field of DAOs is a very young field with many challenges. DAOs may need to mature more and establish good governance practices before they can focus on integrating the software development aspects more explicitly into the DAO.

## 8.6 Future work

The concept of DAOs is incredibly novel and may change how many groups, communities or organizations organize themselves. It presents many opportunities, including new governance mechanisms. Currently, DAOs are developing and testing new methods and systems of governance. There is much work to understand all these developments. At the same time, much research has been done by past philosophers, economists and sociologists whose concepts may be applied to DAOs. In this research, we draw from the research of OSS governance and notice how DAOs may present new opportunities for OSS projects to organize themselves, design new incentive models and even further decentralize the development of OSS. There are two lines of future work that we want to highlight here. The first is further improvement and development of this framework. The second line of work regards further understanding of DAOs. During the case studies, the researchers noticed that there is debate and unclarity of what constitutes a DAO in relation to the many types of DAOs and interpretation of what constitutes a DAOs.

Firstly, during the case studies, one interviewee noticed the lack of a financial dimension to the framework. Furthermore, across the case studies, we noticed that three of the DAOs use or plan for an arbitration or fail-safe mechanism. This may be a prominent enough feature of DAOs, that warrants consideration to be included in the framework. Regarding the financial dimension, it did not emerge in this research, due to the scope of the research. In this framework, it is indirectly covered by aspects of the framework such as the incentives and token model, or in the decision making dimension. In future work, we would recommend further exploration and research of these two aspects for inclusion in the framework.

Secondly, the framework was evaluated as a potential *maturity model, evaluation tool or checklist* for DAOs. This framework was not specifically designed for these purposes. However, it could be further developed to properly support these use cases. Further research could define health metrics, maturity levels and various stages for each of the governance aspects in the framework. DAOs can then be scored on each of the maturity levels and ultimately assessed on their maturity. To illustrate, a DAO could for examlpe be rated on their maturity on conflict resolution and sanctions on the following scale: level 0: no protocols, level 1: loosely defined escalation protocol is in place, level 2: Active conflict mediation and extensive protocols are in place.

Thirdly, more case studies could be conducted of various DAOs using this framework, in order to observe trends in DAO governance and to further validate the framework the OSS aspects of the framework. There are many theoretical voting systems and governance mechanisms that are being designed and discussed in the literature. However, their use is often limited. Therefore, case studies using this framework could be used to study the developments and trends in DAO for OSS governance.

Fourthly, besides the definition of a DAO, we noticed from the case studies that there is a disagreement of what constitutes a DAO or when a community or organization can be recognized as a DAO. Therefore we propose further research into the life cycle of a DAO and to define intermediate phases between when an idea or community forms to an operating DAO with self-executing governance rules.

Moreover, we noticed through the case studies that DAOs have various levels of decentralization and levels of autonomy. Likewise, Hassan and De Filippi (2021) have encountered unclarity in the restrictiveness of the term DAO in regards of the level of

decentralization or autonomity. I.e., what aspects need to be decentralized of a DAO (governance or infrastructre) and what is understood with autonomity (automated or autonomous). Therefore, we propose further studies to research categorizations of DAOs and to define categories that range from centralized to decentralized designs and autonomous to non-autonomous designs. This could result in a matrix model with two dimensions and four categories. I.e., centralized-non-autonomous, decentralized-autonomous, centralized-autonomous, and decentralized-non-autonomous.

Lastly, the case study with the TEC revealed the importance of Ostrom (1990)'s work, *Governing the commons: The evolution of institutions for collective action* in which she presents 8 principles for effective governance of a commons. The concept of a commons aligns with the properties of DAOs. Furthermore, during this study, the researchers have learned that, although DAOs are enabled through technological advancements, DAO governance is a multidisciplinary field consisting of technology, law, sociology, economics and more. As his study draws from prior research of OSS governance and applies it to DAO governance for the governance of OSS projects, the understanding of DAO governance can be further enriched through the lens of these other disciplines.

# Chapter 9

# Conclusion

This study set out to understand DAO governance and how it can be applied for the governance of an OSS project. Throughout this work this study has presented a thorough understanding of OSS governance and compiled the literature in a complete overview of the governance concepts of OSS governance. Furthermore we have researched DAO governance mechanisms and created a framework that combines the aspects of DAO governance and OSS governance to form the DAO for OSS governance framework. Additionally the study made several findings over the course of the case studies. The case studies have also provided insights into the practical governance of DAOs.

This chapter concludes this study and reflects upon the research questions in relation to the results and findings of this research. The main research question of this study is supported by three sub-questions. Hereafter, we reflect upon each of the questions.

**MRQ:** How can DAOs support OSS project governance?

The main research question is answered through the sub-questions. Firstly the sub-questions are answered and reflected upon, after which the main research question is discussed.

**SQ1:** How are OSS projects governed?

A SLR of the existing literature of OSS governance was conducted to answer this question. The SLR provided an understanding of OSS governance. The results of this process are presented in chapter 4. The extensive literature shows various classifications and perspectives of OSS governance. The analysis of the literature has led to the understanding of OSS governance through the (a) **6 governance dimensions**, (b) various **analytical levels**, (c) various **community types** and their governance characteristics and (d) the **motivations** of the community members. Ultimately to answer *SQ1*, table 4.7 was created to present a complete overview of the governance mechanisms found in the literature, structured according to the 6 dimensions of Markus (2007) with the extension of the leadership and decision making dimension, inspired by (De Noni, Ganzaroli, and Orsi, 2013; Tullio and Staples, 2013).

**SQ2:** What governance mechanisms do DAOs provide?

In order to answer this question, a MLR of DAO governance literature was conducted. Chapter 5 serves to answer SQ2. During the MLR the various elements of decision making through proposals and voting were identified. Simple and more complex voting systems were identified such as the one-token-one-vote system or the conviction voting system. Three main categories of governance concepts were identified in the

literature, (I) Decision making, (II) Incentives and (III) community. Various variations to the process of decision making in DAOs were found. Several attributes were identified of these variations. Additionally we can decompose the formal decision making process to (a) the creation and submission of proposals and (b) the subsequent voting of the proposal. In regards of the incentives, for DAOs, the alignment of interests and incentivization of members of the DAO is a large aspect of DAO governance. DAOs offer the opportunity of new mechanisms to incentivize participation. Especially as DAOs orginate from developments in blockchain, there is a large focus on tokens and incentive design. Furthermore, in regards of a decentralized environment, the literature considers the community aspect as well. However, in the literature this aspect has not received as much attention, unlike incentive designs or the voting mechanisms. By analyzing the literature an overview was created of DAO governance mechanisms in table 5.1. This overview is likely not exhaustive, as many governance mechanism can be created in DAOs and new ones are still being developed and tested. However the created overview captures the main mechanisms that are currently used in DAOs and presents a higher level understanding of how governance is achieved through DAOs.

> **SQ3:** What elements of governance can be considered for a DAO that governs an OSS project?

Through SQ1 and SQ2, a separate understanding of the governance of OSS and DAOs was formed. In answering SQ3, this research considers how DAO governance can be applied to OSS governance and how OSS governance fits in a DAO environment. The relevant DAO and OSS governance concepts were identified and included, adapted or excluded to form the DAO for OSS governance framework. The structure of the framework is based on the governance dimensions that were identified through SQ1 and SQ2. The adaption results in the following dimensions: *legal foundation*, *decision making*, *leadership and role structure*, *project chartering*, *incentives*, *community management* and *software development processes*.

**Main research question**

Through answering SQ3, the DAO for OSS governance framework is created to answer the main research question; *how can DAOs support OSS governance*. The framework presents the various relevant dimensions of DAO for OSS governance and their respective governance aspects. The DAO for OSS Governance framework and its respective governance aspects are described in chapter 6.

There is not a single answer to the main research question as there are many ways through which governance can be achieved. Instead, the framework identifies the various relevant aspects of DAO for OSS governance. When a DAO for OSS projects, considers the governance aspects of the framework, it results in clarifying the governance model of the DAO, as is demonstrated through the case studies. The framework can be used to understand how DAOs can support OSS project governance and to formulate an answer for a specific case.

The framework is overall well-validated through the case studies and forms a solid foundation for future research into DAO for OSS governance. Further case studies can reveal trends in the governance of DAOs and can further validate the OSS development aspects of the framework, as these aspects were not as well covered in the case studies. Furthermore, future studies may consider to include a financial layer and the proposal arbitration mechanism. Through future work, the framework can

be further developed into a full maturity model with defined maturity levels for each governance aspect.

Even throughout the course of this study we have witnessed how DAOs are rapidly evolving and seen new developments. Various DAOs are testing and developing new governance mechanisms using the tools that DAOs provide. As such it will be interesting to see how the DAO for OSS governance framework remains relevant as DAO governance evolves. DAOs may very well become a well adopted organization form in our society, financial systems and regulations. DAOs are starting to understand effective governance mechanisms and are starting to move away from the simple one-token-one-vote model. While the adoption of DAOs is rapidly growing, it remains debatable how many of the DAOs are truly decentralized and autonomous and to what extent they are actually decentralized or autonomous. Furthermore, the first DAO (Build Finance DAO) has already been taken over and had its funds drained, as an attacker exploited the governance mechanisms of the DAO by creating a proposal that remained unnoticed. Likely we will see more of these exploits of weaknesses in the governance model of DAOs. As such, it is paramount for DAO developers and researchers to understand the governance of DAOs, in order to improve the governance designs of DAOs, and anticipate such attack vectors. This framework contributes to this understanding by presenting a foundational high-level overview of the various governance aspects and considerations of a DAO for OSS.

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# Appendix A

# OSS DAO Question framework

This is the initial governance framework that was developed. It consists out of questions that were formed based on the OSS governance overview and DAO governance overview, tables 4.7 and 5.1. This version of the framework was later adapted and generalized into the final model in figure 6.1.

| DAO Governance model for OSS projects V0.3 | | |
|---|---|---|
| OSS | | DAO |
| **Legal foundation** | | |
| Under what OSS license is the project released? | | What kind of legal structure will represent the DAO? |
| | | Does ownership and control of the project lie with the DAO? |
| **Decision making** | | |
| What decisions are made off-chain, without a formal vote through the DAO? | | **Proposals:** |
| Is there a defined process for decisions that are made off-chain? | | Which decisions will be made on-chain, through a vote? |
| How are the various decisions in the project delegated to different roles? Is this a more centralized or decentralized configuration? | | Who is allowed to submit proposals? |
| How is the outcome of a decision enforced? | | Is there a cost or other requirement to submitting proposals in order to limit the number and increase the quality of proposals? |
| | | Do submitted proposals require vetting or approval before being voted on? And by whom (specific roles/subcommittee/community support)? |
| | | Are outcomes of proposals also enforced on-chain? |
| | | **Voting:** |
| | | How is voting power acquired? E.g., a meritocratic process reputation based voting, or a stakeholdership model through tokens. |
| | | Can votes be delegated to a representative? |
| | | Do voters have a single vote, or are they able to cast multiple votes? |
| | | Is there a cost associated to casting votes or does the voter need to stake tokens or reputation in order to vote? |
| **Leadership and role structure** | | |
| Are there formal leadership roles? | | Is the influence of the leadership directly reflected on-chain? E.g., through voting power or control over proposals. |
| Is leadership established through democratic or more autocratic designs? E.g., elections of leadership roles/representatives or self-appointed leadership. | | Is the role structure reflected in the DAO, or is there no formalized hierarchy and is influence and power reflected through the voting power? |
| Are there other observable roles? And how are those structured? | | |
| **Incentives** | | |
| Are developers employed? | | Are DAO members rewarded for performing certain activities? |
| Are developers rewarded through a salary? | | Are DAO members rewarded in fungible or non-fungible assets such as tokens or reputation? |
| Are there other extrinsic or intrinsic incentives for contributors? | | Are development activities directly or indirectly funded through the DAO? |
| **Project chartering** | | |
| Is there a mission or vision statement to bring the community together under a shared ideology? | | Is the DAO involved in the process of determining release plans and development roadmaps? |
| How are release plans or development roadmaps established? | | |
| **Community management** | | |
| How can new community members get involved with a low barrier to entry? | | Who can contribute towards code? |
| Is there a process through which new contributors prove their knowledge, technical competences or alignment with the values of the project? | | What is the process for members to join the DAO? |
| Are there any determined sanctions against violations of rules, norms, values or goals of the project? | | Are there any barriers to joining the DAO? |
| | | Do DAO members have to verify their identity? |
| | | Are there on-chain mechanisms for punishing members who violate norms and values or behave against the goals of the project, by for example reducing reputation? |
| **Software development processes** | | |
| Who decides what is developed? | | Is the inclusion of new code decided on on-chain? |
| What procedures are followed before new code is accepted? | | Are software releases formally decided on on-chain? |
| What are the procedures for a new release? | | |
| How are responsibilities for tasks distributed? Are some tasks lefts open or are they all managed and delegated? | | |

# Appendix B

# Coverage of governance aspects in the DAO for OSS governance framework

The following two tables show respectively, how each governance aspect of the OSS governance overview (table 4.7) and DAO governance overview (table 5.1) are included, excluded or adapted to form the DAO for OSS governance framework in figure 6.1.

TABLE B.1: Overview of the adoption of the **OSS** governance concepts (table 4.7) in the DAO for OSS governance framework

| **OSS governance mechanism** | **Inclusion** | **Details** |
|---|---|---|
| **Leadership and decision making:** | | |
| Leadership | Adapted | Adapted to *role structure* and *establishment of leadership*. |
| Elections | Adapted | Generalized to *establishment of leadership*. |
| Delegation of decision making | Adapted | Adapted to *roles and responsibilities*. |
| Voting | Included | Included as an overarching aspect with sub-attributes. Voting is a primary decision making mechanism in DAOs. |
| **Ownership of assets:** | | |
| OSS License | Included | Included as the license defines the software as open source. |
| Foundation | Adapted | Adapted to *ownership and control* and *legal structure*. DAOs are not necessarily represented by a foundation, therefore this aspect is generalized to *legal structure*. Additionally the foundation has ownership and control over the project, this is separately addressed in *ownership and control*. |
| Code forking/sub-projects | Dropped | In the context of DAOs for OSS governance, this was deemed a minor governance property that relates to the rights and licensing of the software. |
| **Chartering the project:** | | |
| Mission and vision statement | Included | *Mission and vision* are important for any organization and aligns the goals and objectives of the members. |
| Release plans and roadmaps | Included | Coordination of *release plans* and *roadmaps* remains relevant in DAOs for OSS. |
| **Community management:** | | |
| Membership | Adapted | Adapted to *joining process* to emphasize the process through which new members get involved or formally become members. |

**Table B.1 continued from previous page**

| **OSS governance mechanism** | **Description** | **Details** |
|---|---|---|
| Role advancement | Included | Aspect is moved to the dimension of *leadership and role structure* instead of community management. Like traditional organizations, DAOs have roles as well, therefore *role advancement* is included. |
| Divison of roles/role structure | Included | Aspect is moved to the dimension of *leadership and role structure* and included as *role structure*. |
| Incentives and motivations | Included | Included as a separate dimension, named *incentives*. Incentives is a more prominent and important aspect of governance in DAOs. |
| Training and indoctrination | Adapted | Adapted to *vetting of new members*. This aspect remains relevant to the governance of OSS DAOs. |
| Reputation | Adapted | Adapted to *reputation model* in the *incentives* dimension. In DAOs reputation can be tokenized and given additional utility. |
| Norms | Included | Included as *values and norms* and moved to the *project chartering* dimension as it is a higher level governance mechanism that sets expectations and aligns the behavior of members. |
| Collective sanctions | Included | Included as *conflict resolution and sanctions*. It remains relevant to DAO community management. |
| **Software development processes:** | | |
| Release management | Included | Included as *release procedures* as DAOs can have a distinct way of managing on this aspect. |
| Modularization | Dropped | It is partially covered by *role structure*. The modularization aspect however, is not relevant enough to DAO for OSS governance. |
| Responsibility management | Included | Included in *roles and responsibilities* in the *leadership and role structure* dimension. It remains relevant in OSS DAOs. |
| Code control | Included | Included in *ownership and control* in the *legal foundation* dimension. It is relevant to how a DAO is in control of the code. |
| **Conflict resolution:** | | |
| Rules and procedures/policies and guidelines | Included | Included as *conflict resolution and sanctions*. Clear procedures to mitigate conflict and set to set expectations, remains relevant in DAO governance. |
| **Use of information and tools:** | | |
| Formal tools and procedures | Dropped | This aspect relates more to operational aspects of OSS organizations. In relation to governance of OSS DAOs, it is deemed less relevant. |
| Communication channels | Dropped | This aspect relates more to operational aspects of OSS organizations. In relation to governance of OSS DAOs, it is deemed less relevant. |
| Issue tracker | Dropped | This aspect relates more to operational aspects of OSS organizations. In relation to governance of OSS DAOs, it is deemed less relevant. |

TABLE B.2: Overview of the adoption of the **DAO** governance concepts (table 5.1) in the DAO for OSS governance framework

| **DAO Governance mechanism** | **Inclusion** | **Details** |
|---|---|---|
| **Decision making:** | | |
| Proposals sub-level | Included | Included as *proposals* governance concept with sub-aspects under the *decision making* dimension. |
| Proposal submission | Included | Included as *limitation on proposal submission* under the *Proposals* sub-level. |
| Proposal approval | Included | Included as *proposal approval* under the *Proposals* sub-level. |
| Proposal domains and on-chain vs off-chain | Included | Included as two separate aspects of *on-chain decision domain* and *off-chain decision processes* under the *decision making* dimension. |
| Improvement protocol format | Dropped | The mechanisms of this standard format are covered through *limitation on proposal submission* and *proposal approval* |
| Voting sub-level | Included | Included as *voting* governance concept with sub-aspects under the *decision making* dimension. |
| One token one vote | Elements decomposed | Decomposed to *voting system*, *token model* and *distribution of voting power*. |
| Conviction voting | Elements decomposed | Decomposed to *voting system*, *token model*, *distribution of voting power* and *voting cost*. |
| Liquid democracy | Elements decomposed | Decomposed to *voting system* and *delegation of votes*. |
| Quadratic voting | Elements decomposed | Decomposed to *voting system*, *voting cost* and *distribution of voting power*. |
| Futarchy | Elements decomposed | Decomposed to *voting system* and *voting cost*. |
| Reputation based voting | Elements decomposed | Decomposed to *voting system*, *reputation model* and *voting cost*. |
| **Incentives:** | | |
| Reputation | Included | Included as *reputation mode* under the *incentives* dimension. |
| Admission fee | Dropped | It is part of the *joining process*. There are many possible aspects to the joining process. This aspect was not deemed distinct enough to warrant inclusion. |
| Indirect economic incentive | Adapted | Adapted under *DAO participation incentives* and *reputation model* under the *incentives dimension*. |
| Staking | Dropped | Staking is a particular financial incentive mechanism that can be used for various purposes, such as voting. It was deemed too specific and can be approached through the *token model* or *DAO participation incentives*. |
| Fungibe tokens/economic | Included | Included as *token model* under the *incentives* dimension. |
| **Community:** | | |
| Member identification | Included | Included as *identity verification* under the *community management* dimension. The identity of a member can be important for legal purposes and can be of concern to DAO governance in a pseudonymous environment. |
| Community monitoring and compliance | Dropped | The aspect is more of a property of DAOs, than a governance mechanism. Furthermore it can be partially covered through *conflict resolution and sanctions*. |
| Forking | Dropped | This aspect is more of a solution for a situation when parties can not come to a solution. Furthermore, it is more of a property than a governance mechanism of DAOs. |

# Appendix C

# Case-Study Protocol

## C.1 Informed consent

**Taking part in the study**

- I have read the research information sheet dated 20/12/2021. I have been able to ask questions about the study and my questions have been answered to my satisfaction.
- I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without any justification.
- I understand that taking part in the study involves an audio-recorded interview or, if I don't agree with an audio recording, an interview in which the interviewer will take written notes.

**Use of the information in the study**

- I understand that information I provide will be used in the master's thesis of Jozef Siu, more specifically in the chapter that deals with the evaluation of the proposed framework.
- I understand that personal information collected about me that can identify me, such as my name or function, will not be shared beyond the study team.
- I agree that my information can be anonymously quoted in research output.

**Signatures**

Name of participant: _____

Signature: _____ Date:_____

*I have provided this information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.*

Researcher name: Jozef Siu

Signature: _____ Date: _____

## C.2 Research information sheet

Version 1.0, Date: 20/12/2021

**Context and purpose of the research**
You have been asked to participate in an interview as part of a research project about the governance of open source software projects(OSS) that are formed around a decentralized autonomous organization(DAO). This research is executed as a master thesis project in the programme Business Informatics of Utrecht University, under the supervision of Dr. Slinger Jansen and Dr. Sergio España.

In this research we have formed a governance framework that captures the various governance aspects of a DAO that is developing OSS. The goal of the framework is to create an understanding of the various dimensions and aspects of governance in OSS developing DAOs. The framework can help model the governance of a specific OSS DAO or aid (new) DAOs in their understanding of the various aspects of governance and their considerations.

This interview is set up to capture the governance model of the DAO that you represent. The framework, that is also provided to you, consists of multiple layers that each concern a governance dimension for an OSS DAO. The interview begins with general questions about the DAO. Then, we will go over questions that cover each of the governance aspects of the framework. Followed by an evaluation on the completeness and usefulness of the framework.

**Usage of data and personal information**
You can withdraw from the case-study at any time by informing me. If you wish to withdraw from the study at a later moment in time, you can let me know via e-mail. Any of the information provided during the interview will then be deleted and not included within the research output. The latter request should occur within 10 days after the interview. The master thesis is expected to be publicly available in the thesis archive of Utrecht University. The researchers aim to publish the results from the study. In case you do not wish the organization to be mentioned in articles and publications by name, please announce this via email. During the case-study, I will take notes. If you agree, the interview will also be audio/video recorded. Relevant parts of the audio-recording will be transcribed for further analyses. You also have the right to request access to, and rectification or erasure of the interview recordings and note takings. The information captured, either by note-taking or transcribing of the interview recording, will be anonymized before serving as input for the master thesis. Personal information regarding the interviewees will not be shared beyond the study team. The study team consists of me (Jozef Siu) and my supervisors (Dr. Slinger Jansen and Dr. Sergio España).

**Additional questions** If you have any unanswered questions about the case study, feel free to contact me.

**Contact details of the researchers:**
Name: Jozef Siu, email: j.y.l.siu@students.uu.nl
Supervisor: Slinger Jansen, email: slinger.jansen@uu.nl

## C.3 DAO for OSS Governance Framework

This is the DAO for OSS governance framework that the case-study will address. The questions are designed to answer the governance aspects of the framework for your organization. It can be useful to keep this framework in sight, for reference during the interview.

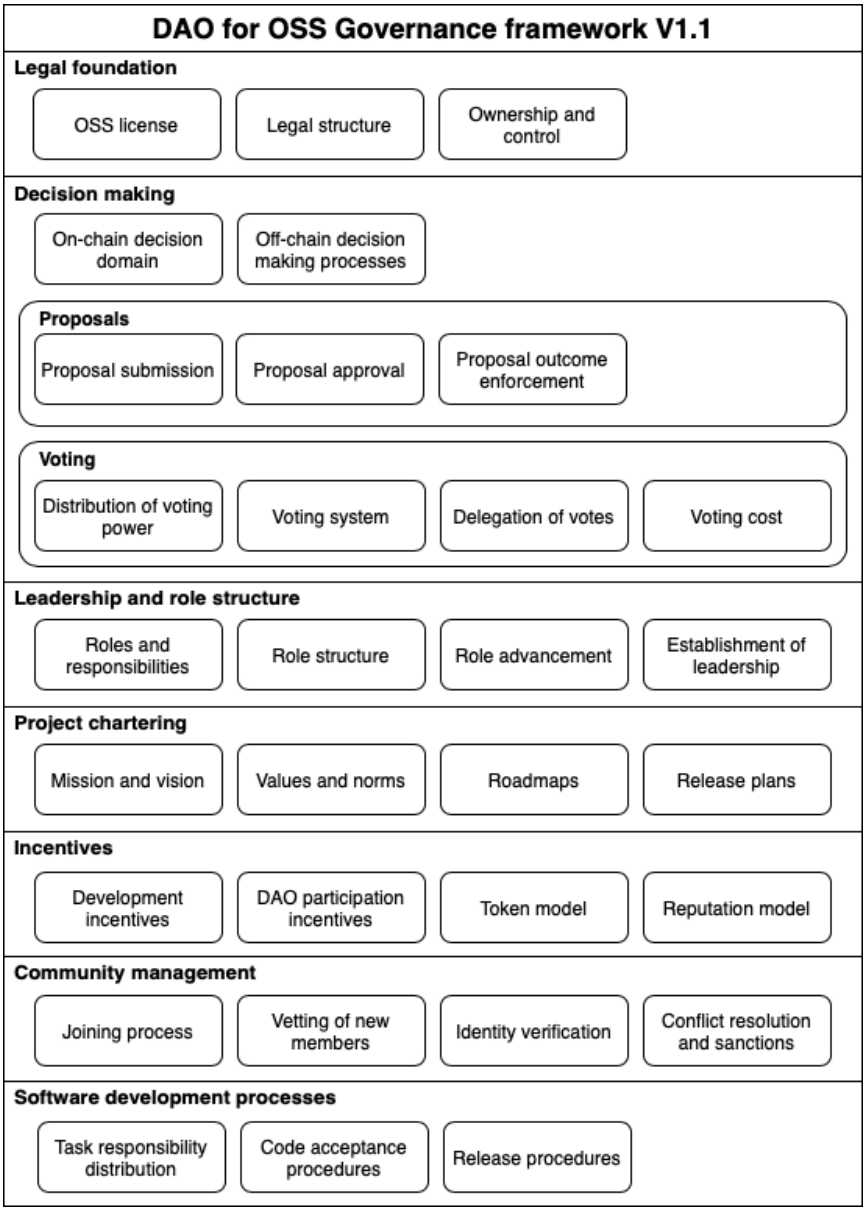


Figure C.1: DAO for OSS governance framework

## C.4 Questions

### C.4.1 General questions

- What is your name and what is your role in the DAO that your represent?
- What is the name of the DAO?
- How long has the DAO existed?
- What is the purpose of the DAO?
- How many members does the DAO have?
- Which communication, governance or blockchain tools that are essential to the DAOs operations are used? E.g.,
  - DAO platform
  - Blockchain platform
  - Blockchain solutions
  - Communication tools
  - Collaboration tools

### C.4.2 Legal foundation

- How does the DAO have a legal representation?
- How are the DAO and its members protected from liabilities?
- Under what OSS license is the software released?
- Who has ownership over the created software and does the DAO have direct control and ownership over the source code?

### C.4.3 Decision making

- Which decisions are taken on-chain through the DAO?
- What decisions are made off-chain and are there any defined processes for these decisions?

#### Proposals

- Who is allowed to submit proposals?
- Is there a cost or other requirement to submitting proposals in order to limit the number and increase the quality of proposals?
- Do proposals need to be approved before being voted on? If so, who approves the proposal and what are the approval criteria?
- Are the outcomes of proposals enforced on-chain?

**Voting**

- How is voting power acquired?
- What kind of voting system is used? E.g., one-token-one-vote, quadratic voting etc.?
- Can votes be delegated?
- Do voters have a single vote or are they able to cast multiple votes?
- Is there a cost involved with voting?
- Is there a staking or betting mechanism?

### C.4.4 Leadership and role structure

- Are there formal leadership roles?
- If there is a leadership, how is it established?
- Are there other defined roles and how are they structured?
- How are the roles acquired?
- Do these roles have additional power or influence, and how is this reflected in the decision making on-chain?

### C.4.5 Project chartering

- Who decides on the vision or mission statement or other long term goals of the DAO and what is the process of changing this?
- Who decides on the values and norms of the DAO and what is the process of changing this?
- Who determines release plans and project roadmaps? What are the mechanisms that ensure that these are followed?

### C.4.6 Incentives

- How are development activities incentivized?
- What are the extrinsic or intrinsic incentives for DAO members to participate?
- Does the DAO have a token model?
- How are tokens issued?
- How are tokens distributed?
- What utility do tokens provide?
- Are there mechanisms that take tokens out of circulation?
- Does the DAO have a reputation model?
- How is reputation awarded?
- What utility does reputation provide?
- Are there mechanisms that remove reputation?

### C.4.7 Community management

- How do new members get involved with the DAO?
- Is there a formal process for members to join the DAO?
- Do new members need to prove their knowledge, technical competences, or alignment with the values of the project?
- How is the identity of new members verified?
- Are there any protocols for preventing or resolving conflicts?
- Are there any sanctions against members who act against the interest of the DAO?

### C.4.8 Software development processes

- How are responsibilities for development tasks distributed amongst DAO members?
- What are the procedures for code acceptance and how is the DAO involved in this process?
- What are the procedures for a new release and how is the DAO involved in this process?

### C.4.9 Framework evaluation

*Please take a moment to look at the framework to reflect on the interview. In a minute we will continue with an evaluation of the framework.*

- Did this framework provide any new insights?
- In what way do you think this framework is useful?
- What would be the best moment to use the framework in a DAO's lifecycle?
- Should the framework become part of the DAO canvas?
- Are there elements of governance that were not covered by the framework or do you think this framework is complete?
- Do you have any suggestions for changes to the framework?

*Thank you for participating in this case study. We have come to the end of this interview. If you have any other questions, please let me know.*

# Appendix D

# Other contributions

## D.1 Oddysey momentum hackathon

During this hackathon with SecureSECO, I build a front-end prototype, based on Vue.js. The framework allows for static site generation and is based on the React framework. With static site generation, webpages are server-side statically generated into almost pure html and css content. This vastly improves the loading time of webpages, as there is no need to make additional requests to databases, make requests for other resources and perform additional processing at the client-side.

Additionally together with Tom Peirs, a Master Business Informatics colleague, we build the data-crawler that crawls for packages and requests trustdata from various sources, such as the sourcerank of libraries.io and performs a trust calculation, which is then submitted to a MongoDB server.

## D.2 Tech Tuesday presentation with ICCU and Lisk Center Utrecht

During this Tech Tuesday event on November 9th 2021, students, start-ups and other IT-professionals came together to connect. Presentations were given on the topics of blockchain, virtual reality, cybersecurity, artificial intelligence and self-sovereign identity.

I was granted the opportunity to speak about security and showcase the SecureSECO project and the ambitions thereof. I spoke about dependencies in the world wide software ecosystem, the interconnection thereof and the vision of SecureSECO to secure to the entire software ecosystem. On the topic of SecureSECO I highlighted the project of TrustSECO and fundamental questions such as what Software Trust means and what trust impact factors there are. Additionally I highlighted the other work and ambitions of SecureSECO, such as hunting for vulnerabilities, scanning, analyzing and parsing source code, creating a decentralized SecureSECO ecosystem with providers and buyers of security data and the incentives involved. And finally touching on this research, as SecureSECO aims to create a DAO that turns governance over to the whole SecureSECO ecosystem.

# Appendix E

# dOrg interview transcript

## E.1 General information

**Interviewer:** Let's start with general questions.
**Interviewer:** You are [name of interviewer] right? From the dorg and you are just a builder? and something more right?
**Speaker 1:** I am a builder and a tech lead.
**Interviewer:** You are a builder and a tech lead. And the full name of the DAO is dOrg?
**Speaker 1:** Yes dOrg. I guess like, the legal name would be dOrg LLC.
**Interviewer:** Yeah dOrg, dOrg LLC and the DAO has existed since when? 2019? Or was it before that?
**Speaker 1:** I don't remember the exact date off the top of my head.
**Interviewer:** Because from the media messages I got from the BBLLC is June 2019, but I'm not sure if that's also when you guys started.
**Speaker 1:** Yes, So what I did in the past is, I looked up when our registry with the state of Vermont.
**Interviewer:** That's fine too, I suppose.
**Speaker 1:** Yeah, because that's when we were like incorporated. Uhm, let me see. If I can very quickly... [After some searching] Uh, I think the date you have is right.
**Interviewer:** It's fine, just for indication. So can you tell me what the purpose of the DAO is?
**Speaker 1:** What is the purpose of the DAO? That's an excellent question. I would say the purpose of dOrg is to probably I think... Is yeah right here as our website. This describes it; We accelerate development and adoption of our favorite web three projects. That's probably good in a nutshell.
**Interviewer:** Alright, and how many members do you have?
**Speaker 1:** We have at the moment 55 active members.
**Interviewer:** Allright. Which communication governance or blockchain tools that are essential to your operations do you use?
**Speaker 1:** Uh, we use Discord. We use Discourse, which is our private forum, and then we use Snapshot. And we use Gnosis Safe. Anything else? Blockchain platform... Ethereum. We use a custom ERC 20 token. And we use Google meets.
**Interviewer:** All right. Yeah, that gives me a bit of an image of the general things of your DAO.

## E.2 Legal foundation

**Interviewer:** Yeah, you have a legal representation, the BBLLC DAO right?.
**Speaker 1:** Yes, so we have a registered agent, which I don't remember who they are, but, uh, we also have some members of dOrg that are lawyers. And we also have a partnership with lexDAO as well. lexDAO, the legal DAO.
**Interviewer:** Are they really relevant? As in... I know they do... they promote or work on the legal positions of DAOs, I suppose. But what do they do for you?
**Speaker 1:** We don't have anybody on retainer right now, so yeah it's more to answer your question like do we have legal representation? Yes, we have people we could tap for legal representation. Yeah, but we don't have anyone like on retainer or something.
**Interviewer:** Yeah, and how DAO and its members were protected from liabilities.
**Speaker 1:** Uhm, by being a LLC everyone is a co-owner and contractor and so we use the limited liability of US corporate law.
**Interviewer:** And by default everybody is limitedly liable?
**Speaker 1:** Yes, yes.
**Interviewer:** Nice how that works.
**Interviewer:** So you guys work on software projects as well, but do you have your own software products or projects?
**Speaker 1:** Yes so as I mentioned, we have a dOrg token that we've built ourselves, that I believe is yeah, it's open source. You can find it on our GitHub and we are building on top of that and currently we have some private projects like dOrg App and stuff that we're not ready to share yet. Uhm and originally, which is like no longer, just like our project but PolyWrap was sort of like originally started within dOrg and sort of spun out into its own DAO and it's own project. I don't know if you've heard of them, formally known as Web 3 APIs.
**Interviewer:** Right, no, I have not actually, OK cool. Do you know what OSS licenses you generally use?
**Speaker 1:** So for the stuff we build, we prefer to use open source. Usually MIT just because if we build something we want anyone to be able to use it for any reason or change it or contribute to it. For the things we build for our clients on our behalf, usually these are also open source or closed source, depending on our clients preferences. Obviously smart contracts can't really be closed source. But typically our clients, some of our clients like to have their front end applications closed source to make them slower to fork.
**Interviewer:** Yeah, OK. Clear answers. Yeah, who has ownership over the created software? And does the DAO is the DAO also legally the owner and does it have control over the created code?
**Speaker 1:** In terms of code... Direct control and ownership over the source code... Uhm, so most of the time when we're working with clients, we of course surrender the rights to the code we're working on. So, and the client either decides to have it either be open source or closed source, and so we surrender all the rights to that. In terms of what we build overwhelmingly, we've just decided to do open source. I'm not sure if we have a legal agreements, or legal provision within our operating agreement. That's DAO members surrender all rights to dOrg. I'd say in practice like 2 situations so far, clients do or it's open source. Yeah, it's pretty much in practice what has been the case... Oh yeah, and our landing page is public. Yeah, but I think that's the intention. That, like we make all the stuff we make internally public and then...
**Interviewer:** OK. That's cool.
**Interviewer:** Do you know a bit more about how the dOrg LLC ties into the actual

Dao that you have in voting. How that legal representation works or legal entity works in connection with being binding and...
**Speaker 1:** Sure, so I'm not a lawyer. But what I do understand is that; the ownership of our LLC is proportionate to our on-chain sort of reputation in dOrg. And so we're using our non transferable token to represent, you know, dOrg token to represent that reputation. And so it is. It is 1 to 1 and the the benefits of being a blockchain based LLC is... I think Vermont has a framework that allows you to do that quite easily.
**Interviewer:** So the ownership is legally written as in being proportionate to reputation? So that is how it is registered.
**Speaker 1:** Exactly, yes Yes, and also are on-chain. Transactions are the; we use as like digital signatures for our organization and stuff, so when we pass a proposal, it's also like a legally binding decision.
**Interviewer:** Right, so you could go to court like. Regular court to fight... As it is legally binding
**Speaker 1:** Yeah

## E.3 Decision making

**Interviewer:** Right! Then that's it for the legal foundation. Let's move on to decision making. That part consists of the difference between what we do on-chain and what happens off-chain and then how do you do proposals and how do you do voting. So first, which decisions do you take on-chain?
**Speaker 1:** There are actually pretty limited amount of decisions that we do on-chain. Uhm, one is the snapshot proposals which typically concern. Uh, approving new projects funding. Uh builders to join dOrg and sort of meta governance changes. And so that's at the highest. That's in our snapshot. That's like at the highest level of abstraction. Then there's execution of those through our dOrg treasury, which are signers, will create and execute transactions to implement the decisions of those snapshot filters. And then there's local decisions, which are... Every project, internal and external, has their own Gnosis Safe. Typically, actually I think it's just external. At this point I think we changed that back. So every client project has its own Gnosis Safe, which will pay dOrg a cut in exchange for dOrg reputation tokens. And we'll also pay the builders on that project and pay these sourcing team. And so they execute. Transactions to basically split up the payments that way. In terms so that was. Uh, your on-chain question about on-chain right yeah? Yeah, that's on-chain.
**Interviewer:** Do you also vote on client projects?
**Speaker 1:** Yes, so and you can like... I don't know if you have a link to our snapshot. But uhm, you can, since it's all public. You can go see the history. Here, uhm. Yeah so. You don't see a lot of it as of late because we've had some sort of long term relationships. Uh, here's, uh, so here's a approved coordinate, engagement approve, lavonna engagement. Approve a cordao engagement....
**Interviewer:** OK. Are those the new projects?
**Speaker 1:** Yeah, so we approve new projects, basically new clients. They want to work with us. We have like a governance process to be like hey do we want to work with them or you know. And then you find people who join their project.
**Speaker 1:** Yeah, yeah so. Uhm, it's sort of improving the engagement, right? So it's like, hey, I have this potential prospect with this team or well, like does this look like a good plan? And with this, maybe this proposal or this like sort of yeah? And

so does this look good to the dOrg DAO, right? Yeah, sometimes there's feedback that, like oh, we gotta change up the team a little bit we gotta change up the pros a little bit.
**Speaker 1:** Or we gotta you know.
**Interviewer:** Yeah, so it's kind of a formed proposal?
**Speaker 1:** Yeah, and the same could be said of you can see activate like these activate proposals are people joining or proposing to join.
**Interviewer:** And also deactivation?
**Speaker 1:** Yes, deactivation is for people. Who are leaving the the dOrg DAO. Most overwhelmingly through inactivity. That's how most people leave. They move on to other projects and other things and stuff. And so we have this inactivity threshold.
**Interviewer:** All right, that's quite clear. Yeah, are there also? off-chain decision making processes which are defined. I mean a lot a lot of off-chain decisions happen, but are there also important processes which are happening off-chain?
**Speaker 1:** So I would say that we have this whole builder covenant that I mean kind of defines our expectations of people's off-chain behavior and uhm, sort of escalation protocol, which is also off-chain until the final step. So that's the behavior we expect from people having off-chain and if it doesn't happen then we have this process that eventually goes on-chain up. If it goes too far... But then there's also like all this behavior that we expect from our different roles like you can see being a tech lead like being a PM that like hey these are the duties of a PM tech lead like that. We expect people to self organize. Basically have conversations discussions. Uh, kind of reach like a consensus. Yeah, same thing with like our sourcing team. Most of the time, especially local decisions within client projects or internal projects. Those don't need to go on-chain. The team can work it out themselves. Usually they go on-chain, if it's some decision that we need more visibility through the DAO... Like meta governance especially whereas like something bigger.
**Interviewer:** Yeah, are there also decisions that are nonlocal that are taken off-chain?
**Speaker 1:** Sure, so maybe an example would be, uh, I can give you an example actually that I was involved in. So one was we had some film crew contact us that they wanted to do some interviews with some stuff. And uhm, some people were interested in that, and so a team just sort of formed around that. And I was like part of that sort of looking into it, but then looking deeper into them. Unfortunately, they were like a scam, which is not uncommon. Unfortunately, in the crypto world, there's a lot of scams out there. Uhm and so then, the team was like yeah, they look like a scam. We're not gonna follow up with this. None of that happened on-chain.
**Interviewer:** Yeah
**Speaker 1:** Right, you know? So that was all like in discord discussions and Google meet. And stuff... But you can think of other situations like that. Like say, if a prospect wants to work with us and like there's the sourcing team might organize around that and stuff so. A lot of the sort of spontaneous or low effort decisions we just have the...
**Interviewer:** Yeah, but I guess. The important decisions are all taken on-chain moving. Or are delegated.
**Speaker 1:** Yes, and that's why, like payment is on-chain, still right, like all payment. And also like our major governance decisions which we consider bringing new people in. Or you know having people leave getting new client projects on and like medicaments so so. Like our main major decisions. Yeah so. Kind of. There are no major decisions being taken off-chain I suppose. Yeah, only operational or local or yeah... I would say that every decision path that eventually gets to like a major

decision that happens on-chain.
**Interviewer:** OK. [Irrelevant part omitted]
**Speaker 1:** Yeah, I mean like for example if for some reason we have to remove someone from the DAO that would never be oh, a couple people just kick you out, or another client project. No one has firing authority individually. Yeah, so like that's another major thing, hiring, firing or just deactivating. Mostly like I said it's through inactivity and if someone has moved on and we're not sure if they want to be continued to be involved, like even then we would have just removed them like we've reached out to them. Hey, we're having this governance decision... So yeah.
**Interviewer:** Right. Yeah, pretty good then actually.
**Speaker 1:** That's how we maintain our identity, right? 'cause if we don't, if we have major decisions happening off-chain, then we might as well be a traditional corporation, right?
**Interviewer:** Yeah, I can imagine that with a lot of DAOs there are still not everything happening on-chain. It's kind of what I got from the Aragon guy that I was talking to. He says, yeah, we do have things in place, but they're not really, actually representative.
**Speaker 1:** Yeah, and that's why we moved to snapshot and Gnosis Safe because Snapshot allows us to sign proposals right? That's how our governance can work through signing, which is not like a gas. You know, a cost thing and it's why we moved away from DAO Stack too, because we didn't want to be dumping ETH with crazy gas fees and stuff for every decision we make. Yeah, we do want to improve our Gnosis Safe process a little bit, but that's also been a way to like lessen gas fees from doing payments basically so.
**Interviewer:** Yeah, OK. So that's clear. Let's move on to how you propose, create proposals and vote on them. So is anyone, any member, able to create a proposal.
**Speaker 1:** Yeah, anybody with dOrg token can create a proposal. So usually if they want to get it passed they should create a forum topic and they should alert people of discussion and invite discussion and talk about it before making the proposal. I think there's been a handful of proposals on our snapshot that just someone just made a proposal without talking about anybody with it. And they didn't pass.
**Interviewer:** Right? So is there a cost to... other requirement to submitting a proposal?
**Speaker 1:** I don't believe so, no.
**Interviewer:** Like a commitment cost or yeah some mechanism that says oh this proposal has to meet these three criteria.
**Speaker 1:** Now, so how we do it is; Relative majority and like we have a proposal open for a certain period and it has to pass relative majority to be, you know, sort of enacted. And as far as I understand, like from Snapshot, I think their stack is combination on-Chain off-chain. But the on-chain activity is like the signing of the proposals and the making of proposals. I think I don't know if they store the proposals completely on-chain. Maybe it's like ipfs or something like that. It could be. But yeah, this isn't like Aragon or DAO stack where you're doing a bunch of transactions for every step.
**Interviewer:** Yeah, OK, so you can just freely create a proposal. If you are a dOrg member.
**Speaker 1:** Yeah.
**Interviewer:** Yeah, so nobody needs to approve a proposal. They're just live.
**Speaker 1:** No. We don't have thousands or hundreds, 10s of thousands of members or something, right? So like I could understand why other DAOs might have like, oh,

there's this process to get to proposal, and especially if like proposals are for everything, every transaction, I can understand the need to control that. But the fact that when we moved away from DAO stack that really helped. Like our payment decisions are no longer at our DAO. They're at our individual safe level and so the snapshot is like the higher level governance stuff and so people don't get noise anymore from local project decisions essentially. Does that make sense?
**Interviewer:** So you moved away from DAOstack.
**Speaker 1:** Yeah, so imagine we used to be using DAO stack, meaning every on-chain transaction.
**Interviewer:** ... had to go through the entire DAO.
**Speaker 1:** Yes, there's a lot of noise.
**Interviewer:** And now you move it to the project level I suppose.
**Speaker 1:** Yeah, so the gnosis safe [inaudible] both our Treasury and our client projects. Make the actual payment transactions and our snapshot is the basically governance and meta governance decisions where they happen and so anyone can make. A proposal in those. I suppose, anyone can make a transaction if they're a owner of that gnosis safe, right? If I'm a owner of a client project co-owner, I can make a transaction, and that's a governance decision or proposal.
**Interviewer:** But that does not involve the entire DAO then.
**Speaker 1:** No
**Interviewer:** And are those payments for expenses and and towards eh salaries I suppose? Or paying you guys or what kinds of transactions are those?
**Speaker 1:** Yeah, mostly their compensations and reimbursement so.
**Interviewer:** Yeah, compensation and reimbursement yeah. Alright, and are the outcomes of proposals enforced automatically on-chain? Or how are they enforced or?
**Speaker 1:** No, that is a reality of our government system currently that we're trying to improve. Currently, no, they're not enforced automatically, even though they... because we're a BBLLC these are like legally binding decisions that you know our snapshot proposal link. They're not on-chain until the dOrg signers execute. So you might think of how some governments have a legislative branch and executive branch. Really like the snapshot is our legislative sort of branch so that enacts the proposal but doesn't actually do the on-chain transactions that need to happen from that proposal. That would be our dear Treasury safe, and our signers, which I think are top seven reputation holders. They execute those. Not automatically currently.
**Interviewer:** Who is the dOrg Treasury safe? Who is that or what?
**Speaker 1:** So 10% of every client project goes to dOrg and that goes to our treasury, and so that builds up. And then we use our Treasury to fund internal projects or reimburse people and stuff like that. And so if I pass a proposal that's like a meta governance decision saying. I want to... or a governance decision, this decision like I want to pay a social media person monthly 2K to run our Twitter or something, right? Then like if that proposal gets passed, that doesn't mean that the social media person is immediately paid 2K monthly, right? That means that. The dOrg singers have to, from their project safe get that going and execute on that.
**Interviewer:** So the proposals are executed by the dOrg signers and are legally binding.
**Speaker 1:** Yes, but not automatic in terms of like computational.
**Interviewer:** Yeah, but not enforced. Yeah, yeah are not automatically yeah. All right, clear and very useful to be able to rely on that.
**Speaker 1:** Yeah yeah it is, uhm, we're designing our apps so that we can get some of those friction points down though. So that the cut from safes automatically goes

to our treasury and that, like, maybe we can make it so that certain decisions from our treasury are automatically executed.
**Interviewer:** But that is still happening manually. Yeah, and somebody doing accounting on that.
**Speaker 1:** Yes, and we have an accountant to do that.
**Interviewer:** All right, let's move on to voting and that's clear on our proposal part. So yeah, you use reputation tokens for voting, right?
**Speaker 1:** Non transferable.
**Interviewer:** Non transferable reputation tokens.
**Speaker 1:** So, everyone earns... Typically there's 1 reputation, 1 dOrg token for every dollar they make at dOrg. There are also some ways to donate your time to dOrg. And get paid in a bit more reputation, but overwhelmingly like especially on client projects people get one token per dollar. And so that equates to their voting power.
**Interviewer:** And they can donate their time to D org. Which is differently compensated?
**Speaker 1:** Yeah, so we have this basically internal operations. I don't think this is super well documented, but currently we have what we call a swarm which is like all the different internal operations projects. And so people can contribute to those, and they can claim compensation from that and typically they are ranges, meaning I could do 50 bucks... I can do one to one. I could do 50 bucks and 50 D org token. Or I can do 25 bucks and 75 dOrg token or like if I want just go in like 100. So in our internal operations there's ways for people to donate their time if they want more reputation.
**Interviewer:** OK. And it's one reputation, one vote. And that's for all of your votes.
**Speaker 1:** Yeah.
**Interviewer:** Can votes be delegated towards other people?
**Speaker 1:** Not currently, we hope in our app to be able to support delegation in the future.
**Interviewer:** OK. Uh, yeah, so you always vote with all your tokens or or your voting power. There's no cost because you use snapshot, right?
**Speaker 1:** There is cost if you execute Gnosis safe transactions, but those are actually reimbursed by the accounting team, so everyone who spends gas fees to execute Gnosis safe transaction gets that ETH back basically.
**Interviewer:** Yeah, there's no staking or betting mechanism.
**Speaker 1:** Not currently, we experimented with some staking app, but it didn't take off really. There was a lot of enthusiasm, but there's some more experiments we want to do in the future in terms of like defi mechanisms that I think people are brainstorming right now.

## E.4 Leadership and role structure

**Interviewer:** All right, then that's pretty clear. Let's move on to how you are organized in your... With your members and positions, so you have no formal leadership roles, but you do have the top seven signers, right?
**Speaker 1:** Yes, so the top seven signers. The signers are the top 7 reputation holders in dOrg. You can even look at the dOrg token holders of the latest token.... Our Treasury mints the token to update like sort of send it's updated versions of the token and send it out, so let's see. Actually see right here holders. Yeah so. We go up. Yeah, so right here. I'm just like sending it over the chat, but uhm. That is our

token like or the latest version of our token and. You can see the holders and the top 7 holders. Uhm, meaning the ones who don't opt out of being a signer. They say like... oh 'cause like being a signer, you have to pay some attention. You have to sign transactions. You have to, you know, make sure everything is right? I'm pretty sure no one has opted out.
**Interviewer:** OK, but you have the option of opting out.
**Speaker 1:** Yeah, if you want. If there's too much work and so the top 7 are signers and they sign and or propose or execute transactions from our treasury that result from our governance decisions on snapshot.
**Interviewer:** Right? Are they manually authorized on your Treasury?
**Speaker 1:** Yeah, so they are owners of the Treasury, right so? If you think about Gnosis safe like our project. Client projects pay 10% to that Treasury and they are owners and so they can make transactions. And so yeah, hypothetically they could make arbitrary transactions, but that would be pretty transparent to like people and stuff and the idea being that. Because these are our top reputation holders, meaning the people who have over time earned the most money from work with dOrg and also stayed ahead of the inflationary pressures that, like as new members join. And other people are earning money. These Members have also stayed ahead of that. But the idea being that they would have an incentive to not sabotage dOrg.
**Interviewer:** OK, yeah.
**Speaker 1:** Then it would be, I think 7. So it's four of seven, right? So it would be four of them would have to sort of conspire to sabotage it so well, yeah.
**Interviewer:** And so if the 8th holder moves to the 7th place, then that would switch around as well.
**Speaker 1:** Yeah, yeah, so they would execute a transaction that changes ownership.
**Interviewer:** OK. Yeah, do you have other roles defined in your organization so you have? I think you have part time roles. Like marketing, accounting, legal talent, acquisition, builder experience, client experience.
**Speaker 1:** I would say there's sort of management roles and that are really managers. There's tech lead and project manager which are the rolls with some clearly defined responsibilities. But then there's a number of specialist roles that have emerged. One is like facilitator which is sort of like our... They like help with meetings and like moderation on our Discord, different platforms like communications, internal and sometimes external. You know we have a social media person, we have an accountant person we have... But we consider all of them to be builders. Because they're just builders working on certain internal projects. And other people can contribute to accounting, can contribute to facilitating something too. So I think in some ways it's better to conceptualize those as different internal projects that different builders with different specialties, play either a major, minor or no role.
**Interviewer:** And how are those rules acquired?
**Speaker 1:** Uhm, mostly with governance this decision. So, especially with like a project manager and tech lead those you can see like, if you look at our snapshot history, you can probably see if you search tech lead. Or actually there might not have been one for a while. So we definitely have those as governance decisions. The idea being that someone has established a track record and we feel they either deserve tech lead project manager, badge, because they can handle that responsibility. Uh, in terms of like some sort of specialist roles to support internal projects. Uhm, sometimes those relate to governance decisions. If we're bringing new people in, but more often than not, we found that like the people who want to contribute sort of do, and gravitate to those projects and some carve out issues for themselves, but like there's not like a like a; oh like we have an accountant or we have a social media

person therefore no one else is allowed to, you know, contribute to those areas. It's not the case and. I think even. For a wildly experiment for social media. Like having like a discord bot that anyone could submit posts for social media and like if they met a criteria like two or three sign offs or reactions, then they would get posted. Then they end up like, you know, sort of happening 'cause. It turns out that there's only a few people who are interested in contributing to our social media.
**Interviewer:** Uh, do those project manager or tech lead roles also have? Additional, power, influence or... things that they are allowed to do or able to do?
**Speaker 1:** They do have the tech lead together with the project manager. Have sort of adding and removing, I would say influence. When it comes to client projects. And so if a client project needs more builders or they need to... for whatever reason have less or remove some builders who are not working out, then they can. They can ask people to do that. We've had situations where I think they've asked builders to leave a client project if, like their contribution wasn't working out. But if that builder disputed their recommendation, then that would go through our escalation protocol and stuff. And so, the decision of that, would be binding or something. But really they just have sort of influence over that and so yeah. They also have responsibility and so in terms of like where the technical direction of our project is going like that stops with the tech lead and the tech lead is ultimately responsible for the technical delivery, whereas the project manager is ultimately responsible for keeping the non technical aspects on track, communication with the client. So they sort of work closely to make sure the project is on track.
**Interviewer:** So is the Project Manager also responsible for handling the budget for a project?
**Speaker 1:** I'm not a project manager, so I don't know off the top of my head everything they do, but let's see. Here they are, yeah, monitor scope load and deadline, so typically. We have a sourcing team or like I would say, a sales team, that negotiates with the client about budget and scope or the engagement. And more and more of our engagements are very long term and so our clients will pay typically for our time. And an effort that they'll be like, hey, we need to hire 5 developers from you we'll pay them... We need 2 halftime two full time and we'll pay this much per month and so we don't do a lot of fixed price. We do some fixed price projects. But we don't do as much as we used to, and so that's why project managers tend to focus on managing scope load or deadlines to use the budget. But they do talk about budget in terms of like if we feel the client needs more developers for the work they're asking us for, or if for whatever reason we're under utilizing their budge. Often that can be because the client isn't communicating and they're not giving us the information we need or something and so they they do deal with the budget in that sense.
**Interviewer:** OK, so that's part of their responsibility.
**Speaker 1:** And usually they execute the transactions from the Gnosis safe or at least create them for that client project. So they do some sort of accounting billing for the individual client project.
**Interviewer:** OK, so you have the yeah project roles; the builder, the project Manager, Tech lead and then you have internal roles such as accounting and people who do that and then you have the signers. And that that's about it.
**Speaker 1:** There's not like always a clear delineation between internal and external, right? So if I'm a social media person I'm contributing to dOrg social media. I could also be on a client project or two where I'm working with other clients social media stuff. We try to not pigeonhole people where it's like you are this and you must do this.
**Interviewer:** But yeah, but besides that there's not much of a yeah... I'm just

looking for some hierarchy, some structure, or organization that you use to, distribute responsibilities or distribute power.
**Speaker 1:** Yeah, we try to keep it pretty loose. I think we try to stick to being a worker collective, which is, I think, worker cooperatives can have elected management or constitutionally bound management or something like that. But really we try to stick to the model of collective. Not having a you know actually manager. And it helps to not have actual roles. I mean, I guess we have some specialists, but we don't have sort of constricting roles for people.

## E.5 Project chartering

**Interviewer:** Alright, that's pretty clear. Then let's move on to project chartering. So project chartering is about the high level planning, the high level vision of the organization. So you see mission and vision values and norms, Road maps, release plans. Earlier we talked about the builder covenant. So those are kind of values and norms you have?
**Speaker 1:** Yeah, we also have like for our... I think we have here. There's actually a section to our docs where we actually list our values.
**Interviewer:** Yeah, so you have the core values, the builder our covenants, which consists of these standards and then expectations of professionalism. Yes, the question is who decides on all these things. And how would the process be of changing this?
**Speaker 1:** Yeah, so I can give you an example. So, our builder covenant actually didn't exist until we had some internal challenges and disputes, and we discovered that we didn't have actual laid out expectations of how people should behave or how we want people to behave. And we also didn't have a process for dealing with if issues happened. So the process was actually, I started on a draft 'cause I thought it was needed and I claimed some compensation from the swarm. And then there was a lot of discussion about it, a lot of other people contributed, it is very much a meta governance decision that needed to be made and ultimately it was on-chain. I think this was probably when we're still using DAOStack. But the pull request didn't get merged until the sort of on-chain you know vote was approved. Sort of thing like that.
**Speaker 1:** So if I guess like someone wanted to define different values or something... You know it depends. It depends, I think if someone was like; I want to change the wording and the copy of our values or something and then that probably wouldn't be that hard because like most people wouldn't object and that probably wouldn't be an on-chain decision. But if someone is like I want to change our values. Our fundamental values or change the direction of dOrg. Usually that is ultimately an on-chain decision. But if they're smart, they'll have a lot of off-chain discussion and stuff to see if there's support for that and see what people want and you know get people on board. I think the culture of dOrg is such that we don't like to force things through. We don't like to have, like oh the whales will just force it through and tell everybody what to do. We don't really like to do that, especially because our whales aren't that big, right? If you look at our top token holders, they've depreciated a lot and so we don't really have like whales. I think the top seven is our 51%. Basically, I'm pretty sure. In reputation holders but. Yeah, we don't really have anybody to force things through.
**Interviewer:** So basically you would have a vote on that again?
**Speaker 1:** Yeah, like it'd be a meta-governance decision probably so.

**Interviewer:** Road maps or release plans would be on the project level?
**Speaker 1:** Yeah, I mean we have internal projects and it would be sort of the same, like typically even if there's an internal project, usually there will be some PM or tech lead or maybe both. Internal projects aren't quite as strict, about the process. Yeah, that team would communicate the road maps and plans and [inaudible] would give feedback, but most of the time internally that team would sort of self manage and make sure things are on track.
**Interviewer:** Is there like a broader road map on where you want to go with your own DAO stack or stack of DAO. . . On developments of internally, like you mentioned like you mentioned, you would like to have a some things more automated, but.
**Speaker 1:** Yeah, and no, and I think I know that sounds strange, but I think that's actually kind of like one of the cool things about our organization, because if you think about it, like if you think, when you're talking about governance and you're talking about DAOs, inevitably you have to think about politics and governance in the real world. You know off-chain, like how do governments do things. How do organizations decide things? And it's sort of asking the question. Like you can ask maybe like a king of a country, where will your country be in 5, 10 15, 20 years or something. It can be like I got a plan, this is my roadmap. This is what I'm going to have my nation do, because he has authoritarian power so he can just do that. But if you ask a democracy, like you know, what is the Netherlands going to be like in 50 years. People can say, oh, maybe we'll do this or it would be cool if we did that, but they can't say, oh we're definitely gonna do this, we're going to reach these milestones. Measurable results because ultimately it depends on what dOrg builders want to do. And we'll have dOrg builders leave, move on to other projects. And we'll have new ones joining probably, and we'll have hopefully plenty stay. Uhm, but yeah, we don't know precisely, but we got some cool projects going on right now that we're hopeful, excited about.
**Interviewer:** Yeah I can totally understand how that happens. But you do have longer term plans on the project level, I suppose?
**Speaker 1:** On the client project level?
**Interviewer:** Yeah, or or internally perhaps yeah.
**Speaker 1:** Typically so. Internal project level. Yes, we have plans that are subject to change. Uhm, and like I think as I mentioned, we are currently looking into automating more of our internal operations and improving those sort of manual touchpoints and we have dreams of like maybe, if we can do that well. And also we're designing some apps that can give sort of top level management for us, like in financial measurement for our DAO that this could be something we share. Maybe this is a future product. But because we're not a product driven org. I think our plans long term are just around improving our operations and potentially spinning out product ideas. But like for example, compared to other DAOs like the spin offs that was PolyWrap, that started as internal dOrg projects and then that was spun off. And so they have a long term, sort of plan for their product. [Conversation about looking up PollyWrap omitted] So they're about building out a protocol. So because our DAO isn't about building out and maintaining a protocol and more like iterating and expanding a way of using, Web 3 technology and worker collectives. Then working on different Web 3 project. That is more iterative than sort of long term like we're going to do this in five years and 10 years so.
**Interviewer:** Pretty nice though, that that spun out, I think.
**Speaker 1:** Yeah, yeah, I hope we have and that's generally our plan. I hope we have more internal projects that spin out.
**Interviewer:** It used to be an internal project?

**Speaker 1:** Yeah, it was internal like product development project, but because we want to, we found that it's best to keep DAOs the mission of DAOs and collective sort of narrow. Like they're focused on one thing doing one thing well. dOrg as being like this web3 agency collective, it's going to do that really well and like Poly wrap is going to be like this sort of universal, web3, interface and protocol. Uh, integration protocol that, really we need a separate DAO for that. we need to spin that off as its own thing. So there are dOrg members working on that, I think one of the cofounders is also a co-founder of dOrg. And we have actually, they are also a client of dOrg so we have dOrg client project team working on their protocol and stuff.
**Interviewer:** Oh cool, and they are by themselves a DAO as well. And then they allocate some of their budget towards you guys?
**Speaker 1:** Yeah. And we've been exploring more of that. Like we're just that's maybe another sort of thing we hope long term, is like more DAO to DAO partnerships. We've been trying to connect with a lot of other DAOs and see if there's ways, where you know, they can help us, we could help them. Like even trading services almost. Us giving development services and then giving... Like for example Lex DAO giving like legal services or something yeah.
**Interviewer:** OK. Yeah, that's a nice interaction. [Irrelevant part omitted]

## E.6 Incentives

**Interviewer:** Let's move on to incentives.
**Interviewer:** Yeah yeah, so one part of the traditional open source software development was like incentives of the hacker in his room, building, contributing towards open source because yeah, it was fun. And others being actually paid and not just because they want to learn and, uh, all that kind of changed a lot in the last 20 years, but also it still exists.
**Interviewer:** But for you guys... You guys are paid.
**Speaker 1:** Yeah, Yep, we find that the way to get people to sustainably contribute to both client projects and internal projects is to pay them. Not that revolutionary in the web3 crypto space. But then we pay them in something that has stable value or some sense of real value. And so usually that's stable coin. We do like I said, we do let people donate their time if they want. And we are currently exploring alternative ways of also paying people to upskill and sort of getting a mentorship program going. Where we might have senior people on a client project overseeing junior people who are actually doing the work and the junior people might make a little less, but they might have an opportunity to work on new technologies, whereas the senior people might have the opportunity to make more money for their time than they normally would, right because maybe they're not spending too much time overseeing, but they're getting a big cut. Kind of that compensation or something like that so. We've been exploring ways of incentivizing upskilling by paying people for it. And I think we've even been exploring incentives of like dealing with dOrg tokens. I don't think we've arrived at anything concrete yet when it comes to defi mechanisms with our tokens.
**Interviewer:** Everyone paid an outlook hourly rate or?
**Speaker 1:** Yeah so it, it varies but typically our internal projects have a standard rate that we pay. Unless we're bringing in the specialists from outside or something. Our client projects, the rate is negotiated. The sales team will negotiate the rate with our client and typically. Since our sales people make commission, they make I think 10% of the lump sum or whatever we get, whatever commission they get. they're

incentivized to sort of push that rate as high as it can go, while still making the sale. So our rates do vary by client project, but it is pretty good. Especially if you don't live in a western country. Like we have some colleagues who live in India, Palestine, like or like some low income country and one thing we decided we really hate that some big corporations do is location depending compensation and so we just say like if you're a senior engineer you're going to get paid probably like a US rate for a senior engineer. Even if you're like an incredibly low cost country, so.
**Interviewer:** Yeah, I understand that.
**Speaker 1:** Yeah, we're paying for an experience not for where you're living.
**Interviewer:** Right
**Interviewer:** No no.
**Interviewer:** Yeah, well, I once talked to people from Google and they were like yeah, first we lived in Australia and pay was good, but then we moved to California, and then it was, well, quite high, but then again living there.. It wasn't that high.
**Speaker 1:** Yeah, that's true and it's sort of like backwards where these big tech companies are like we'll only pay you the good salary if you live near us or live in a competitive area, but we think it's actually smart, to incentivize people, hey, we'll pay you the highest compensation we can and you can live wherever you want, we don't care. So I'll hopefully be back in [low cost living country] next month and then my cost of living will go way down. Even though I'm in the countryside, in [US State]. [Personal information omitted] So I hope to go back there soon and, it's making people digital nomad around lower cost countries. [Conversation about housing prices and living locations omitted]
**Interviewer:** So you pay a salary... Are there other incentives for people to contribute or to work? I mean they like it I suppose or.
**Speaker 1:** Yeah, I'd say social cultural incentives that like, so we have more people who are full time dOrg, earning their livelihoods at dOrg and so if they want to make it easier for themselves. To earn their livelihood. If they see some way to improve it, if they want to, if they feel like they like dOrg and they want to give back and like you know, sort of help improve dOrganization. Yeah, I think there's plenty of social cultural incentives and I think they can be a little unique, because they're not like a ladder climbing thing. You're not trying to become director of dOrg or something. So people have a lot of freedom to make improvements and iterate on things.
**Interviewer:** I suppose people are also drawn to the organization form and the freedom, the decentralization, the no boss thing. Independence.
**Speaker 1:** Yeah, absolutely. I would say one weakness we have is that, sometimes our senior people like to move on to their own projects. I think some of them like the freedom so much and then they get so deep into tech the tech that they're like; Oh I want to start this thing or like I want to join this client project as like an actual like full time contributor or something and I want to be less involved in dOrg and like work on this or that thing. Which you know I think, like it can be disappointing, it ultimately indirectly benefits us 'cause they're still contributing to the same ecosystem. And I think that's why we're exploring defi mechanisms right now, because as we get some super highly skilled people and some of those want to move on. Because, you can make some sort of crazy levels of compensation on some crypto projects that we're hoping to find some way to incentivize some of those super senior people to stick around and not just leave for crazy money.
**Interviewer:** Yeah, I can imagine that.
**Speaker 1:** Yeah, because if you're making your own token and your own Defi protocol, then you could decide your own compensation and it can be, if it pumps, it can be something actually quite ridiculous.

**Interviewer:** Yeah, ah right. So you do kind of see that happening in your organization as well.
**Speaker 1:** Uh, yeah, to a limit I think.
**Interviewer:** Uhm yeah, you don't have a token except for reputation. I mean no transferable token.
**Speaker 1:** Uh, no, not currently. Yeah, that's the sort of stuff we're exploring a little bit though.
**Interviewer:** So, you have reputation, you can vote with your reputation, right?
**Speaker 1:** Yeah, it's a prerequisite and that's your voting power.
**Interviewer:** Are there other utilities towards Rep, having Rep? Being a top seven holder, I suppose?
**Speaker 1:** Yeah, that's one. But that's pretty much it actually. Yeah that like if you're in the top seven, you can be a signer.
**Interviewer:** Are there mechanisms that remove reputation?
**Speaker 1:** Yes, so if you check out our escalation protocol that I linked. There's two on-chain outcomes that if there's a dispute and something doesn't work out. One or both of the parties could make proposals to slash or remove someone's reputation. It is sort of a last resort, that's the real firing sort of thing or suspension from dOrg. So those are the mechanisms, whereby that would happen.
**Interviewer:** Are there also limiting factors towards you preventing the 51% or the top 7 from doing what they want? I mean if the top seven of dOrg are with dOrg for many many years. Eventually people in the top seven could gain that much reputation that it's not really feasible to..
**Speaker 1:** You, might think so, but we've just seen that... So I would say maybe a year ago we had two whales with like 24% each or something, or like a year or two ago. They were both collectively 51% and now we have seven who are maybe collectively 51%. And so we've seen the inflationary pressures as being much stronger than the accumulation that each, any individual, can get. So I would actually expect at a certain point, we have to increase the amount of signers to like something in the budget, than like to worry about if the seven, or like if there's going to be a point where they just stick around with the same amount of reputation and are able to just loot the treasury or something. And also like in practice, we just haven't really had a lot of interest in the actual transactions and stuff. Like the governance process.
**Interviewer:** You're just very practical organization.
**Speaker 1:** Well, yeah, so like, there's probably a better way of doing that. So you could have researchers design better mechanisms and then you could have developers engineer like a whole end to end solution. But what we found is just doing that route is very time and cost expensive and so we kind of do like we're experimenting as we go. So we are a bit reactive, like maybe we're not as proactive as we could be in our planning, but it's work so far. And we don't see the chances of like our top 7 signers a year from now, suddenly looting the treasury. And even then, if they were to loot the treasury. So like all our client projects are segmented from the Treasury right? And one could imagine that like oh the singers, who control this safe, they're looting the treasury. You know, maybe we shouldn't pay them anymore. Maybe someone should you know... I think at that point dOrg probably implodes, someone makes a different dOrg, right? And everyone leaves to the new dOrg. Or like maybe the seven signers? If it's like maybe one was trying to loot the Treasury and maybe three didn't read the transaction, right? And they're like, oh, whoops, like sorry guys, then they're probably going to remove that one signer.
**Interviewer:** It's always relative majority right now, right?
**Speaker 1:** Yeah, so currently in our proposals it is relative majority and so we do

know... That's another thing, we do know the some people said like oh, but what if someone just spams proposals? And somebody basically attacks our snapshot. It's possible, I think, currently and like we could maybe build mechanisms to limit that, but in practice, no one cares enough to do that. And even if they did. I think we would just pass another proposal, voiding the past proposals. We could be like hey, we're removing this person who's spamming proposals and we're voiding all their past proposals that didn't yet get executed by the signers or something, right? 'cause it's still manual, right? That's more of a problem for DAO stack or Aragon probably. Which is why I think DAO Stack has like Jan and like you know they have all these other mechanisms.
**Interviewer:** Yeah, and then you need a lot of complicated mechanisms. Whereas in with dOrg, it's quite practical.
**Interviewer:** You just remove the attacker and then fixx, what has been...
**Speaker 1:** And even though, maybe don't have as much on-chain as Aragon and DAO stack. I feel like in practice. We're able to be quite decentralized, even though we're less autonomous. A little bit. Like in some ways, more decentralized than other DAOs.
**Interviewer:** Yeah, that's definitely true, I think. Hearing your story, reading your handbook. You are very decentralized, much more so than other dao's which have a lot of autonomy or automation built in.
**Speaker 1:** Yeah, I think that's because getting automation right or the autonomous part is hard and expensive and if you get it wrong then it's you wasted that time basically. And so we want to be decentralized and so we just pragmatically figure out like on-chain off-chain like what can we do and then we do that right. [Conversation regarding time of interview omitted]
**Interviewer:** Yeah, so that was it for the incentives do you have anything to add?
**Speaker 1:** No, I think we're covering a lot.

## E.7 Community management

**Interviewer:** Yeah, then we'll move on to community management. Although less of a community, more like colleagues I suppose you guys are but also community?
**Speaker 1:** Yeah, I would say. In some ways, we're more of a community than your average business, I think. Because people earn their livelihood here, often full time, it is a different way, different field.
**Speaker 1:** But currently we're incredibly selective, in terms of who can join.
**Interviewer:** Yeah, 'cause it's a bit different from open source software projects where you have like a whole external community as well and interaction with that.
**Speaker 1:** That's true. Yeah, we don't have... and PolyWrap does. Because you know they have investors and they have, community members and stuff like that. But yeah, for us we're focused on our builders and I would say our community, we do have people on our discord that I think are part of our Community. Like they talk amongst themselves. And like to ask us questions sometimes. And we also have these DAO partnerships like partnerships with DAOs. And so we do have, a bit of a community, but it's not the same of having a protocol that we're sort of built around.
**Interviewer:** Yeah, this question more applies to open source software projects. How do new members get involved with the DAO as in? Yeah, how do you attract new people with a low barrier, things that they can do or participate in. With you, it might be a little bit different. I don't know if you have an answer to something like that. How do you interact with new people? How do you attract new people or how

can they you know do something?
**Speaker 1:** Yeah, so currently. We have, usually a pretty, handholding process. I mean, first it starts out, we fill out this builder interest form. Like if they want to join dOrg. I think it's on our careers page. And that goes to this form that we have in airtable and so then, it's kind of a, don't call us, we'll call you. Sort of things, so usually different builders occasionally look through that. Often salespeople look through that, looking for people with different expertise. And a lot of people fill that out, but we only sort of reach back out to a select few and when we find someone who we want to activate, usually that's either someone we don't know, but they look really good. Or we've had some sort of referral from them, either from our finance partners, builder or something. Then usually if it's a personal referral, the person who's referring, then will either shepherd them through or that is one of our specialist roles, a facilitator will shepherd them through, post on the forum they'll do an interview. If they're technical, they'll do it with one of our tech leads. If they're non technical, they'll do it with one of our PM's. This is just one interview usually and then, they'll post feedback from that interview. Like basically saying, this is how it went, highlights, yes or no, this is their recommendation. They will post a snapshot proposal to activate them. Once that passes they are a builder and so then the facilitator usually will give them all their access and usually have a meeting with them to help them navigate our DAO a little bit to OK you have this background. There's these client projects. You can connect you with this. There's these internal projects that you... You should talk to someone, so then usually sort of get people plugged in that way.
**Interviewer:** Yeah, so it's yeah you sign up and then you'll call them kind or they get referred.
**Speaker 1:** And we used to be incredibly open and like, let almost anybody in actually, but you know, especially with engineering. Like you have to be a bit more careful to verify that you know certain people have the expertise they say they have. Before putting them on high visibility client projects and stuff. Especially in the crypto industry, I think because there's a lot of ambitious people who want to get rich with crypto and stuff, and so some people are willing to push the envelope a little bit.
**Interviewer:** Yes, so the formal process is signing up, then be asked. Go through an interview with the tech lead or dOrg builder. Then some discussion and feedback happens, and then a proposal happens with snapshot. And then they get a walkthrough on dOrg. Do new members have to approve their knowledge, technical competence or alignment with the values of project?
**Speaker 1:** Uhm, yes, we recommend Members do. We don't really have formal processes around continuing education, training or upskilling more or less. We hope that since many of our members are also freelancers or otherwise involved in the industry, that they will find ways to do that and get on client projects we want to do that, but that's definitely one area that we're hoping to improve.
**Interviewer:** OK.
**Interviewer:** Do you, do you verify identity of new members?
**Speaker 1:** Yes, so because every Member must be a contractor under U.S. law, right? We do need to have the real life information for tax purposes and for filing purposes and business purposes. So most of the time, unless some Members prefer at least their public private profiles to be private. We operate on sort of real name identities. Not always some members prefer to go by their aliases. But ultimately, we need to have their real identities for tax purposes.
**Interviewer:** Yeah, OK. So they'll just send you their identity information and you

check it out then?
**Speaker 1:** Yeah, so part of the onboarding is we have them fill out this form for U.S. tax which includes their real stuff.
**Interviewer:** But you don't meet them in real life or whatever. Not usually. We do usually have a yearly retreat. We had our last one in Barcelona this past summer, which was like a week or so long. Uhm, and people tend to meet up spontaneously too, like often at Etherium conventions. I think people met up at the one in Lisbon that was recent. I think like East Denver is coming up, we'll probably have people there. Yeah, so it's not like a formalized process. We like to get together once a year for like for some to[inaudible].
**Interviewer:** But you do verify the identity, yeah? Yeah, so everything is applicable to U.S. law even. For yeah, even people outside of the US?
**Speaker 1:** Yes, so I'm not exactly sure of the legal requirements for having contractors outside of the US. But I know our accounting team ensures that we conform to U.S. law. And so we do report what we pay our builders to the US government. And if they are U.S. citizens they have to pay taxes. And of course, typically since they're contractors, they have their own business. So maybe that's a bit confusing. Maybe it's specific to U.S. law, but every contractor has their own LLC, their own business and so they contract with dOrg.
**Interviewer:** So everyone is a contractors from their own business?
**Interviewer:** Yes everyone. Yeah, I mean everyone should have one if they want to limit their liability.
**Interviewer:** OK, now the picture clears for me personally.
**Speaker 1:** But yeah, that's how it works. And dOrg pays some taxes. I'm not really sure about the corporate taxes, I don't know too much.
**Interviewer:** Yeah OK, that makes it a lot more understandable for me as well. Regarding tax, I was wondering a little bit about that. And then obviously this is the answer. Yeah, and then you have the escalation protocol to deal with issues.
**Speaker 1:** Those are like issues that can't be worked out between two people or between a group of people that are just sort of intractable issues that we need a process for.
**Interviewer:** It is only the escalation protocol that is in place? Or are there also other guidelines or protocols that deal with how certain issues have to be dealt with?
**Speaker 1:** Ultimately things come down to the escalation protocol. So if you wanna see the advice for... for example risk factors or project managers like that section. Like, uh, let's see being a tech lead... The responsibilities of being a tech lead... So the project managers and stuff will make recommendations or say like hey, we think this or that should happen. And if builders don't agree and they fundamentally don't agree, which is pretty rare. Then that would go through the escalation protocol. Yeah, so pretty much everything boils down to that and rarely do we reach that.
**Interviewer:** I can imagine. Do you have anything to add about managing your members or resolving conflicts.
**Speaker 1:** I mean, on our discord server we have, like I think we have like. Announcements and stuff up. There was like a thing where Oh yeah yeah we had some warning about spam, which you see pretty common, in like crypto discords that no Member of dOrg is ever gonna ask you for your private key or you know. Some people are trying to represent themselves as dOrg or stuff like that. Yeah, usually our facilitator manages updates to our discord and we have a social media person that does blogs and our social media so I think we had a newsletter before. So that's pretty much it to be honest. That's all I can think of.

## E.8 Software development processes

**Interviewer:** Yeah, it's pretty clear in your organization, I think. Let's move on to the last part of the framework, software development processes. You're not a product driven DAO, so maybe a bit different, less relevant.
**Speaker 1:** Yeah, I would say that like, some of these varies by project, by project, and ultimately. Those procedures are at least on client projects, up to the tech lead. Right, so the tech lead is responsible for the technical delivery of a project, and so ultimately the technical side. What kind of review process approval process? You know the release process is appropriate to that project. Depending on the needs of the team, the needs of the client. The same could be said for internal projects, as these are broader visibility's, right? So, I don't think we've had any internal projects where we're sort of staking or putting real money in them. I mean we use gnosis safe, but we generally prefer to use things that are fully audited, well tested. That's why we're, in some ways, we are sort of hacking together a DAO using gnosis safe and snapshot. But there's actually a reason for that, and the reason is gnosis safe has been pretty well tested, audited, verified. So we feel pretty safe about gnosis safe. Putting our putting our money there and there's a lot of newer DAO frameworks out there that have a lot more features. A lot more functionality, a lot more going on. But getting audited in this space is so expensive. And like such a significant effort, and often those audits don't cover economic exploits a lot of different things that you would want them to cover up. We've sort of had emergent internal policies of selecting technologies that are robust. Have a track record.
**Interviewer:** Are there any certain responsibilities that could be differently allocated I suppose?
**Speaker 1:** It depends. There's different kinds of projects, right? So there can be [a project] where we're getting a grant from a foundation and they're expecting us to manage the projects really ourselves. Like sort of overwhelmingly, that they're just sort of giving us the grant, and we're checking in with that and we're doing the whole thing end to end ourselves yeah. This can vary, I think we're doing a grant from the Ethereum Foundation to work on their DAO drops projects. And so I think, Vitalik was involved in talking to us about requirements for that. So it depends how much involvement they want to have and then we have other projects where we're just embedding our developers, almost in their team where they're deciding the release process and testing the level of quality. And we're almost sort of staffing their team with people know Web 3. So it depends.
**Interviewer:** It all depends on the project. Okay. Any patterns that you? That emerge or you kind of have seen?
**Speaker 1:** So one thing is, I think if you check out our project management, is we started with this QA worksheet guide. These are sort of our best practices that we want our project manager and tech lead... Make sure these [things] are getting covered and these are sort of our baseline.
**Interviewer:** Ok, that's clear. That's a pretty good satisfying answer actually.
**Speaker 1:** Actually to be honest, I didn't know that the QA worksheet... these docs are getting updated periodically and so sometimes I'm like, oh I didn't know they updated. So I think this is pretty clear in terms of our development practices.

## E.9 Evaluation

**Interviewer:** Awesome! Then we've gone through the entire right thing. And then I want to know. What do you think about it?

**Speaker 1:** Yeah, I think you have some. Really good questions. I'm expecting to see sort of your final final study, right? Especially in the different case studies. I'm very curious, what other DAOs answers are to this and what your ultimate thoughts and conclusions will be so I hope, when you get your thesis going, maybe you can reach out to us and share the...
**Interviewer:** Yeah, definitely, will do! So yeah, I do have a few questions as well, so. did it provide you with any new insights?
**Interviewer:** Going through this.
**Speaker 1:** I mean, this maybe, this is arrogant, but I feel like we're covering a lot of things pretty well, and yeah. So like that was an insight, because sometimes it seems being in a collective, things are a little messy sometimes. But we're hitting our base is pretty well... [inuadible]
**Interviewer:** Yeah, I agree, yeah. There's really not not much that you've missed. And you are just a builder. Although longer involved, but you are very much aware off what is happening or how it happens, right?
**Interviewer:**
**Speaker 1:** Yeah, so I am a builder and a tech lead 3/4. I'm on a client project, but like 1/4 time I tend to spend on operations. I'm technically in the top ten of dOrg reputation holders, so I'm getting up there.
**Interviewer:** OK. Is there an ambition to get up there? Is there an ambition to become a signer?
**Speaker 1:** I would like to be a signer.
**Interviewer:** That would be cool, right?
**Speaker 1:** But there are also some people who work crazy hard at dOrg. And so I also like spending time with my [family, personal information omitted] and stuff. Yeah, there is one gentleman who like works insane 60 hours, 80 hours or something like that. I don't know how he does it. So his reputation of the signer is sort of well earned 'cause he puts in the time. Yeah, I'd like to get there someday.
**Interviewer:** It would be cool. Good luck.
**Speaker 1:** Thank you, thank you very much. Do you think this framework could be useful for other daos or for yourself?
**Speaker 1:** Yes, absolutely. I think it's a great way to review your DAO basis. I think I was talking with some other researcher that was trying to come up with a DAO certification something or framework, and so I think a big challenge in this space is. Everybody wants to be a DAO. Everybody wants to start a DAO, but not everybody wants to actually be decentralized and autonomous. People need to have some way of knowing what kind of DAO are they? How DAO-y are they actually? And so I think the first step is research and that can also give us insight into what works and what doesn't.
**Interviewer:** Yeah, so how can this be useful then?
**Speaker 1:** Uhm, yeah. So like I said, I think as a self evaluation for DAOs, just to see where they're at. It is a mechanism for others to evaluate DAOs. It is a mechanism for people to evaluate DAOs broadly and see, what are the trends, what works, what doesn't, where are people heading and stuff and what are maybe the changes at some point?
**Interviewer:** Alright thanks. So the next questions was what would be the best moment to use the framework in a DAO life cycle and then you said self evaluation and for research too.
**Speaker 1:** Yeah, so I think probably. I could see it being used at the beginning as like when you're starting it DAOn. Maybe like thinking about this stuff. But also I think it's a great midpoint check where you're like: hey, let's do some governance

evaluation and see are we a DAO? It could also be... There are many crypto startups that start out and they're like, hey, we're traditional startup, but we're going to be a DAO eventually. So when that DAO part eventually comes, then this is sort of like a check of are you a DAO now?
**Interviewer:** Good answers. Are you familiar with the DAO canvas?
**Speaker 1:** I'm not OK.
**Interviewer:** Are you familiar with the business model canvas.
**Speaker 1:** Business model Canvas, no.
**Interviewer:** It's a tool. It's a picture where you answer all the questions of your business model, usually in the business model canvas. So what's your value proposition or your key partners? What are your income streams? Kind of those things and with DAO canvas... It's for people to create a picture on the business model of their business. DAO canvas is to create a model of how their DAO should, could, would look like? Do you think this framework would help new DAOs in picturing what the governance and how the DAO needs to be?
**Speaker 1:** Yeah, absolutely yeah. Yeah, I think it's pretty important 'cause I think like I said, like many people want to start DAOs. But they know how to start traditional companies and so there's more things to think about if you actually want start a DAO.
**Interviewer:** So now a very important question. Are there any elements of governance, DAO governance or governance that have regular governance that were not covered by the framework? Or do you think it's complete?
**Speaker 1:** That's about delegation...
**Interviewer:** Or is there a focus missing?
**Speaker 1:** I don't think so, there's definitely a lot of different DAO mechanisms out there, and more and more are coming up and there are so many different types of those with different focuses. So we're like a services DAO, but there's like protocol DAOs. There's like, community DAOs. There's lots of different DAOs. So far I think this worked well, definitely for us. Yeah, I'm not sure if it would work for all possible DAOs. But it seems high-level enough that it would, but also I think. There may be different types of DAOs that you might want to have different questions?
**Interviewer:** Yeah, but for your case, you're not missing something specifically.
**Speaker 1:** No, I don't think so. I like that you asked about delegation too. I mean, we don't have that, but it's something we want someday.
**Interviewer:** Yeah, so regarding that I've looked at the different voting mechanisms and then I got overwhelmed, lost, panicked. How am I going to make something out of this? And then I tried to break it down and see, OK, What mechanisms are going on here? So one of them is delegation. Others are staking or having a cost towards voting, betting. Voting from a budget. So I think that question is also in there somewhere.
**Speaker 1:** Yeah, that makes sense. Yeah, I think delegations is like the most interesting I've seen, but ultimately there are also different sorts of mechanisms to control who can make proposals when proposals can happen, who can pass them, who can vote on. But there's a lot out there and it really depends on the needs of that DAO. Right?
**Interviewer:** And then the final question, do you have any suggestions for changes or any suggestions for the framework?
**Speaker 1:** No, yeah, I was pretty satisfied with it. So yeah, sounds good.
**Interviewer:** I'm pretty amazed we got everything covered.
**Speaker 1:** All right, yeah, right on time too, yeah.
**Interviewer:** And I mean also, yeah, on time and also all the different governance

elements actually.
**Speaker 1:** Pretty cool. Yeah, feel free to let me know if there's anything else I can help with or anything. Yeah, but happy to be a part of this, yeah.
**Interviewer:** Thanks, this is great. Then, officially I have a sentence. Thank you for participating in this case study, we have come to the end of this interview. If you have any other questions, please let me know.
**Speaker 1:** OK, yeah, will do. Thank you so much. Yeah feel free to reach out if yeah if there's anything else you need and I look forward to seeing the final research, yeah. [End of interview]

## E.10 Email conversation post-interview

*Thes are excerpts of the email conversation that followed after the interview, in which the interviewee requested an addition to the overview of the dOrg governance model.*

**E-mail 1 - Speaker 1:** It'd also be great if we could add something in the incentives section about rep-weighted token bonuses, as we have done two already and plan to automate this to make it a key part of incentivizing people to accumulate more rep.

**E-mail 2 - Interviewer:** Regarding the rep-weighted bonuses, that's interesting. Can you tell me a bit more about it? Like: In what token did you award bonuses? Who received the bonuses and how were they distributed? Was this also an idea that kind of came up and was then voted on Snapshot? Do you know more specifics about the automation ideas? Like the interval of bonuses and the distribution key?

**E-mail 3 - Speaker 1:** Sure, so I know we've done these before but can only find records of our most recent one. Typically, 10% of all funds go to the dOrg treasury including token compensation for our clients. We decided, instead of swapping them for stablecoin or ETH, that we distribute them as a bonus to our reputation holders. We distributed an end of year token bonus to builders who were active and had at least 10,000 rep as of the end of 2021. This also included a reputation update, which currently happens quarterly to conserve gas but we want to happen monthly or even more often if we move off Mainnet. Here's the transaction for the bonus. Here's the Snapshot proposal that was passed to approve the distribution. Calculating the bonus was based on the square root of reputation to reward builders based on aggregate value added to dOrg while curbing the disparity between larger and smaller rep holders. This was inspired by quadratic funding and voting methods that are used in systems like Gitcoin. Going forward we would like to automate monthly rep updates and token bonuses. This could either utilize the push method developed here (send tokens out to everyone in a single transaction) or a pull method where the script updates a merkle root that allows each builder to claim the tokens owed to them. We also want to consider moving this entire process to Polygon in order to minimize gas. I hope this answers your questions but feel free to ask any more you have.

# Appendix F

# Aragon interview transcript

## F.1 General questions

**Interviewer:** Let's start with questions, and I'll record as well. Your name is [Speaker 1], and you are a member of Aragon executive SubDAO The official name of the DAO is aragon Network DAO. How long has the DAO been there? I know aragon association been there since 2016.
**Speaker 1:** The DAO was launched on 20 october last year. 20 october 2021
**Interviewer:** Could you word the purpose of the DAO?
**Speaker 1:** That's the fun thing, it was never formalized
**Interviewer:** It was never formalized, okay, okay, will you leave it at that?
**Speaker 1:** I can give you my perspective of what the DAO should be It should be a tool to decrease the dependency of the prospective network on the current core team. In the beginning it would be a tool to enable the current core team to proactively push more and more of the work towards participants of the network towards a community of interested.
**Interviewer:** How many members? Etherscan shows 12000 addresses.
**Speaker 1:** I will leave it at that. In the spirit of permissionless system, it makes sense to give everyone an opportunity to participate and become a member by just purchasing tokens. Obviously the more tokens you hold, the more interest you have.
**Interviewer:** What tools do you use for communication or governance? I suppose you use aragon voice for voting.
**Speaker 1:** Yeah however, it is suboptimal. We will be transitioning to [redacted]. I mean this is not public information fyi, we haven't announced that this transition will happen. It depends on... This should become public information by mid-march.
**Interviewer:** It is fine to not include that.
**Speaker 1:** Voice is suboptimal, we will be using [redacted]. Similarly we are currently using aragon govern, which has proven to be also not optimal. We will be probably transitioning to... So govern is an optimistic governance framework. So we'll transition away from that to a more traditional governance framework.
**Interviewer:** But yet to be determined how?
**Speaker 1:** We're building a framework there. In terms of purely simple communication tools we're using Notion Decentralized alternatives are emerging, currently no decentralized alternatives to notion. [inaudible] A forum

## F.2 Legal foundation

**Interviewer:** And you also have discord. Let's move on to Legal foundation of DAO Does the DAO have a legal entity or foundation? From the Charter it says it will not

have a legal entity, is this true?
**Speaker 1:** This is the status quo The space around legal wrappers is rapidly evolving At some time if it makes sense, there could be a legal wrapper. It is not something we're ideologically opposed to. This is something that currently doesn't make sense.
**Interviewer:** How are the dao and its members protected from liabilities? Or is that unclear?
**Speaker 1:** That is somewhat unclear. I think, basically the charter transfers some of that liability to the compliance SubDAO. Because the compliance subdao has veto power. So basically anything from which potential legal liabilities could arise, is decided upon. the compliance committee have the power to veto that.
**Interviewer:** Understand that. So OSS license, is mostly GPL?
**Speaker 1:** I don't understand that I don't know what... GPL?
**Interviewer:** the software license that you release the software under... The copyright license
**Speaker 1:** No Idea, I'm the most technical member of the executive subdao. There's a technical subdao which deals more with... So basically I don't think it's ownership per see, since it's open source. There are some brands, that are being owned by the aragon association, that is a non profit, that is basically a steward of the brand and the treasury and it will transition those assets into the DAO. IT holds the multi-sig that enable code upgrade, basically the keys to the repo.

## F.3 Decision making

**Interviewer:** Let's move on to decision making, I distinguish between on-chain and off-chain For on-chain I wonder about the on-chain decision domain. What decisions do you take on-chain?
**Speaker 1:** Basically main dao has free reign over budget. Any token holder can vote on... Pretty much any token holder can submit a proposal following a certain procedure, allowing for deliberations and feedback. So they have to post a forum, then have to submit a proposal with a certain voting window. Anyone can do that. They only have a treasury that they can control. Other assets haven't been transferred away from the association. What decisions are made on-chain vs off-chain? Very few decisions are actually made on-chain, that holds true over the entire ecosystem. Most decisions if you look at votes, most decisions are made before they get to a vote. And that's not only... that's true over the entire ecosystem. You rarely see votes that are close,
**Interviewer:** So it's more of a formality?
**Speaker 1:** Most decisions that pass have been taken off-chain before they get to on-chain voting.
**Interviewer:** Okay Are there defined processes for off-chain decision making?
**Speaker 1:** It's politics? There's a defined procedure, you have to submit a proposal into the forum...
**Interviewer:** That's there, Besides that it's politics.
**Speaker 1:** Yes it is politics.
**Interviewer:** If there are a lot of decisions that have a specific frame, then that's hard to define.
**Speaker 1:** You can see that when they're making parameter changes. It is mostly off-chain negotiation and politics. So everybody is allowed to submit proposal The moment you submit a proposal, there's a threshold of 50 ANT as a spamfilter.
**Interviewer:** I saw that

**Speaker 1:** Proposals do not need to be approved before being voted on BAsically the stage when the proposal is in the forum, before being voted on is, actually can you rally enough support for it to pass. Everyone in the forum can disagree, if you have someone in your backpocket that has a lot of tokens they can overrule that disagreement Before a proposal is being executed, the compliance committee has the veto power. Although this proposal has been approved... They can actually remove it before or after voting. They have to justify why the proposal is not passed. If the proposal potentially exposes the dao to legal liabilities or this proposal goes against the charter that is why they're not....
**Interviewer:** Are the outcomes of proposals enforced on-chain?
**Speaker 1:** It's not multi-sig, it's optimistic governance thing. Anyone can schedule an action. Anyone can transfer money out of the treasury. And they have to justify it, like there's a proposal passed to transfer funds. If that action is not proper, anyone can actually challenge it and block it, and it can go to aragon court, which is an arbitration system.
**Interviewer:** How is voting power acquired?
**Speaker 1:** You can buy or earn tokens. You do productive work for the network, you're being compensated in kind with tokens.
**Interviewer:** One token one vote
**Speaker 1:** 1token one vote, we're thinking of other systems related to faith voting, [conviction voting] your voting power is related to the duration of your stake.
**Speaker 1:** Do voters have single vote or multiple? Currently single, once we move to [redacted], we can have multiple In [redacted] you have orders right? You can have multiple options in your preferred order. Then you can consolidate this person has number one and number three... I don't remember the name of this voting mechanism. ... There's no staking mechanism, but this is something we're thinking of. ... Currently no cost to voting.

## F.4 Leadership role structure

**Interviewer:** I have questions regarding leadership and role structure. The DAO is decentralized, but still you'll have some organizational forms
**Speaker 1:** I think this is a direction the whole space is going where you'll have. It's just a matter of human coordination. So you'll have different hopefully competent and experienced groups taking up workstreams. And having relative autonomy within... having ownership of the workstream. You can have two teams working on the same thing in parallel and the team that produces the better output, ends up getting funded in the next round. Currently we have three subdaos, they have the domain of...
**Interviewer:** You have the executive subdao, compliance subdao and tech committee right?
**Speaker 1:** I think executive subdao is currently a bit too powerful, but that would over time dissipate, because as workstreams appear, there are teams that take ownership of those streams and are being elected in the main dao But it's not going to be main dao decides on everything. We wanna do a democracy where we minimize the governance load on, because fatigue. People don't want to vote everyday on random stuf
**Speaker 1:** So it would be like elect a team that takes care of a workstream for a particular time, they have a specific scope and go from there
**Interviewer:** That's how you're taking care of tasks currently?

**Speaker 1:** Currently most work is being done by the association
**Interviewer:** Are the members of the subdaos selected?
**Speaker 1:** Yeah, so basically this was first season... one was elected... To give you an idea, why this is pretty nascent.. the charter received a 0.2% of support from the network, so people don't care. 0.1% voted on the members of the members of the executive subdao. At this point the system is very vulnerable because of low participation, one of the members was voted in. By voted in that means there was one person with a big stack voting for him, means that person got the community support right. They just knew someone with a lot of tokens who voted for them basically. The other two were appointed by the committee. In the Aragon association there's a committee who is the steward of the treasury.
**Interviewer:** within the dao?
**Speaker 1:** No no, it's aside from the DAO. All the assets of the Aragon network... all the tangible assets of the aragon network, they are in a treasury. There's a committee who is the steward of the treasury, and there is the aragon association who is the operational unit, which does most of the productive work on the network. For the next three years, the plan is to transfer that treasury into the DAO. But Currenty the dao only has a small portion of that budget.

## F.5 Project chartering

**Interviewer:** okay hmmm... Let's move on to project chartering Do you have a mission vision or anything values norms?
**Speaker 1:** We have the manifesto... beyond that.... I think However it is pretty broad, so we realized... so the mision vision should be structured better. As I said, this has been overlooked and has to be better. The process of changing that is changing the charter. Then the next question is what is the process of changing the charter?
**Interviewer:** That is going through a vote right?
**Speaker 1:** Ghehehe, so just to give an idea. so the threshold of changing the charter is 0.5% right? But the current version received 0.2 and it still got enacted. So currently the system is very....
**Interviewer:** I get it, there are just not that many people voting.
**Speaker 1:** Most people don't care enough to show up to vote. So release plans and roadmaps is supplied by the aragon association
**Interviewer:** So aragon association is tasked with development for the aragon network, and they have the autonomy to decide...

## F.6 Incentives

**Speaker 1:** How are development... incentivized? Within the association there are employees and contractors and outside of the association, people are incentivized through funding proposals. So for example technical support as a function... do you mean software development or organizational development?
**Interviewer:** So there are two questions, the first one is specific about software development Then there is a second about intrinsic and extrinsic motivations for people to participate
**Speaker 1:** So software side it is aragon association with certain components that are being outsourced through proposals. So for example there's a team that asked .... Outsource of aragon..... If that proposal passes then they get to do that piece of work. So at the moment other teams can apply for funding to do, not in parallel,

but like relying work on growing the technology objects[inaudible] Network[inaudible] Extrinsic or intrinsic?
**Interviewer:** Extrinisc would be money, getting paid, building expertise, Intrinsic I like the DAO space, I like aragon, I want to contribute
**Speaker 1:** Aragon has been one of the first projects in the govern space, in the dao space There is some sort of. There is a lot of brand power. People who are looking into this topic, especially people who are new to this space, they first go to Aragon. Intrinsic motivation is bettering the world, you know, like non monetary recognition helps a lot. Like going into discord server, having hey that helps, is a strong motivation. Being appreciated even is there is not monetary incentive attached to it is a strong motivation in this space.
**Interviewer:** Then that is a culture Aragon is trying to..?
**Speaker 1:** Absoultely We structured a tech support guild where community members are handling tickets and they are being compensated based on that. So there is a team that handles tickets. They are community members So there is this pool of money that is given to this.... Then they are rating each other out. the y rate eachother on who has contributed how much.
**Interviewer:** So you have a financial incentive for community members to actually participate in tech support.
**Speaker 1:** Yeah there are even more proactivemodels that...
**Interviewer:** In light of time, you just have a token model right? No reputation model? So what utility does the token provide?
**Speaker 1:** Currently...
**Interviewer:** As a monetary value, and you can vote with it?
**Speaker 1:** You can vote, and then there's also a right to work. If you want to become a juror on the forum, you have to stake ANT to be able to be part of that pool of jurors that get elected to vote on things within the arbitration system.
**Interviewer:** How are tokens issued? Or is there a fixed pool?
**Speaker 1:** There is a meter. Basically there's a meter contract. Currently I think it's the committee, the committee that I mentioned about the pool of assets that holds the multi sig. Over time that is going to be transitioned to the main DAO It is kind of like economic gains. You can freely mint tokens, but how would the community react to this. And how would the market react to this. As this is basically increasing the supply
**Interviewer:** Do you burn tokens or take tokens out of circulation?
**Speaker 1:** No, there's no such mechanism in place at the moment.

## F.7 Community management

**Interviewer:** There is no reputation model, let's move on to community management. What are ways for new members to get involved with the dao? You mentioned that you were incentivizing community members, to give tech support. And people can come to your discord server. Are there other ways to participate?
**Speaker 1:** Yeah YEah, there are multiple other ways to participate. There's a growing list of ways to participate. Overall that is not being overly structured at the moment. So there's a growing list to participate as the association is proactively pushing work to the community. Ohhh... so there is this work stream and we need someone to lead it... Jump at it. Defend your case why you're the best person to do it and then you get a budget and then you start running with it. So yeah it's
**Interviewer:** When are you a member of the dao? You are a member when you

have tokens right?
**Speaker 1:** Formally yes. You can be a contributor without being a member. If you are a contributor, you would for sure become a member as part of the compensation is paid in tokens.
**Interviewer:** Do new members, or lets say contributors need to prove their knowledge, technical competences, or alignment with the values of the project?
**Speaker 1:** Alignment is part of, in the proposal that you submit. If you apply for funding, we need a proposal you submit to provide justification for the strategic alignment of what you are doing. It can be like. In a way its permisionless. Are you aligned with the association strategically and if not why? So you can go and do something completely different, if you can justify why you do it and how it contributes to the network. We don't want the association to be the single chokehold of power. You can do something different, but you need to explain why you are doing it. Just because, is not a justification right.
**Interviewer:** Do you identify the identity of. . . ?
**Speaker 1:** No
**Interviewer:** Are there Any protocols for resolving conflict
**Speaker 1:** There's the arbitration system aragon court. Ideally There's a team wh ois moving that corner upstream. In the sense of conflict resolution before the need of arbitration, but the system is not in place, it's being developed.
**Interviewer:** Are there any sanctions against members of the dao? Could you for example take away their tokens?
**Speaker 1:** No, if such a person was in a position of power, there are mechanisms to remove them. If they are in a position of formalized power. So for example if you applied for a budget to lead a workstream. That. It's not like, we're not going to pay you for the work done, unless that work is actively malicious. But the DAO can choose to cease the contract. Software development processes
**Interviewer:** We move on to software development processes. For Aragon that could bbe more ambiguous, as there's not one software product that you are pushing.
**Speaker 1:** Basically because software development at the moment its with the association.
**Interviewer:** So code acceptance and release procedures are determined by the association as well?
**Speaker 1:** So the technical committee has to approve, the technical committee is part of the dao structure
**Interviewer:** What does it have to approve?
**Speaker 1:** It has to approve releases. Over time, the idea is. REmember the keys for the repo? Over time the idea is it will be transitioned to the technical committee. At the moment it is more of off-chain consensus. So the technical committee approves and the association executes. But over time the keys will be actually transferred to the technical committee. But at this point with 0.1% approval rate, it is kind of weird.
**Interviewer:** And then procedures for code acceptance is the association has autonomy to decide on how they handle software development
**Speaker 1:** I, like this, look as you noticed there are a lot of things that we're not currently doing, but we're thinking of, but that you're touching upon. LIke preventing conflict, identifying members, we're thinking of the reputation system, it's just not being deployed yet. It's a composable space. Thinking about those things, it means that If we find a solution that is good and working, we're just going to use that. We're not going to build our own for everything.
**Interviewer:** All right, I think this gives a pretty good picture of the aragon DAO.

I'm wondering, how you reflect on this interview and this framework. Maybe you can take a look at the whole framework.

## F.8 Evaluation

**Speaker 1:** Page 66.
**Interviewer:** Did this framework provide you with new insights? Or is it more you already knew all this, but it touches upon that.
**Speaker 1:** I think... I don't think that is specifically new, it is a good way of structuring things. So in the software development process and the project chartering. This is [inaudible] Especially when its roadmaps and release plans, this is stuff that I'm not touching. So this is stuff that I, not really know, and haven't actively thought about. Everything else is like things that we are considering. This is a way of putting that in a structured framework
**Interviewer:** In what way do you think this framework is useful? ... Was it a useful exercise to go through all this?
**Speaker 1:** Yeah, absolutely. Like I said, I'll take the bits that are relevant for me. Not the small bubbles, but the bigger bubbles. So proposals, voting, leadership and role structure. I'll map... basically because a lot of the things that I mention is like oh these are things that we're thinking of, or this is something we're exploring but haven't actually actively enacted it. So it will help me keep a tally of completeness. It doesn't mean oh we have to resolve of all those things, but you have to be aware. Same thing you don't have to be aligned with the association, but you have to be aware of what the association is doing and make the conscious choice of not following that path. So it can be like, oh this is something that we've considered and decided not to do, or this is something that we decided we're doing later or this is something we're doing. So having that... a tally of things to do and like where in time they sit and making the conscious choice like we will make this later or we will ignore this is important. So suppose if someone comes and says how can you guys be so stupid and not think about this. But we've thought about this and decided not to pursue it because of this and this reason.
**Interviewer:** Yep, Good thanks. What do you think is the best moment to use this in a DAOs life cycle?
**Speaker 1:** I think it is a bit overwhelming to be honest. There are a lot of things. So I think this should be fairly late in the life cycle. Everybody has their own definition of a DAO life cycle for me, the definition of a lifecycle is: The moment you have a discord server or telegram group with a community that wants to pursue a common goal. That is when the DAO starts. So you have the idea, Then you have the community around the idea. This is the moment when you're already sort of a DAO. The moment when you have on-chain assets, that's a complete DAO. It's a common objective idea, or pursuit. A collection of people. On chain assets. Those three elements are what a DAO... Those three elements are inside the journey of a DAO. Then you come to let's have a multi-sig, a core team, contributors, community... As you evolve. As you decide things are stable, things are working, we're pursuing the goal. Let us evolve and lets have decentralization that is when you should think of this framework. But if you think of this framework at the idea stage, you're fucked because there are so many things to think about, and at the idea stage, you have to focus on other stuff.
**Interviewer:** Okay
**Speaker 1:** So I think this sits at the progressive decentralization stage. So you're

like: we have a functioning structure, let's make it more decentralized. Let's push more decision making power towards a wider community based... The life cycle of an existing organization transitioning into a DAO is a bit different. So this is for natively emerging DAOs.
**Interviewer:** So I have one final or two questions. Which is, are there elements of governance that were not covered by the framework? Or do you think it is complete? And do you have any suggestions for changes to the framework?
**Speaker 1:** I honestly haven't thought about this deeply enough to provide an answer. The framework seems complete. There are no gaping holes. Oh we haven't thought about this or. I yeah... haven't thought about this in enough depth. To have a thoughtful suggestion.
**Interviewer:** Thank you so much... [closing remarks] Thank you
**Speaker 1:** This is a topic that is relevant for us obviously, and the fact that we're a bit not where we should be in terms of our own organizational development doesn't mean those topics aren't tackled by teams. So stay in touch.
**Interviewer:** It is a hard space, everybody is still figuring out all the aspects
**Speaker 1:** Also it's an opinionated space as well, as people have opinions shaped by their own backgrounds.

[end of interview]

# Appendix G

# SecureSECO interview transcript

## G.1 General information

**Interviewer**: So the name of the DAO is going to be SecureSECO DAO? [Affirmation on camera]
**Interviewer**: SecureSECO DAO it is.
**Speaker 1:** Yeah, I've always envisioned it to be SecureSECO DAO. But I was waiting if somebody would reply and say no, it should be TrustSECO DAO.
**Interviewer**: What will the purpose be of the DAO?
**Speaker 1:** Make the world wide software ecosystem a safer place.
**Interviewer**: How many members? Well, we've not started yet or...
**Speaker 1:** Five... No, I don't know yet. We are with five currently but yeah. If I take the WhatsApp group. I think that's 20 or so. A bit more even. Okay let's say 25. But I'm also counting [Person] and [Persons].
**Interviewer**: Some of them are still a little bit attached I think.
**Interviewer**: Yeah, which communications governance or blockchain tools, that are essential to the DAO's operation are used, so we have WhatsApp. We have a GitHub.
**Speaker 1:** A website, SecureSECO.org
**Speaker 2:** For the proposals we are going to use Snapshot
**Speaker 4:** And for DAO platform, is it Aragon or Colony? S: I look at
**Speaker 2**:: Probably going to be Aragon, because it has templates. And Colony is quite a new project, it's promising, but they're not as far as Aragon yet.
**Speaker 1:** Why do you ask this question, Speaker 4? So I think it's a really important question, but I'm curious why do you want to ask it?
**Speaker 4:** Uh, because I didn't know that we have selected Aragon or Colony.
**Speaker 1:** Ah right.
**Interviewer**: I do want to note that Aragons platforms are messy and their organization is messy too. And that their products are suboptimal. In their own words. Uhm, but that may be another discussion for another time.

## G.2 Legal foundation

**Interviewer**: OK, good, so we've covered the general stuff and let's move on to the legal foundation of our DAO. So, will we have a legal entity?
**Speaker 1:**: What was the question?
**Interviewer**: Will we have a legal representation or legal entity that represents the DAO, yeah?

**Speaker 1:** This is the foundation that I was talking about, stichting in the Netherlands. I'm hoping to get my friend, the notary to make it formal at some point. And this is one of my big challenges. How do we sort of embed the rules of the DAO in the foundation so that they're really connected forever that they can't be disconnected somehow.
**Interviewer**: Yeah, so there are few DAOs which are busy with these kinds of things. There's lex DAO. Maybe it's interesting to get into contact with them, but they are of course not in the Netherlands, but they are a legal advice DAO. Uhm, could be interesting. I know a lot of DAOs are using their services.
**Speaker 1:** Okay cool
**Interviewer**: So how are the DAO and its members protected from liabilities?
**Speaker 1:** So let's say somebody installs a harmful component through SearchSECO or something or through TrustSECO that we didn't know, it was going to be harmful. Then are they protected from liability? Or TrustSECO gives some false information, somebody uses it. I don't know. I mean, at the end of the day. You just use it as an information source right? So it's kind of hard to say. Yeah, so I Would say no... It depends. Whose liability are we talking about?
**Interviewer**: The members.
**Speaker 1:** Members liability. They're not... The organization doesn't.... I don't know...
**Interviewer**: Probably not. Unsure, but something maybe to keep in mind? Spreker 2 Yeah, but is it possible to protect your...? I mean liability is liability, right? If I punch somebody in the face I'm going to get sued.
**Interviewer**: Yeah, but if you are a limited liability company, you are limitedly liable. You are not personally liable.
**Speaker 1:** Oh yeah, so then there's that. Yes, because the foundation will take care of the data. And so, the foundation will be liable for incorrect data, for instance, or for installing viruses on peoples computers.
**Interviewer:** OK. And what open source software license will we release the software?
**Speaker 1:**: Apache... The other one, Affero GPL
**Interviewer**: AGPL okay.
**Speaker 1:** Well, I've thought about nine months ago, and that's where my memory is.
**Interviewer**: So who has ownership over the created code and does the DAO have direct control and ownership of the source code?
**Speaker 1:** Should do yes.

## G.3 Decision making

**Interviewer**: Right. And let's move on to decision making. So what decisions will we take on chain? Which ones? Uhm so yeah. With on chain I mean, which will be formally taken through a proposal through which the Members vote. And then, on the other hand, we have off chain decision making processes which are more, through other communication tools where hands on or if there's....
**Speaker 1:**: I think. The main thing is money, so at the moment. We want to spend money on a new project, for instance using Bitcoin or one of the other platforms for dOrg. So, if we post a project there for a price that would be something that we decide on with the DAO.
**Interviewer**: OK.

**Speaker 1:** And also the changes to the TrustSECO calculation I guess. So if we change the calculation in any way, we need to get people to agree with it.
**Speaker 1:** But I think it should be the optimistic kind of voting. So if you three people say yes and nobody else objects then that's yes.
**Interviewer**: OK. Do you have something to add, Speaker 2?
**Speaker 2:** I think that Snapshot is an off-chain voting mechanism?
**Interviewer**: Yeah, and they store their voting outcomes on IPFS or something.
**Speaker 2:** I don't know if that is enforced onchain automatically.
**Interviewer**: I'm not sure if anyone has actually done anything like automatic execution of proposals on snapshots to Gnosis Safe.
**Speaker 2:** For snapshots it happens for some DAOs.
**Interviewer**: Automatic enforcement you mean?
**Speaker 2**: Yeah
**Speaker 1:** So and what's the scenario here? So let's say if we want to do for instance, a change in the trustseco calculation, we write a proposal, people can give comments. So you have like an open goal for it. And then when it's finished, we vote yes or vote no for it using snapshots, I guess?
**Interviewer**: Yeah, usually you have a discussion on a forum and then yeah. And then if everything is alright, it goes to snapshot. You take a decision and then you have to look at who's going to execute or how are you going to execute the proposal? And usually there are people who are responsible for handling the outcomes.
**Speaker 1:** I guess that goes into the proposal as well, then if Interviewer and Speaker 3's name are on it, then the two of you can take care of that it gets properly executed.
**Interviewer**: And then for financial proposals there are people who are all holding the keys to the treasury?
**Speaker 1:** Oh that's very interesting. Yeah, so this is. Where I want the Committee of Wise People, yeah?
**Interviewer**: So mostly there are multisignature wallets. So you would need approval of...
**Speaker 1:** We will need that.
**Speaker 2**: Also there are some risks with multisignature wallets.
**Speaker 1:** What kind of risks are there? That so somebody dies or something, or...?
**Speaker 2:** Like there's a small group of people who in theory can do everything with the wallet. So that involves a risk.
**Speaker 1:** Yeah for us I mean so the thing is the SecureSECO DAO has the goal of making the software ecosystem safer, so as long as it adheres to that goal. Anything is allowed I guess. So what I'm looking for, and this is where I'm more speaking in general terms than that I know how to implement it. But as long as any initiative fits that bill, I guess we would support it. I Guess we would even financially support it if we have money in the coffers.
**Interviewer**: Yeah, it makes sense, uhm? Also, you can also think in more practical terms that if a small group were to take action which is not in line with the majority, that they are holders of power, then while you will have conflict and. Then another group may split off or up. Yeah, it will harm the trustworthiness of her project.
**Speaker 1:** Yeah, but would that happen if we are sitting? On top of the money, the software development decisions... We give the DAO a lot of power, so commits, a pull request from someone will be accepted I guess by some key members in the DAO in most cases silently, so it doesn't need any voting or anything unless it's a really big change I guess. So as long as we have those sort of key holders in the DAO.

Oh yeah and if they leave then we have a big problem. Now this is of course the scenario you're talking about. Now and then we have the data in SearchSECO. I'm hoping that gives the DAO enough power, enough value to stay more powerful than its competitors.
**Interviewer**: Yeah, that's the value proposition of the DAO. Yeah, so who's allowed to submit proposals?
**Speaker 1:** Anyone in...
**Speaker 2:** Yeah, so from the interview we had, I think we came to the conclusion that only whitelisted members can make proposals.
**Speaker 1:** And what does it mean to be whitelisted? Is the barrier for that very low or is it very high?
**Speaker 2:** Now I think that's going to be KYC process.
**Speaker 1:** Really!? That's a heavy decision. So why does it have to be KYC? I give my data to everybody but...
**Speaker 2:** Yeah, because it's mostly going to be companies or going to make proposals in a DAO. And you want to know which companies are operating in the DAO?
**Speaker 1:** I found it so interesting that you say they're mostly companies I hadn't even thought it would be mostly companies. I mean, I hadn't thought about it at all so, that's actually a really interesting addition.
**Interviewer**: Yeah, you'll have individual community members, developers. But you also have the stakeholders I suppose. Of which many will be companies I suppose.
**Speaker 1:** Yeah, so these are org members I guess. We're going to give them some kind of qualification.
**Speaker 2:** And if you want to make proposals. I think you have high stakes in the DAO. Why wouldn't you do small, KYC process? Yeah, makes it makes the environment much safer I think.
**Interviewer**: Will it not be burdensome for the DAO itself? To execute the KYC. ?
**Speaker 1:** Yeah it will be. KYC is expensive. I mean relatively, it's a couple of euros I guess. Per person or per organization. Yeah, the upside is that we are immediately covered against all kind of money laundering expectations... OK, I had no idea we would be this formal but I'm happy we are.
**Interviewer**: Will there be a cost or other requirement to submitting proposals in order to limit the numbers and increase the quality of proposals? Yeah, there will be a small fee. Like a little small fee, so you don't get malliciousness...
**Speaker 1:** What is a small fee?
**Speaker 2:** I think something from 2cents to €1.00. Yeah, not too much because activity in DAOs is a very big problem. So you don't want to scare people off with high costs. But a small fee, I think, will raise the quality of a proposal.
**Speaker 1:** When you say one euro, now I think it's more like a DDoS prevention mechanism. So that people don't start sending... I thought when you said small fee, I thought €100, for instance. I don't know. Utrecht could easily pay that for an update of the TrustSECO mechanism if
**Speaker 3:**is doing that. Because, well, she's the expert on TrustSECO so, why wouldn't we pay €100 to ensure that this gets implemented? But I don't know what the life cycle of a proposal will be. I guess we have to define this as well, or we have to steal it from somewhere.
**Interviewer**: Very much true, yeah?
**Speaker 1:**
**Speaker 2**:, Do you have a picture in your head of what a proposal lifecycle looks like and can it be part of your thesis? I haven't really thought about it. But I'll start thinking about it. Yeah, I think most DAOs it's like a week or something.

**Interviewer**: It could also be determined practically depending on the proposals. See as you go or decide as you go.
**Speaker 1:** Yeah it could also be part of the proposal procedure that you actually say, well, this proposal is going to take this much time for its complete evaluation.
**Interviewer**: Will we have approval of a proposal before voting on?
**Speaker 2:** Yeah, there's going to be a committee of experts who will have to check every proposal and they will accept it or decline it. When it gets accepted, it gets listed on the voting platform. Snapshot I think
**Interviewer**: What happens if it gets declined?
**Speaker 2:** Uhm, well, the proposal has another chance to embrace the proposal. I think that's fair. So the committee should give a few arguments why it was declined.
**Interviewer**: Is this for every proposal or mostly technical proposals? And what criteria will there be for the committee to decide on.
**Speaker 2**:: I think it's also going to be optimistic governance so that small proposals don't even have to be looked at. Because you can't vote on every decision in the DAO. It's just not efficient. So we need to define. What is a simple proposal, what is a more important proposal. That's important to note.
**Speaker 1:** Yeah, it's really interesting because the pull request is typically something small. It's a small addition to a tool or it's changing the TrustSECO mechanism that could actually be the result of a proposal. So it's kind of interesting to see OK, when. Does a proposal have enough impact, or when there's a pull request for instance of impact to say: ho! Ho! we can't just implement this we need to vote on this first. So I think this is also one of those touch and go things where we just have to do it and see how it works and then we know if it's going to work out.
**Interviewer**: Yeah, definitely.
**Speaker 3**: So in this, the process should be manually approved by a committee or or team so maybe we can set up something automatically to check the quality of the proposal? Such as if one participant, submit a duplicate one or we can easily identify if it is a valid proposal, I think we can write some code to do that automatically before somebody manually approves the proposal.
**Interviewer**: You can also make a standardized format for proposals. That would help too.
**Speaker 3**: Yeah, but in this case we can't check if it is a duplicate one.
**Speaker 1:** I'm hoping that parts of this process will be completely automated by tools in the future. That Aragon will have things for this, or because it feels silly that we're even thinking about, you know how do we accept or not accept the Google Doc as a proposal. I've seen some of them for colony and they look really nice. They're just people writing things down and saying these are my ideas. What do you guys think. Shall we have a vote on this and then eventually many of them are just accepted without those votes, 'cause people say this is a great idea. Let's do it. So I'm hoping we don't have to write that tool form because it sounds like a lot of work for something that should be taken by platform I guess.
**Speaker 3**: Yeah, platform is fine. If people manually do the check, then yeah, it will be huge work. So I think platform, other platform work, others some tools. Can do that automatically will be perfect.
**Interviewer**: We come to an interesting part with voting and how is voting power required? How will I have some say in the Dow.
**Speaker 2:** Yeah, you can acquire voting power by providing valuable contributions to the DAO so it can be anything. It can be proposals, can be mining, it can be... It's going to be a reputation based system. You will acquire reputation based on your activity in the DAO.

**Interviewer**: OK, will these be metrics that, uh, automatically tally up some? Will you have a list of OK, so this contribution is five points that will be 10 points or will this be done manually at the end of every month. Hey, how much should we give that person or that person and then make a proposal or?
**Speaker 2:** I think manually is impossible. So it has to be done automatically.
**Interviewer**: OK. Do you have an idea of which activities and how to award?
**Speaker 2:** Yeah, so I think for voting we should. It sounds like that. Making proposals that are accepted by the experts. For mining, you can get reputation, but I think also maybe on the forum like community help.
**Interviewer**: This is like a thumbs up kudos, thank you.
**Speaker 2**: Yeah, kind of.
**Interviewer**: Yeah, something like source credit ish?
**Speaker 1:** yes
**Interviewer**: Uh, what do you imagine would be the largest source of voting. Power income?
**Speaker 2:** Yeah, I think that's the quality proposals.
**Speaker 4:** OK.
**Speaker 1:** Yeah, so not mining.
**Speaker 2:** Yeah, I don't really have a very good idea how valuable mining is for the DAO.
**Speaker 1:** And so I mean we will be mining for source code for searchSECO and we will be mining for trustseco to get data on software packages. So every contribution. In this domain. Will be will be very helpful, happy with it. So if somebody contributes their server or somebody contributes their Internet connection. That gives them all some kind of credit and we could say that's only financial rewards. Or we could say that gives you both financial and reputation. Uhm, personally, I'm mostly out for the reputation awards because I want my, uh, my 10percent voting power in the DAO. But I guess there's also people who are just in it for the money, which is also fine, so yeah. I imagined it would be something like this, but I'm also open to proposals here.
**Speaker 2:** I think the quality proposals is really, well what gets a DAO further. So that should be rewarded highly.
**Speaker 1:** OK, so I'm thinking about the following scenario I propose. Ah, right, OK, no there there. There it happens. Because I'm paying the developers, right? So when I pay the developers I should be getting something back for that, but I guess that could be that. I make proposal. The developer builds it in and then I get the reward for the proposal, so I guess there my credit is safe. And then I just get financial rewards for the resources I provide. Interesting, sort of DAO community points or something?
**Interviewer**: Yeah, income stream is another question mark.
**Speaker 1:** Yeah, for me it's not a question mark, so right now if companies want to use our data, they can pay for it in two ways: one is by providing their own data and two is by paying.
**Interviewer**: OK. All right, uh, So what kind of voting system is used? It will be reputation based if you thought about it will be one token one vote, conviction voting. Quadratic voting.
**Speaker 2:** Yeah, from my research. I used a model for it and the results were that it's going to be a reputation based voting system.
**Interviewer**: OK, reputation weighted?
**Speaker 2:** Yeah, reputation.
**Speaker 1:** So does that mean I have to pay when I make a vote?

**Speaker 2**: Well your reputation, It's burnt after you use it for your vote.
**Interviewer**: Your reputation is burned after you use it for your vote. So there's a cost towards voting actually, namely your reputation.
**Speaker 2**:: So it is a mechanism that will keep the DAO leveled for every player.
**Speaker 1:** And also for new entrants and.
**Interviewer**: OK, so all your reputation is burned. So if let's say. There are two proposals that or let's say there's a proposal for today and a proposal for tomorrow.
**Interviewer**: I will only have a reputation weight for... So if I vote today I lose everything. Or I can allocate an amount?
**Speaker 2**: You can allocate an amount of reputation, how important is the proposal to you? Allocate accordingly. You have to choose wisely.
**Interviewer**: OK, will that then be a quadratic model? Your first vote costs one token. Your second vote costs two. Third vote costs four. Fourth vote, 8. Will it be a quadratic model, or will it be just straight out I put in 20 reputation and it will be 20 votes?
**Speaker 2:** It's not going to be a quadratic model.
**Interviewer**: OK.
**Speaker 2:** Because in the model I used, these are also [inaudible]. So you can only add reputation based voting system.
**Interviewer**: OK cool, Speaker 3?
**Speaker 3**: Ah yes, I have a special case for TrustSECO We do not only need to vote on the trustfact from the proposal, we also need to consider the weight of each trustfact, though that's because there are some new trust facts submitted and we need to calculate the trustscore. And secondly we want the weight of each trust factor is not fixed, but dynamic, so we need to calculate the weights of each trust factor periodically so in this case I don't know either if somebody from the committee can [inaudible] the proposal for the weight of each trustfact. So in this case, for the weight calculation, the ballot. I don't know if it can be rank or score. Now like that. Then it will be easy for the trustscore calculation.
**Speaker 1:** Can you give an example so let's say I want to change the trust score where community is 99
**Speaker 3**: [indaudible] But we can give all the existing trust factor. Then we need all the voters to provide their score for each trustfact or their rank for the trustfact. Then we can. There's also some formula to calculate the weight, so it would be more accurate if we manually providing weight. In your case, uh, 99As all the results would be from the voter from all the participants instead of by [indaudible]
**Speaker 1:** So let's say that I propose that this is the new weighting mechanism, so 99 percent for one factor and one percent for all the other factors. Then people can say yes, I agree and people say no I disagree. And if enough people say no I disagree, then the proposal is simply shut down, right?
**Speaker 3**: No, I mean why do we provide exact value for each factor. Well, we only need the voters to provide their value. So for the score ballot, there will be 1 to 10. Then they just provide round one to 10, maybe 10 for source code, one for maintainability and we calculate the weight factor.
**Speaker 1:** Yeah, so I think you're touching on a very interesting point. What if we just leave this open? So what if we just leave it to the end user and we make it completely configurable, we propose that it always comes with the default weighting, which is everything 10Six months like that.
**Speaker 1:** Is this something that we want to do vote based or do we just want to say OK, the trust score is calculated with everything 10
**Interviewer**: I think you might need a committee for that, to think about and make

a proposal to change the trust score. Also, do you retroactively. . . ? I don't know.
**Speaker 1:** Yeah interesting yeah. So we need to make sure that a certain tool if it got a really low score last year and the trust core mechanism changes then that the old score should be retroactively changed as well, right?
**Interviewer**: Yeah, or you just store the trust fact, but not the trust score.
**Speaker 1:** Yeah, we do that anyway, yeah.
**Interviewer**: And then you can, on the front side, calculate the trust score based on the weights of the trust facts.
**Speaker 1:** Yeah, and the trust score we can just say, well this year this year we're working with the 22 trustscore But you can also go back to the 2021 trustscore and base your whole system on that. Interersting, I had not thought about this at all. It's a lot of work actually. That's the part I'm worried about.
**Interviewer**: OK, so
**Speaker 2**:, can votes also be delegated?
**Speaker 2:** I think yes, because in the early stages
**Speaker 1:**is going to be like a major player in the DAO I think you also want that some votes could be delegated to him.
**Interviewer**: Does he get to be in charge of like your voting budget, or a portion of your voting budget?
**Speaker 1:** Do I want this? Do I want this kind of power? I don't think I want it. Keep your votes.
**Interviewer**: Maybe it's not a very compelling argument or a compelling mechanism in this system?
**Speaker 2:** There are some systems that's I think it's called. . . In futarchy you can choose whether you want to delegate them or not. [inaudible] Can buy and sell faults from other players. But that's more in financial applications, so that's not pretty here.
**Interviewer**: Yeah, Futarchy is the prediction market one which I find: like what is going on here.
**Speaker 1:** It sounds dodgy.
**Speaker 2:** The reputation based model. I don't really think there's a lot of delegation. I think this is more like the Economic DAOs.
**Interviewer**: Is there a cost involved with voting?
**Speaker 2:** Yeah, [inaudible]
**Interviewer**: Yeah, your reputation gets slashed or whatever you put in. Will there also be a staking or betting mechanism?
**Speaker 2:** No, that's that's in, uh, in different funding systems.
**Speaker 1:** I say we keep it simple, I'm even wondering if we need the delegation idea 'cause, then you could really have representatives and representatives calling out. Like follow me, I'm the greatest thinker in this space. So that doesn't feel like what secureSECO is about, somehow.

## G.4 Leadership and role structure

**Interviewer**: All right, then, let's move on to leadership and rule structure. So yeah, we can be like everybody is equal but, ultimately, you will have experts and people who take on roles.
**Interviewer**: So will there be any formalized leadership roles? Or people who will be kind of in charge of.
**Speaker 1:** What if we don't? Is it possible to not have that?

**Interviewer**: Yeah, sure, surely.
**Speaker 1:** Yeah, then it's just whoever is the most entrepreneuring active member. Who gets the most votes and most power? And most that's sort of always been the idea? Where we try to ensure. That you know the maximum of 10So that we have at least always have 10 very influential people.
**Interviewer**: Yep, uhm, are there other defined roles and how are they structured as in? Also, will we have subgroups in the DAO which are responsible for certain aspects?
**Speaker 1:** Yeah, good one I guess. Like if somebody wants to organize a community, event. Yeah, then it would be very nice to have a committee for this, uh? Like, uh volunteers. So it, it makes sense to do that somehow, but it sounds very formal at this point. Like right now I don't want to say okay
**Speaker 1:**is the big boss or
**Speaker 3:**is the big boss. Somehow that feels wrong.
**Interviewer**: Okay. Yeah, sure. Are there roles that we can define within the ecosystem or within the Community? More like a Community member or a contributor. If you want to make a difference between that, or if a company gets involved, what will they be called? Will they be a partner then. . . ? Or will we have core contributors or core developers?
**Speaker 1:** I think you've touched on the main distinction, so I think that you have developers and proposers, but they're all just you know, one big gray mass of people who want to contribute in whatever way they're capable. Some are technical or not technical. And then you have the companies which indeed will contribute in a very particular way.
**Interviewer:** OK. But very much open actually, right?
**Speaker 1:** I guess so yeah, because. Yeah, but why would we now say well we have a secretary, for instance.
**Interviewer**: Yeah, that will emerge, when when it emerges.
**Interviewer**: Then that's very simple. Leadership and rule structure. We'll see as we go and we will be an open source software project.
**Speaker 1:** I hope so. Then it's a complete meritocracy, so the the more you bring in the more you can take out of it.

## G.5 Project chartering

**Interviewer**: So let's move on to the project chartering part.
**Interviewer**: Who decides on the vision or mission statement or other long term goals of the DAO? What is the process of changing this and do we have one?
**Speaker 1:** We don't have one yet, but now that you mention it. I think I should start writing one. I think that's one of the main things: that I write a document that sort of lays out like the five core principles of what SecureSECO should do and if the DAO adheres to these five core principles. Uh, as as judged by the members of the [inaudible] community or the access community or group of 10 full professors then, uh, the DAO can continue. Then the DAO should not be unplugged from the foundation.
**Interviewer**: OK, and uh.
**Interviewer**: Will this also be need to be approved by the community? The the community, being us 25? Sure, it's just us.
**Interviewer**: Have you also thought about values and norms of the DAO.
**Speaker 1:** No, I mean, I believe strongly, that we should have some kind of code

of conduct. That just, you know, be nice to each other. Don't discriminate or that's the usual stuff.
**Speaker 1:** Uhm, and I guess that these things can also be changed again, based on proposal. So somebody can propose to change the Charter to say something different. For instance, uh, but then I think we also need an expert committee to be flown in from the access and [inaudible] community.
**Interviewer**: Sorry, what kind of community?
**Speaker 1:** So this is my current plan and it's a bit vague, but there are two communities in Netherlands. The community of full professors in software engineering and the community of full professors in cyber security and if we just ask a committee of you know five members from one and five members of the other to keep watch. To be there, they only have one decision they can make, uh, which is unplug the DAO or keep it working. That's so they are the ones who could potentially say... They cannot become members, so they cannot become members who vote to and do these kinds of things. So that's the exclusionary one.
**Interviewer**: OK. Uhm, so these two communities will have the power to unplug the DAO
**Speaker 1:** Yeah, to kill the DAO. Yeah, so let's say a group of Ukrainians enters the DAO and starts extracting money from it in an unfair way because they have gained a lot of power and are just emptying the treasury. Yeah, that's the moment when somebody from that group should jump in and say, yeah no way. This is going wrong.
**Interviewer**: Does there have to be a consensus between those two groups.
**Speaker 1:** Uh, yes I see it more as a committee being composed of members of those two groups. Software engineers know about software and cyber security experts know about cyber security.
**Interviewer**: And what would it mean to unplug the DAO?
**Speaker 1:** It basically means that the foundation just becomes the foundation again, that there's money in the foundation accounts and foundation crypto account. Uh, and that's they start sort of either reinventing the DAO so that it works again in the future. Or that they spend this money on research in this field. So it's really the emergency button. If this is pressed, then the it's a way to keep the money in the coffers, and make sure that it's spent on the right things.
**Interviewer**: So, the DAO will have another treasury from the foundation?
**Speaker 1:** I think there's only one treasury. Yeah, so this is why I was very interested in this multi-sig stuff you guys were talking about. Because it could also be that we have to approve every big transaction. So above €1000, for instance that it should be approved by this committee for instance. So I'm now wondering whether we should have that unplug mechanism or whether it just should be somebody who's sitting at the key who has the key to the Treasury, maybe that's that's already enough. OK, thanks because obviously it's not clear yet, so it's it's either one of those two scenarios. And the whole idea is to make sure that the Ukrainians don't steal my money. And by my, I mean our, but you know, currently I'm the one who's bringing in the most money.
**Interviewer**: Yeah, and who determines release plans and project road maps? Or how will those be determined?
**Speaker 1:** Yeah, so right now it's super. Ad hoc so people. I propose a feature or
**Speaker 3:**proposes a feature or Speaker 4 proposes a feature, and then with the money that I have in my pocket, so not the money that's in the DAO, I determined that software will be developed. Now in the future, of course it would be better if we could actually do it through the DAO through gitcoin or something like this. Yeah,

so I think there's always going to be two money flows. One is the research flow that's helping
**Speaker 3:**and Speaker 4 and others who want to build software. And there's also going to be the flow in the DAO itself. And there yeah, proposals can be made with that money and things like this, but I think I will be active for a long time as an external funder I guess. I say me but, it's of course the Dutch Government.

Incentives
**Interviewer**: So how will development activities be incentivized?
**Speaker 1:** Yeah I'm hoping that we can use a platform like gitcoin or freelancer.com or whatever where we can just post a job and say, uh, there's an offer and a bounty and when the development is finished, we give the money to the person who I didn't work.
**Interviewer**: Also something from open source community or more dedicated developers. Or do you think it will be mostly through bounties and freelancers?
**Speaker 1:** Yeah, I think it will be mostly that. The interesting thing is, we just acquired a 3 year, person, a scientific programmer. He will be also contributing to the software and I will be determining what's on the road map. So, but as it's open source it will be contributed from me to the DAO I guess. And I get to determine it and I'm very happy.. actually Speaker 4 and me get to determine it together. The the DAO doesn't have much to say about it I guess. I mean the DAO could disapprove of the commits we make. But I can't imagine why anyone would do that. Because these are contributions that make the DAO more successful initially.
**Interviewer**: Yeah, so the DAO itself is not very active in the development of the software?
**Speaker 1:** Not exactly, it will be when there's money, so when there's enough money, if there's €10,000 in the account then we can really start thinking hey, what's the next language we want to implement in SearchSECO or what's the next data source we want to add to TrustSECO. And then it becomes really interesting, then it becomes voting time. I really hope he gets to that level.
**Interviewer**: Yeah, that would be good. But that is the ambition, right?
**Speaker 1:**: Yeah, totally.
**Interviewer**: Yeah, what would be extrinsic or intrinsic incentives for DAO members or people who participate in the DAO?
**Speaker 1:** Intrinsic, you want to make the world wide software ecosystem a safer place. Which has always been the goal. But extrinsically you will get credits, i.e., money for contributing resources. So if you have a free server in your, uh, in university, that's not doing anything, just run one of our clients on it and you can actually mine and make money with it. Uhm, so that's extrinsic. Yeah, I think that's it for now. For me it's also academically, of course, that we prove that theDAO concept works and that's more maybe intrinsic. People want their projects to be highly rated, highly ranked. Get a good trust score.
**Speaker 2:** Yeah, companies want to gain influence in the organization. So they have to be active to gain more power and to benefit themselves in the proposals. And that's the main driver for the largest tank wars.
**Interviewer**: But if people want their projects to be highly ranked. Would they be influencing the trust score or? I mean...
**Speaker 1:** I guess so, the incentives there is, that if we calculate the trustscore, your package has a score of 100 right now, but that's also based on the amount of information we can get. So if you can do somehow a contribution that we get more information, then your trust score might also be higher. Or if you want to influence

the trustscore then you disagree with the way it is currently calculated.
**Interviewer**: All right. Then the very traditional incentives in cryptocurrencies and blockchain, the token models or the token model. Will there be a token, besides the reputation model? Which we've already discussed.
**Speaker 1:** Yeah, I'm definitely thinking we should use a token, it's a pretty famous one. Called the euro. That's in the foundation. That will be the main source of currency. But if we need to convert to Bitcoin, Ether whatever, for whatever reason, that's perfectly fine by me. Yeah, but there won't be a tradeable, SecureSECO token?
**Speaker 1:** I've heard that you need a team of 50 lawyers to launch cryptocurrency or token these days. And I I don't want to pay for lawyers, I want to pay for a safer software ecosystem.
**Interviewer**: Yeah, it doesn't make sense currently anymore.
**Speaker 1:** Yeah, but we need some kind of thing to transact with.
**Speaker 1:** If somebody provides us with some data and we want to pay them for it well, then we need to pay them somehow and the way in which I wanted to do this actually for now is that people just send an invoice to the foundation.
**Speaker 1:** Yeah, so that makes us help follow the tax law. So that's where our DAO becomes legal, so to say.
**Speaker 1:** I feel really insecure about half of these answers.
**Interviewer**: That's alright. Then they might also change.
**Speaker 1:** Yes obviously.
**Speaker 1:** It's very early days where we haven't even been to...
**Interviewer**: Very much. And yeah, so the reputation is, will it there also be other utilities towards it, besides being able to vote?
**Speaker 2:** Haven't really thought about that. But as of now, I think. The only utility is voting and making proposals.
**Speaker 2:** But maybe in the future you can stake it or something to gain a little bit of passive income or... It's an option in some DAOs. But it's also more for economic tokens.
**Interviewer**: So in dOrg they have started with reputation weighted bonuses. So yeah, then reputation kind of also changes into economic incentive. But it isn't directly an economic asset.
**Speaker 2:** But what kind of bonus do you get from staking your reputation tokens?
**Interviewer**: No, reputation weighted tokens. So you have this much reputation and then a calculation is made of it, and then, well, if you have more reputation, you'll receive more tokens. And those are random tokens. Those are like Bitcoin or Ethereum or whatever they have in their treasury.
**Speaker 2**:: Interesting
**Interviewer**: Will there be mechanisms to remove reputation?
**Speaker 2:** Yeah, so I was thinking about the burning mechanism. Where for every proposal that's been made and every vote that tokens that were allocated for are burned.
**Interviewer**: Yup, but will the DAO also be able to decide? We don't trust this person. We slash his tokens or burn it? Would the DAO be able to take away reputation? I don't know if that's technically possible, but.
**Speaker 2:** No, like in what situation would you want to take away reputation from someone?
**Speaker 1:** The one mechanism that maybe, answers this question is inflation, so I always wanted to make sure that if I have 100 reputation this year, then in a month that should be 90. So that I keep being incentivized.

**Interviewer**: OK, Yep.
**Speaker 1:** You're also talking, for instance, about excluding... Let's say, uh, Speaker 5 gets kind of rebel in the group and starts trying to steal the money from... or to give it out for free to the Ukrainians. Then we will be able to remove his reputation?
**Interviewer**: Yeah, as a sanction mechanism. Too big? Could be?
**Speaker 1:** Yeah no I don't know. It could be a good idea. I don't know how it would work though?
**Speaker 1:** Like how do we hurt people?
**Speaker 2:** It's like they're creating a social credit system like for every bad action, you will lose reputation, for every good action you will gain reputation.
**Interviewer**: It's just a question.
**Speaker 1:** Well, the big fear is the Ukrainian... sorry for saying Ukrainians I could just as well say the Frisians. But yeah, just a group of people who entered the system in a sort of sybil attack and they come with 100. All hundred take out the money and they divide the profits.
**Speaker 2:** Yeah, so maybe the emergency DAO should be able to remove reputation, yeah? In emergency cases only

## G.6 Community management

**Interviewer**: Hmmm, emergency DAO. Alright, that covers the incentives. Let's move on to community management. This will be about how to attract the community. How do you manage the community, grow the community and how do we get new members? So yeah what are ways for new members to get involved with the DAO or interested people.
**Speaker 1:** I think one of the key values is our data, so we have the trustSECO data and we have the SearchSECO data and if you want access to it, you need to either pay. To either pay or become an active member and ensure and provide your own data to get credits and then get maybe even paid for those credits or use it to buy new data again. So that's the engine that keeps everything running, and from there I think there are all kinds of interesting places and groups of people that we can address. One is software engineering researchers, because software engineering researchers want access to our data. They want to know OK, does this method live in other places? And big companies want access to our trust data like iktu wants to know, OK, does trustSECO say anything about this software package? So for all of them there are reasons to be pulled towards this. And there are different events. There's a contest called the Repository Mining Conference contest, so this is a contest where I would like our datasets to be entered. These are some of the mechanisms I'm thinking about.
**Interviewer**: But also if you look at other DAOs, if I wanted to currently contact them or see what they are doing, I just join their public chat.
**Speaker 1:** Yes. We need a public chat.
**Interviewer**: Or, uh, yeah, or you look at their GitHub and see issues or their forums.
**Speaker 2:** Most DAOs have a Telegram chat.
**Interviewer**: I thought they were all on discord. Probably both.
**Speaker 1:** Well, we will find this the cheapest solution there.
**Speaker 1:** Yeah, so I guess the formal process will be KYC. I'm looking at the questions.
**Interviewer**: Yep. So what does it mean to be a member then?

**Speaker 1:** Good one, it basically gives you access to the data. Without having to pay for well... without having to pay for it with money. You have to pay for it with your own data and resources. But I think if you now become a Member, I think you should get some credits, like starting credits or testing credits. So let's say you get €5 in in data credit, so you can at least do one projects evaluation against SearchSECO or 100 projects against TrustSECO. Then you can't really get the €5 out of the project. I mean we should say that if you want to get money out of it, it should be at least €100 or something.
**Interviewer**: OK.
**Speaker 1:** For being a member, it just gives you access to things you want. It gives you an account.
**Interviewer**: OK. But does it require you to? So if you want to vote, or if you are a miner. Uh, are you remember them too? Or are you a different type? Yeah, but then also you need to do KYC before you can mine or...
**Speaker 2:** No, I KYC was only for creating proposals. Voting is also anonymously.
**Speaker 1:** Yeah, so you say anonymously and it's but it's key based, right so? You have a key. Why does it? It doesn't have to be anonymous? I mean, I'm happy to hear that Speaker 4 supports my proposal or
**Speaker 2:**is against my proposal, so that's how I'd like to see it. And then talk to you guys about it and say why are we disagreeing? What am I missing? Or is that not how I should see it?
**Speaker 2:** You just see an address and I think for voting it shouldn't really be KYC. As you can really make very large impacts.
**Speaker 1:**. But how do you avoid Sybil attacks?
**Speaker 2**: With voting costs. [inaudible]
**Speaker 3**: But that doesn't mean all members do voting?
**Speaker 2:** Yeah, I think all Members can oppose this.
**Speaker 1:** No it's reputation.
**Speaker 3**: But I remember Arthur did a set of interviews. Many participants say hi only. At first they only do the voting only trustdata. If all members are easy to do the voting, then the quality of the results maybe not quite level.
**Speaker 1:** Well, yeah, it's a good question, but if one of us has a lot of reputation, so you and I and Speaker 4. Actually, all six of us will have a lot of reputation, because we've done proposals. I think we are going to be the heaviest voters also. So hopefully it will not be polluted by sybils. By people who have evil intentions.
**Speaker 3**: But is it [inaudible] KYC for all the members instead of just for the proposals.
**Speaker 2:** That's going to be a very high barrier for new entrants to join.
**Speaker 2:** Yeah, people in this space are really not fan of KYC so.
**Speaker 3:** Do you think we need to collect some information of members like. Years of experience. Then maybe we can do, or show the voting result by some different kinds of members such as, for some developers, they have more than 10 years or 20 years experience. So then we can consider their expertise. So we will show the voting result, this result is by some 10 years experienced developer. This result... Yeah, something like that? Will that be quite complex?
**Interviewer**: Yeah, I understand.
**Speaker 3**: I think it can fix the concerns from our.
**Interviewer**: But voting is also maybe a political process. Like there's also politics involved. Convincing people of arguments. Maybe that person can exercise their experience or show their experience in that way. Or convince other people to also vote in his way?

**Speaker 3**: Yeah, I just need the result can be, show difference, uh, can be based on different kind of voters.
**Speaker 1:** Yeah, so what's the biggest fear? So somebody comes in and says OK, this trust score should be calculated no longer, with this really nice 10 10 10 10 but we now go for a 90 10 split between community health versus reliability or. So somebody proposes this. You and I will probably go: Ah this is bullshit we don't like this proposal. So you and I put maximum weights in the scale. So already we have 20% of votes saying let's not.
**Speaker 3**: I'm only concerned about the voting results. As with other interviews, they only trusted data voted by the experts instead of all the members. Yeah, so for example in our DAO, we have 20 voters, but only one expert. Then the others maybe are fresh or they don't have any... [experience] They are not seniors, so maybe their result provided will be not quite reliable. So yeah, so that's the concern from participants in Arthur's interviews. I think it makes sense.
**Speaker 1:** Yeah, so this is where the DAO has to prove itself, and I think you're really touching on one of the most sensitive parts. Because what if these Ukrainians again enter our system and basically just undress it completely? Then just say OK, well from now on it's going to be a coin toss. That's how we develop the trust score. So one tool gets zero and the other one gets one. Then our system doesn't work anymore. Yeah, so we need to find a way to make sure that the DAO always has wise people in it or people who vote, are wise.
**Speaker 3**: Yeah, exactly. Just like Hidde's annotation results. I think all of us will provide different trust results for the same message, so I think the voting result will be definitely different based on people's background experience. He's saying, yeah, I need to do some...
**Speaker 1:** Smart organizing.
**Speaker 3**: Yeah, exactly.
**Speaker 1:** Well, so and I don't know what that is yet, I think we have to start thinking about these scenarios, because it's this sybil attack that I'm really afraid of. Yeah, and then not necessarily a real sybil attack, but just 100 people who say, OK, we're going to attack the secureSECO DAO and right now they could very easily. They just need to earn all the reputation and then they can outvote us immediately? Yeah alright, I'm looking also at
**Speaker 2:**and Interviewer. To help us out with this and come with a proposal. Not right now on the spot. Oh good, we have some things to think about.
**Interviewer**: Definitely, OK, KYC, do new members need to prove their knowledge, technical competencies or alignment with the values of the project?
**Speaker 1:** I don't think so, we could ask for a, uh, a check that they say I've read the Charter and I believe in the same things.
**Speaker 2:** And there was also a github check right? So that the account has to be existing for two years, yeah? So that's a minor check for knowledge
**Speaker 1:** Yeah, that stops the sybil attacks a little bit.
**Interviewer**: Yeah, the Sybil attacks is on the mining part or?
**Speaker 1:** Sybil attacks can happen anywhere and it's basically Interviewer 1, Interviewer two, Interviewer four. All voting on the wrong thing, adding data to the wrong thing.
**Interviewer**: Yeah, but what are you most concerned about?
**Speaker 1:** So if Interviewer 1 to 100 entered the system all of a sudden and they start exerting far more influence than this one Interviewer that's representing these 100 should have.
**Interviewer**: But then the 100 Interviewers should also earn reputation in a way.

Spreker 2 Yeah true, so reputation wise it's not so problematic yet.
**Interviewer**: OK and then. How is the identity of new members verified? That is the KYC process.
**Speaker 1:** Or the GitHub credentials. So that's much lighter, that's just a single sign on solution.
**Interviewer**: Are there any protocols for preventing or resolving conflicts? Some DAO have an escalation protocol or anything, but that will be when necessary, probably.
**Speaker 1:** Yeah, we may need it when we get big enough and all of a sudden 50% of the groups says left and the other 50% says right, that we have a big judge to stand up. Like the Dutch full professors in software engineering.
**Interviewer**: Then are there any sanctions against members who act against the interest of the DAO?
**Speaker 1:** Not yet, but
**Speaker 2**:, any ideas?
**Speaker 2:** No, I think we should not do that. Because there needs to be a group who decides, like what's against the interest of the DAO. How are you going to define what is against the interests?
**Speaker 1:** Well with the Charter.
**Speaker 2:** I think you should leave this to the emergency DAO. When there's a real threat happening. I think you need to leave it for only emergency cases.
**Speaker 1:** I'm really afraid of the rage quit, so if five people decide to do a rage quit and they throw all their voting power at the proposal that says destroy the DAO, then we have to, by our own laws destroy the DAO.
**Speaker 2:** But why would anyone do that? First they have to build a lot of reputation.
**Speaker 1:** Yeah, that's what the rage quit is all about. So somebody has built up a lot of reputation, but they're so angry that they just go well, fuck this and they throw over the keyboards and they start... So this is rage quit. And if one person does it, there's no problem because they have 10
**Interviewer**: But besides funding, there's not a lot that's very critical no? Critical assets. I mean, the software is open source. You could decide to OK crap, we've lost here. Let's start over.
**Speaker 1:** Yeah, well, what if it's a protocol that decides to stop all the data flow towards SearchSECO?
**Interviewer**: Yeah, regather data?
**Speaker 1:** We regather the data and we start DAO 2.0.
**Interviewer**: Would be crap, but...
**Speaker 1:** Years of investment. We solved the software.
**Interviewer**: But at some point you would be able to identify these threats more concretely.
**Speaker 1:** So no sanctions.

## G.7 Software development processes

**Interviewer**: Yep, currently not. But there is a possible plug further down. And then we move on to software development processes. How are responsibilities for development tasks distributed amongst DAO members? This question is coming from a perspective of open source software projects where there's just a community of people... There are core contributors who will work a lot and then there are other

issues which are left open to the community or are left open to anyone. How will those development activities be well distributed?
**Speaker 1:** I don't think they're really distributed. I think it's carrots, so if somebody wants to work for carrots. We pay them in carrots. Voor niets gaat de zon op, as we say in Dutch, so nothing is free in life. And if somebody wants to volunteer for the project. And do contributions, great, awesome. If it doesn't happen, it doesn't happen.
**Interviewer**: And what are the procedures for code acceptance and is the DAO involved in that process?
**Speaker 1:** Right now we just accept anything that comes into Github. Haha, free code!
**Interviewer**: Yeah, currently no.
**Interviewer**: And the same for code acceptance goes for releases, currently none.
**Speaker 1:** Yeah, there's not really special procedures or anything like that so, I mean you've all seen part of the release procedures when Marien said oh there's a new version out there, please upgrade your servers. And then nobody did. And then nothing happened.
**Interviewer**: Yeah, it does also makes [more] sense when the project is more mature.
**Speaker 1:** Yeah, but it's a really good question because like I said before, every review or every pull request should be reviewed and if a pull request is small and doesn't affect the spirit of the project or helps it positively, then it should just be approved. But if it's against everything and it's a huge feature addition for instance, it changes the Trust calculation for instance. And then it has to go back for a vote.
**Speaker 1:** We need people there. We need the four eyes principles. Yeah, but again I look at
**Speaker 2:**and you to make proposals and I will accept them blindly.
**Interviewer**: So much for four eyes principle, right?
**Speaker 1:** OK, three eyes principle, haha.

## G.8 Evaluation

**Interviewer:** Right, uh, we've gone through all the. Elements or dimensions of governance in the model, and then we come to framework evaluation and I hope you guys can be critical.
**Interviewer**: So the first question is, did this framework provide you any new insights?
**Speaker 1:** Multi-sig wallets was new for me, I had heard the term before but I only now understand what they are and how useful they can be.
**Interviewer**: That's not from the framework, but...
**Speaker 1:** Well, OK, this talk.
**Interviewer**: Yeah, this talk.
**Interviewer**: But I suppose all the elements were already aware of all the elements of governance that this framework has covered?
**Speaker 1:** Let me go through them. Well, I mean the fact that it triggered me to start the project charter. I mean of course I knew that it would. Have to happen at some. Point, but this apparently, now it feels like a good time. So I sort of see it almost like the maturity model, your questions and. Some questions show us like OK, yeah, we've thought about this, but most questions make a seed: that's OK. Our Dow is still at level 0 in this respect. So we really haven't thought about it and even if we do think about it, we go: oh shit, this needs to be implemented and takes

a lot of writing to just even write down these rules and regulations.
**Interviewer**: Yeah, from the interview with the Aragon guy he said yeah, this model, for a DAO at the beginning is just overwhelming.
**Speaker 1:** Yeah, that's how it feels.
**Interviewer**: It's overwhelming and you have other things to focus on.
**Speaker 1:** Yeah, totally. Tell me.
**Interviewer**: He also, kind of called it a maturity model. For a DAO that is already established and has some assets, for them to look at this and assess what are we missing. And also as an overview. So, in what way do you think this framework is useful? Or did it provide you with any new insights
**Speaker 2**:?
**Speaker 2:** Uh, probably be thinking about more specific situations that could happen to the DAO. Like with the Ukrainians and in which ways they can break in. And also,I was thinking about what's a small proposal, what's a big proposal. How should the reputation be a test to that. Like you can't give the same contributions to every proposal. Some proposals are just the adjustments of a value in the code. And some are very new mechanisms that we build, that should be rewarded way more than voting on proposals. And how you can contribute the reputation automatically, that really got me thinking. Like is it even possible or?
**Interviewer**: Yeah, perhaps that's not even feasible.
**Speaker 2:** I don't even think that's possible. This really got me thinking.
**Interviewer**: All right. So then the next question: In what way do you think this framework is useful?
**Speaker 1:** Yeah, just as a checklist. It's so handy to have it. As there are so many things we didn't really think about yet, or that were mentioned in passing and security problem or yeah... And in that sense I think I'm going to keep this on my desktop somewhere so that I can always go back to it when I'm looking for problems, when I'm thinking: OK, What what have I not thought about, oh yeah, this this this. It could even be like a to do list. I am wondering if there could be a separation in sort of practical aspects, like how do we deal with a pull request on GitHub. Versus the more philosophical aspects, how do I make sure that the Charter is enforced? But maybe they are all practical aspects that I'm just still too young to see it. I'm wondering if you could colour them as blue and red.
**Interviewer**: Hmmm, I think there's maybe a bit of a distinction between the software development side and the governance side. But then at some point they also overlap because governance impacts the software development. I've tried to make that distinction in the beginning, but then also realized, OK, some things are overlapping, and the distinction is not clear enough. So it didn't make enough sense to me. But I understand where your thinking is coming from, because there is some kind of a spectrum of different kinds of governance elements. Ones which are more touching the foundation of the organization, while others are more touching the operational aspects.
**Speaker 1:** Yeah, and so that's just one of the questions that came to my mind, uh? Yeah, so and it's super useful. It's I, I don't even know where to start with saying how useful is it just makes you really think and also, yeah does it miss any parts? I didn't think about anything here that... It was more daunting, so I'm more looking at a Mount Everest and thinking: I'm not worried yet about cllimbing the top. I'm only worried about, you know how do I even get up to a 100 meters.
**Interviewer**: Yeah, definitely. Also, don't worry about climbing to the top. Because if you worry about, that then you're not going to start climbing.
**Speaker 1:** Yeah, it's like starting a business if I'd known how much work it would

have been. Then I would have never started.
**Interviewer**: Yeah, what would be the best moment to use the framework in a DAOs lifecycle?
**Speaker 1:** Every year I guess.
**Interviewer**: Every year? Yeah, so also at the beginning?
**Speaker 1:** Yeah, definitely right now, because these are the perfect things to be thinking about. The Ukrainian problem is something we... Maybe we shouldn't call it that, the Frisian problem, is really a problem. So we need always keep it in mind. And if we're reminded about this yearly I think would be very useful.
**Interviewer**: Yeah, did you find this daunting, too daunting?
**Speaker 1:** No, I still want to make the software ecosystem a safer place. So it doesn't stop me from wanting that.
**Interviewer**: Yeah, then I have the question should be part of the DAO canvas, but most people were actually not aware of the DAO canvas at all.
**Speaker 1:** Yeah, what do you think
**Speaker 3**:? Because you've filled out the DAO canvas. I get the feeling. That there's really a lot of overlap, especially when it comes to what are incentives? What are the tokens? I think these parts are all in the DAO canvas right?
**Speaker 3**: Yeah, but the DAO canvas is quite rough, ways to talk about so many details. Even though there's some overlap, and also the DAO canvas is based on a [inaudible] based on a reference. So I think we can use this one to replace the framework in our DAO canvas, I think. In the DAO canvas in the left part, I just copy the framework from the reference you set in our introduction paper. So maybe now, we can probably replace it.
**Speaker 1:** OK, cool. So no, one should replace it, is a very nice answer, I think.
**Interviewer**: Yeah, definitely. Are there elements of governance that were not covered by the framework or do you? Think this framework is complete? And do you have any suggestions for changes to the framework? Are you feeling that there are areas missing, which you are quite focused on or which you think we haven't touched upon?
**Speaker 1:** I have the feeling, but this is again a hunch, that if I use the word meritocracy, I got the feeling that a lot of these answers were automatically falling into place, or at least limiting my options a little bit. Uh, so that's one of the things, where I think there should be templates, where I could say something like: The way the Dutch Government is now. Because then we talk about delegates, you have 150 delegates and there's a party system. So there's sort of delegated delegates which... What a country. So I'm wondering, could that... Maybe that's more of a future work option. Where you say, how can you template this?
**Interviewer**: Yeah, yeah so, how could you use references to existing governance models?
**Speaker 1:** I guess so yeah, and then I press F5 or or whatever the generate button would be, so that a lot of the things are just automatically created. Because, there are so many things that I haven't thought about and I don't really care. You know, whether we burn 10% of your votes or 100% of your votes. I don't know what works... What works is what usually works! I know that's probably the wrong attitude, because we're in such an early domain. But yeah, I also think there's already some proven examples of how it works really well. So yeah, I'm really surprised about all these DAOs buying football teams and stuff. How did they work? What mechanisms? Are they imploring that are so successful?
**Interviewer**: Those are companies buying football teams, right?
**Speaker 1:** Well, it used to be, but nowadays there's... There was a bid to buy

a football team and there was a bid to buy a company and there are these meme stocks.
**Speaker 2**:: The American constitution.
**Speaker 1:** Oh yeah, the American constitution one.
**Speaker 1:** Yeah, and the meme stocks so that all of a sudden everybody started buying AMC, the movie theater business stocks in the US. I mean, terrible idea,I think, really bad for investors, but something is happening there and why are these DAOs succesful?
**Interviewer**: That's a world of its own, right?
**Speaker 1:** I guess so yeah.
**Interviewer**: Yeah, to be honest, in my research I haven't really looked into their direction. But of course, that's also not the focus of my research, but that's a whole other kind of DAO? I mean, what are they?
**Speaker 1:** Right, yeah, I don't know. They say they are DAOs. They say they're the Constitution DAO.
**Interviewer**: I guess they just have a wallet and they can vote?
**Speaker 2:** Yeah, it's more like pooled capital. And there are. Are a few fund managers? Yeah, and the DAO decides on which investments are made.
**Speaker 1:** I got the feeling that, that one went Awry, because they forgot to vote, or something? It was a really silly reason. They could have won it, because they had the money in the pocket?
**Interviewer**: The constitution one?
**Speaker 1:** Yeah
**Speaker 2:** No, there was a billionaire with more money than the DAO itself. And he got...
**Speaker 5**: I don't think they failed. They were bidding against each other and then they failed to indeed vote. They had more in stock, but they just didn't manage to finalize their final offer. So they got outbid.
**Speaker 1:** Yeah, OK, well then ignore those. I'm just hoping that there are techniques, yeah, but it feels a little bit like we're inventing the wheel when others have already invented the spoke system. And the naaf[Dutch for hub] system.
**Interviewer**: Any thoughts from you,
**Speaker 2**:? Uhm, no I think it covered all the aspects of the DAOs very nicely. I don't have any ideas for changes or.
**Interviewer**: How do you look into the DAO space,
**Speaker 5**? And what did you get from the last hour?
**Speaker 5**: Well, I find it hard to answer from my DAO perspective. The time that I've spent in this area is not too long, so I can't answer from that. But from a research perspective, I can answer this better. And I think your model is answering or like shedding light or... Discovering the structures that are hidden within this space. So from that perspective I'm very interested what results you're finding. And to disagree, I think your model is overstepping a bit towards what you can already see in the field. So I'm really interested in: Are you actually able to validate the model based on what you're seeing in the field or is this really too far?
**Interviewer**: So you if It's too far ahead?
**Speaker 5** Yep, exactly. But I'm not sure what you've seen in other cases.
**Interviewer**: Yeah, most interestingly in the Aragon DAO that I had interviewed. Aragon DAO is like the oldest DAO organization that there is, probably... stil. It was interesting to see that they had nothing thought out. They were lacking a lot in a lot of areas, regarding the governance. But what I see is, that in more practical, more focused organizations, which have a clear purpose. Which are smaller, such as

dOrg, I could fill in all the bubbles actually. And then a DAO also makes more sense when you have a specific purpose.
**Speaker 5**: A specific purpose indeed. Very interesting to see this. To see where the field is moving, what kinds of variances are starting to bloom.
**Interviewer**: Yeah, I was really surprised by Aragon, how unorganized their... And I think they have a lot of people coming in and out. Their head of governance quit I think last month, or something.
**Speaker 1:** Yeah, this is already like the third time that that happened. And didn't they start a coin or? Don't they have a shit ton of money?
**Interviewer**: Yeah they have a shit ton of money. Because they have a coin.
**Speaker 1:** Yeah, that's the funny part.
**Interviewer**: Yeah, they have a shit ton of money and they just throw shit at the wall. Instead of working on a specific product, they just release products of which nobody knows what the products are, and then they make fancy pictures.
**Speaker 1:** Yeah, well, I mean so for colony, I'm paying some attention there too. By the way, make sure to enter your data in the colony giveaway sheet. Because they're now trying to sell the colony tokens for €2.00 so their starting price is €2.00 so already your investments doubled, your gifts. Haha, I see Speaker 3 looking very convinced. [sarcasm?] But hopefully your Christmas gift will be... The deadline was this Monday or something, but just fill in your data.
**Interviewer**: Is it like a bonding curve or some model that they are selling their tokens to or?
**Speaker 1:** I have no... Yeah so now they go onto copper which is... apparently it is a big Market. So this is the first time they actually do an open market procedure where any asshole can buy coins. Yeah, and hopefully this €2.00 coin or two euro value shoots up to 20. Well, then you will all have enough money for dinner. [closing remarks and conversation has been omitted]
**Speaker 1:** Yeah, and thank you all for attending and for your thoughts and well. I'm guessing it would be nice to have a place where we collect all our thoughts on this so, The DAO Charter or the DAO laws or something like this? I will start writing that. Haha, ah I see Speaker 5 is writing his constitution on the notepad very good. I'll start such a document soon and then we can start sharing these thoughts and so yeah, and we'll structure it by Interviewers model, because why else do we have a model?
**Interviewer**: Alright, thank you guys, I'll share my results as soon as I'll have results. [End of interview]

# Appendix H

# Token Engineering Commons interview transcript

## H.1 General information

**Interviewer**: All right, if you, uh, once you look along with the question, that's all right. So you might have seen the governance framework which is on page 66.
**Interviewer**: Yeah yeah, it consists of seven aspects of governance or 7 layers: dimensions legal foundation, decision making, leadership and rule structure, project chartering, incentives, community management and software development processes. Yeah, these are the dimensions that I have identified as being important to an open source software developing DAO. And in this interview I want to assess the governance model of the TEC and see what aspects we can fill in and that is what these questions are designed for.
**Interviewer**: So I'd like to start with general questions.
**Interviewer**: So what's your name and what role do you have in the DAO that you represent? We already went over that a little bit... And Speaker 1 you were a steward for the token engineering Commons, right?
**Speaker 1**: So in the token engineering Commons they are all stewards.
**Interviewer**: OK.
**Speaker 1**: I guess I mean there's different roles, there's contributors and stewards, and yeah, so I'm a steward for two working groups. The stewards working group and community tasks working group.
**Interviewer**: OK.
**Interviewer**: And the DAO, the official name of the DAO is the token engineering commons?
**Speaker 1**: That's correct.
**Interviewer**: How long has the DAO existed?
**Speaker 1**: When did it started existing?
**Speaker 2**: Like technically, we'll start existing now.
**Interviewer**: OK.
**Speaker 2**: But we've been in this process of the cultural build since July 2020.
**Speaker 1**: So I think the reason that we're hedging on that question is because does the existence of the DAO start when a token is issued? Or does the existence of the DAO start when there is a community building the technical and cultural builds to arrive at the token issuance?
**Interviewer**: That's debatable, but I would say the latter.
**Speaker 1**: When the community starts.
**Interviewer**: Personally, I think it's about the people and the...

**Speaker 1**: Yeah, I strongly concur.
**Speaker 1**: Because in that case it's a year and a half, almost two years since the idea to say we're going to build this Commons as commons stack and engineering.
**Speaker 1**: And agreed that we would build the First Commons with the token engineering community.
**Speaker 1**: So maybe when the token engineering community decided to launch a commons for themselves is when the work started?
**Speaker 1**: And [Speaker 2] you would know best, but I would say.
**Speaker 1**: 2020 MID 2020 Summer 2020.
**Speaker 2**: For when we started the cultural build where we started everything, July 2020.
**Interviewer**: July 2020 it is.
**Interviewer**: So for an idea how how many members?
**Interviewer**: Does a DAO have?
**Speaker 2**: 279... well, this is also debatable, we had a lot of people... The best way to measure, who were in the community. Are the people who received praise. So people who were somehow active who had come to at least one meeting or UM showed up somehow. Then they would have praise. And then we had a count of praise that was around 350 people. If I remember correctly. But then we had the Hatch and the Hatch participants that were, the people who were members of the trusted seed that wanted to participate in the initialization of the TEC.
**Interviewer**: And those were 279?
**Speaker 2**: And those were 279. Is it 279?
**Speaker 1**: 271. But I just want to say. I want to make the distinction clear, so there are people participating in our community after the Hatch period, which is basically the token fundraise right... like the fundraise to participate and own tokens in the TEC. And so I actually look at the community as not just people who hold the tokens, but people who are putting effort into what we're building.I mean, if I had to like you know, I would say it's about 400, but half of like. 1/4 of that is active and the others are around and maybe not as active.
**Interviewer**: Yeah, I get it. I understand. It's just a general question to get an idea of what the size is. So you guys have succeeded in going past the Hatch fate phase, right?
**Speaker 2**: Hmhm[affirmation]
**Interviewer**: Yeah, and then, uh, I wonder which? What communication or governance or blockchain tools that are essential to the Dow's operations do you guys use.
**Speaker 2**: Now we're using the gardens framework. Something 1hive developed, but it was based on something that Aragon had. But 1hive, UM, do you know them?
**Interviewer**: Yes
**Speaker 2**: Yeah, when 1hive developed this Gardens template, because they were the first ones to use conviction voting. To implement conviction, voting in a functioning DAO. And then the TEC has been the first one to implement the conviction voting plus the augmented bonding curve.
**Interviewer**: OK.
**Speaker 2**: And yeah, so we're using their template for like where the DAO is hosted and we use the xDai blockchain.
**Interviewer**: OK.
**Interviewer**: Yeah, and what communications channels do you use with your community? I suppose you have discord.
**Speaker 2**: Discord, telegram, forum, twitter, medium. Those five primary I'd Say.
**Interviewer**: OK.

**Speaker 1**: Before we move on to the new question are we still on tools 'cause there's a whole lot more.
**Interviewer**: Uh, if you think there are very important tools.
**Speaker 1**: Super important, snapshot.
**Interviewer**: OK snapshot, super important, definitely.
**Speaker 1**: Other tools that are very important?
**Speaker 2**: So the forum, the forum is one that we....
**Speaker 1**: The forum we mentioned on communications.
**Speaker 2**: But the forum is also used for proposing. So we use the forum for proposals to be sent to snapshot, and we'll use that for conviction voting as well. So all the proposals will leave in the forum first.
**Interviewer**: Yeah, and then you use snapshots to actually do the votes
**Speaker 2**: Or conviction voting or TAO vote
**Interviewer**: Oh OK so you have two voting systems in place.
**Speaker 2**: Yeah, we call it polycentric governance because we have many voting processes.
**Interviewer**: OK, we'll get to that, I think, yeah, yeah.
**Speaker 1**: Before we move on from tools. Coordination is mainly GitHub of course. And Zenhub is the project management layer on top.
**Interviewer**: OK anything else?
**Speaker 1**: Those are the primary ones.

## H.2 Legal foundation

**Interviewer**: Then let's move on to the legal foundation of the token engineering Commons. The first question is how does the DAO have a legal representation? And with that I mean does it have a legal wrapper or legal entity which it is tied to?
**Speaker 1**: I would answer that no. Uhm, no formal legal. It's not registered in Albany. It's not a DAO in Wyoming. So if that's what we mean by a legal entity. We have a legal working group. We have 12 working groups. 14 stewards and 12 working groups and one of the working groups is the legal working group. We have had lawyers come to advise on documentation and other things, but they have come and gone, you know?
**Interviewer**: OK.
**Speaker 1**: So we can grab a lawyer for as long as we could hold on to them, before they do something else.
**Interviewer**: There's a Swiss foundation with the Commons Stack, right? Is that still tied or involved in any way? Or is it not relevant?
**Speaker 1**: It is relevant. I think it's in the second questions about how the members are protected from liabilities. There is a common stack association which sort of has a slush fund to provide up to 10,000 Swiss francs in legal defense for anyone participating in good faith in the TEC, who find themselves charged with something for participating in the TEC. But it has not yet been exercised.
**Interviewer**: Yeah, OK, oh that's that's interesting. Yeah, the next question is under what open source software license is a software release, but then again, you are not necessarily an open source software developing organization, right?
**Speaker 1**: We do. I think it's GPL V3? If that's the right one, the latest one. Uhm, we there are definitely pieces of software like bots for discord. Things like this that the TEC themselves are releasing and make available to the to the public.
**Interviewer**: I just realized I missed the most important question of the general

questions, which is what is the purpose of the DAO?
**Speaker 2**: To advanced token engineering.
**Interviewer**: That's a very good answer.
**Speaker 1**: Like 3 words is all and maybe to elaborate on that a little that's true, that's the whole mission. And it comes across in being able to fund projects. Like open source software, tools, research, education specifically for token engineer. So if you imagine that the Commons has like. Public goods you know, like public resources and then token engineering is like token engineering public goods yeah.
**Interviewer**: Okay, Does the organization also do work themselves in advancing token engineering rather than just funding projects?
**Speaker 1**: You two are big.
**Speaker 2**: No. Yeah, I think this is a good question because I think it's a mix of... Part of our mission, that is the education of people who are in the community to be understanding of token engineering tools and methods and practices so part of the cultural build is also educating the community on token engineering, so people can make the best decisions towards funding, token engineering public goods. So the proposals that are going to come are probably from active community members, from not so active community members and from people that maybe will just arrive at the community with a proposal because they just have a proposal, but I think building the experience of the people on the ground is very important. If you ask any of the stewards now how much they understood about token engineering when they joined the community and how much they understand now is like a huge difference. And this is part of the collaborative economics concept that I think we'll talk more down the road like involving people and the decisions about our economy, design.
**Speaker 1**: Yeah, yeah, I think what [Speaker 2] said is super important because it's true. It's about educating everyone in the community about token engineering. But also in a direct answer to that question I would say yes, there's two working groups that are what I would say is, actually like doing token engineering. There's the Labs working group. Which has been participating in the proposal inverter, which is a sort of very, vanguard, new tool in the DAO space, to have one proposal be soliciting multiple different organizations at the same time for funding. It's like one proposal goes here, one proposal goes there, one proposal goes... It's a very interesting new way for advancing people seeking proposals from multiple organizations. And is doing solidity courses and on data modeling for the praise system. I'd say they're actively doing token engineering and then the other working group is Omega Working Group who is looking at doing token engineering more from an ethical standpoint. so the ethics involved in token engineering. And I would say maybe the other working groups are more operational and you know... governance and community. But those two working groups are probably doing what may be considered... Arguably softgov is doing token engineering and advancing government models and token engineering as well. So I would actually strongly say yes. I'd say we are doing token engineering as well as hoping to help others in advance it is a nascent field.
**Interviewer**: OK.
**Speaker 2**: Yeah, the the params working group that doesn't exist anymore now too. But they built the commons dashboard and it is what allowed us to have this collaborative design on the economy. And also the reward Systems working group just does, thinking on the best design for a reward system... We are doing a parallel research group in the token Engineering Academy and we're starting to include this as a new branch of token engineering. Uh, governance through the governauts and reward systems. Just because they affect so much the token design.
**Interviewer**: Ok, all right, then, let's move back to legal foundation and and, about

ownership and ownership and control of the source code and organization. How is that organized?
**Speaker 1**: Ownership of the creative software. So because I guess it's GPL it would be open source. It would be difficult for me to pinpoint any piece of software that's not on GitHub under GPL V4.

## H.3 Decision making

**Interviewer**: OK. Then let's move on to a very big topic, decision making. So yeah, naturally in the blockchain space and Dao space we have on-chain voting usually. Or formally the DAOs vote on certain topics and certain decisions are not made through a vote, and I wonder which topics or governance aspects are actually taken through a vote.
**Speaker 2**: Yeah, I can share my screen here. I need to finish the text here, but you can already have a good view. This is our like governance framework, so we have advice process that should be always where you start. So you have three types of advice process. If it's a small impact decision, you just ask experts. Or if there's like just one person that you can talk to. It's a more informal process. But we still like to document it, just so people know the importance of always seeking advice. So this is for a small impact decision, something that needs to be quick and then medium impact decisions you can ask a working group. So if it's something that has a specific work stream. And could be solved just within a working group like maybe in a meeting there is a little voting, uh, or like a sensemaking or a topic is brought up and there is advice for something to move forward with. And large impact decision is when it's hard to define, who do you need to seek advice from. It's most likely that the whole community will be affected more than a large group, so you post on the forum under community advice. And this posting on the forum, it's also good for proposal making so sometimes, a proposal that is posted under advised process can be solved without any further voting because there was consensus, because nobody blocked that. Because there was not like any challenging comments and there is a clear path for action so that the person could execute that. But then if it needs funding, it will be posted in advice process. Feedback will be gathered and then it will be transferred to the proposal section to be sent to conviction voting on-chain. And if it's a cultural decision, then it comes from the forum to snapshot. So snapshot has three use cases. That is, there's large impact, cultural decisions, Community signal. If there's something that it's not going to have a clear yes or no result, but you want to understand what direction to go and then Runoff vote from token log.

So token log is a curation tool it gets issues from GitHub. Puts them on a backlog that you can vote on which ones are the most important so it uses quadratic voting and then the top decisions stay on top. And we are using this process for collaborative economics design and we also used it for deciding our mission, vision and values. So, it's good to use when we want proposals from many, many people. So many people submit proposals and you go through them. You curate the top ones and then the top ones go to a runoff vote on snapshot, and then for this vote we use quadratic rank choice voting.

And then there's Tao voting that you also need to submit a proposal in the form first, and then when it comes to Tao voting. It's only if you're doing modifications and the parameters opted out itself. But the TAO voting shares the interface with conviction, voting and there's different parameters to be voted on.

**Interviewer**: Yeah, so what would be a parameter for the DAO.
**Speaker 2**: We just selected the parameters. So the winning proposal was. Goldilocks, maybe about here it is. For TAOvoting

So this the winner proposal Goldilocks has 85% support required that is. How many of the people who voted need to vote yes for this proposal to pass? Not people, I mean percentage of tokens. And there is a quorum of 10%. So 10% of the token Holdings need to vote for this proposal to be valid. The vote duration is of five days. And there is a three day period for delegates to vote. So from this five days to only two days, delegates can vote. But then there is a period that delegates can vote of three days. Uhm, if if the decision flips. In the last days... In the last three days of the vote, then there is an extension of two days added. Just to mitigate, uh, like last minute crowd decisions and then there is an execution delay of 0.5 days in case people want your rage quit. In between that period, like if they didn't like this decision. Uh, they have some time before the decision is active. For people to rage, quit and. In one time to review delegates is the time people... Like if you delegated your vote to someone else, uh, you can review the decision they made and if you want to change you have two days to change that.
**Interviewer**: After the end of the vote or...?
**Speaker 2**: Yeah, after the end of the evaluate period So I think it's after the end of this five days, right?
**Interviewer**: And then you have two more days to evaluate the delegates?
**Speaker 2**: I think... is this right [Speaker 1]?
**Speaker 1**: So, OK, So what happens is the delegates vote. And then there's this period of time where the people who delegated votes could be like, did that go the way I wanted it to, and that then people can individually vote to flip what the delegates have voted.
**Interviewer**: OK.
**Speaker 1**: It's sort of like a check on the delegates in some ways. And then if that happens then it's extended actually because there's something controversial happening, so there's sort of this time to extend the vote to make sense.
**Interviewer**: Yeah OK.
**Speaker 2**: Yeah, so the final time when all the extensions would be at 7.5 days to to pass the vote. It's important that it's longer than in other types of voting just because it's like God Mode, it can change anything in the DAO.
**Interviewer**: And these parameters change per proposal or are dependent on the proposal?
**Speaker 2**: Yeah, you could only change the parameters of DAO voting through DAO voting, so you would use those parameters to change any parameter.
**Speaker 1**: Yeah, the important thing about TAO voting is It's not to pass proposals for funding, it's to change the parameters of the... Turn off the bonding curve! To change big decisions that affect the DAO itself.
**Interviewer**: OK.
**Speaker 2**: Yeah, if you want to install any application or anything like that you need to go through TAO voting and then conviction voting is to pass funding proposals. So we have these two modules that shared the same interface in the gardens.
**Speaker 1**: And I dropped this voter pamphlet in our chat because it has that and a bunch of other slides in it that you might also think could be interesting.
**Interviewer**: Oh, that's really cool. Thank you for that. This is a lot of information. Uhm yeah impressive elaborate.
**Speaker 1**: [Speaker 2] were you able to share the graphic with him? I mean it's

not done, but I think it's done enough that it could actually be helpful so yeah.
**Speaker 2**: But still some of the recent information has to be changed.
**Interviewer**: OK, and have you also defined what a small impact or large impact decision is?
**Speaker 2**: Yeah it is. There is a forum post that defines.
**Interviewer**: OK
**Speaker 1**: And maybe like as your ballpark gauge. A small decision might affect a working group. A large decision affects the whole community, right? So it's sort of like, there's probably some Gray area, but like as some way like some big you know, apply to most situations, metric you could think of it like that.
**Interviewer**: OK, so who's allowed to actually submit a proposal?
**Speaker 2**: Anyone.
**Interviewer**: Anyone that is a token holder? Anyone actually?
**Speaker 2**: I don't think in conviction voting you need to pay any type of fee to submit a proposal and in TAO voting you need to pay the fee. I think there was that just the hatch....
**Speaker 1**: No, in conviction voting you will need to hold TEC tokens to submit a proposal.
**Speaker 2**: Oh yeah?
**Speaker 1**: Yeah, because remember conviction is going to launch before the bonding curve and we were like, we told, [Person A.], hey it's a ready proposal and then when [Person G.] and I were talking or he sent a message maybe. That's like maybe: you can't actually submit a proposal because people don't have TEC tokens yet.
**Speaker 2**: Oh, but I thought that you need the fee for TAO voting because conviction voting is an application that you need to install.... wasn't that...?
**Speaker 1**: I don't think of it as an application I think of it as another module.
**Speaker 2**: But it works like a dapp like the conviction voting dapp. So I thought that was, but it is....
**Interviewer**: You will need to have some TEC to submit a proposal.
**Speaker 2**: yeah, that's good to know, I didn't know that. So you need to stake something to submit...
**Interviewer**: Yeah, is there then also a cost towards submitting a proposal otherwise than having a TEC?
**Speaker 1**: So there is some questions around spamming of the conviction voting and a deterrent to spam would be you have to actually post something to submit the proposal and then I believe that you. Could request it back. As part of the proposal.
**Interviewer**: That is an ongoing proposal or?
**Speaker 1**: Now I'm feeling a little uncertain about it too. Yeah, I'm pretty sure the way it works is that you know we came up with this proposal fee in order for people not to just spam endlessly that are either the TAO voting or the conviction voting, probably you get it back if the proposal passes and if the proposal was challenged then it has this process to go through an external arbiter Celeste.
**Speaker 1**: Which I don't know where that is the right place to get into that is but.
**Interviewer**: But it's just a small fee, right? Just to prevent spamming?
**Speaker 1**: I don't remember what we...
**Interviewer**: Ok, that's all right. OK, so that mechanism is there. That's good to know.
**Speaker 1**: Maybe can we say this? Can we say we I will take a note to get back to you about exactly if there's a fee for conviction, voting and TAO voting and what it is.
**Speaker 2**: He just answered me. It's 200 for conviction voting.

**Speaker 1**: 200 wrapped xDAI or 200TEC?
**Speaker 2**: 200 TEC.
**Speaker 1**: I have someone at my door I'm just going to hop off for two minutes.
**Interviewer**: OK, yeah. Next question is then do proposals need to be approved before being voted on, and if so? Do proposals need to be approved by someone?
**Speaker 2**: Well by vote only by vote. Otherwise, like the advice process, the idea is that you don't need approval that you just need advice to know how to forward.
**Interviewer**: And then are the outcomes of proposals enforced on chain? For a proposal on-chain, then TEC token holders decide.
**Interviewer**: Yeah, so is the outcome also enforced on chain? So I guess if it's about funding. Would the outcome of a proposal also ensure that the funds are actually distributed? Or will it be someone that holds the keys to the....
**Speaker 2**: Yeah, yeah, yeah it happens. It's automated through conviction voting, so it was put in, and when you submit the proposal and then if it's approved, then you receive the funds and that entries.
**Interviewer**: OK, it is actually automated with conviction voting OK. It's not necessarily with every DAO that that is automated.
**Interviewer**: Uhm, so then we come to the voting part.
**Speaker 2**: Sorry, I was just having the answers from... So both in TAO voting and Conviction voting there is a deposit.
**Speaker 2**: Of 200 TEC... Or 200 like DAI worth of TEC for both TAO and conviction voting, and I think this is just like against spam.
**Speaker 2**: Yeah, I will actually receive the tokens today. The TEC tokens.
**Interviewer**: You will receive the TEC tokens today.
**Speaker 2**: Yeah, everyone. It's a big big plan.
**Interviewer**: Uh, is that then from the Hatch TEC tokens that it gets converted to TEC or?
**Speaker 2**: Yeah there was Hatch TEC tokens and now they are converted to TEC.
**Interviewer**: Now big step then today, big milestone. Cool Haha, I see someone being very happy about it.
**Interviewer**: Yeah, I had the idea you are currently still in the conversion or in the hatching and getting passed through that right.
**Speaker 1**: Yeah today for all hatchers we all receive TEC tokens from the Hatch tokens and then a week from now, our bonding curve opens. So it becomes a publicly available token.
**Interviewer**: Crap too late to become a Hatcher. OK cool yeah, so let's move onto voting. So how is voting power acquired?
**Speaker 2**: You vote with TEC tokens.
**Speaker 2**: So you either received that through the reward system, like if you contributed work and received Praise or Source Cred rewards, then you receive TEC tokens. Or you need to buy them through the bonding curve or you were a Hatcher and you bought them to come in.
**Interviewer**: OK.
**Speaker 1**: Are you familiar with praise or source credit?
**Interviewer**: Uh, yeah it is, giving praise to someone or receiving some kind of credits for work or. It's kind of a reward for your work or contributions, right?
**Speaker 2**: Yeah, anyone can praise each other on Discord this praise gets quantified. So because it's a very subjective, input that you need to quantify into an objective value so that that final value becomes what you're going to be rewarded.
**Interviewer**: Rewarded in praise or in TEC?
**Speaker 2**: Rewarded in TEC..

**Interviewer**: So both praise and source cred ultimately translates into TED.
**Speaker 2**: yeah
**Interviewer**: And then additionally, you can also buy the TEC Tokens.
**Interviewer**: OK uhm, so you use conviction voting and TAO voting? As voting systems.
**Speaker 2**: on chain and then advise process. And I think it's important to not think that voting systems are only the ones on-chain. And that decision making is like a whole entity that is just many forms of making decisions. And some of them have the accountability measure on chain or there like automation for how that vote is going to be executed on chain, but a snapshot vote that happens off chain and has like cultural implications should be seen as important as a conviction, voting or a TAO voting. So that's why we call it the polycentric governance because all of these modules are decision making systems, not necessarily voting systems. Most of them are voting systems, but decision making processes.
**Interviewer**: Yeah, there's a distinction between the decision making processes or systems that you have in place versus voting systems, which I specifically talk about in this part.
**Speaker 2**: Yeah, even if we talk about voting system as snapshot even being off chain is still a voting system. And Token log is still a voting system.
**Interviewer**: Yeah, definitely.
**Speaker 2**: Uh, but advice process is also a decision making process. It should be like considered in the same area.
**Interviewer**: Yeah, when when I started this my idea was that voting is occurs on chain and that therefore there's a permanent record of the fold and the decision being made, and therefore there is some binding element or legitimacy towards to vote, and therefore well, because it is an on chain vote. It is legitimate. But now there's snapshot which is used by everyone. And, well, it's accepted as being a legitimate way to make decisions and vote on proposals while not necessarily strictly being on chain.
**Speaker 1**: I also want to add there, you know. This is just a funny humorous part is that: I think when I first joined. There was we had the Token Engineering discord and we didn't really use the forum and we were voting by like Discord post with emojis or like polls on telegram, you know. So even though while it might sound kind of silly and humorous, we had discord posts with emojis, thumbs up or thumbs down or birthday cake. It is actually an effective tool for small groups like it doesn't scale great, but for small community making decisions of low to medium impact, it's just as effective as any other tool. We have gone away from that very early on though.
**Interviewer**: Yeah, funny.
**Speaker 2**: Now, legitimacy is a big topic actually, and I think there are many ways to have legitimacy on decisions. Sometimes on chain decisions are not legitimate, like if there is some type of attack. It is an illegitimate decision that was made using a legitimate tool and and that debate is so broad and. I think it's difficult to base something based on. Like I think we need to expand our concept of legitimacy and that I think transparency adds a lot of legitimacy.
**Speaker 2**: And transparency has been a huge thing for the TEC. Like all our calls are recorded. You can find everything in the forum. All the calls are open on discord. I think everything is in the open and I think that creates a... Transparency and communication I think are the best things to create legitimacy.
**Interviewer**: Yeah, [Speaker 1]. told me that you guys record every single meeting and you publish...
**Speaker 2**: Our YouTube is a piece of art.

**Speaker 1**: It's like a very long term performance art.
**Speaker 1**: Yeah, I just read a New York article of a professor of the University of Vermont who wrote every single day of his life. So it's like, you know, 60 years of... chronically an average for life. And it has been assumed by different, like different I don't remember the institute, but it was like you know, one of these preservation institutes. And the work of art is just that it's like consistently every day for 60 years which is like remarkable, so I think we're like on that path?
**Speaker 2**: Yeah, consistency is so important, yeah.
**Interviewer**: OK, so yeah votes can be actually delegated in the system.
**Speaker 2**: Just for TAO voting
**Interviewer**: Oh only for Tao voting. Do voters have a single vote or they able to cast multiple votes?
**Interviewer**: That's a different for both systems, right? Do voters have a single vote or are they able to cast multiple votes?
**Speaker 2**: It's token weighted votes so. TAO voting I is single vote, right? I think it's just yes, yes or no. I'm just wondering if it's just like a yes or no decision.
**Speaker 1**: We have one happening today. Yeah, I think it is yes or no, whereas conviction voting there is no no.
**Interviewer**: Yeah there is how much do you support this?
**Interviewer**: OK, is there also cost involved with voting? Is there a cost involved with voting, or is there a staking or betting mechanism?
**Speaker 2**: Yeah, that's why we were just talking about $200 worth of TEC for both conviction, voting and talent.
**Interviewer**: Yeah, that's for a proposal.
**Speaker 1**: What do you mean by betting mechanism?
**Interviewer**: Uh, there's like the Futarchy model. I'm not entirely understanding of that model. But it is kind of based on prediction markets and also you get a return the outcome of the proposal. There's some kind of betting involved in that, so it is you are actually rewarded for voting or betting for the right for the option that wins
**Speaker 2**: Holographic consensus uses that is like you have reputation for voting. And that is not attached to any financial cost. And then you have a token that has financial value that you bet on the outcome of proposals. So that creates a curation system, so the proposals that have more backs on them, more stakes, they get higher on the list and that is used like inform voters of what is value aligned and then voters if they pick that option that received more stakes the people who staked get a return on that like a percentage. But if voters pick a proposal that someone betted against, then that person loses. Because ultimately voters are the ones that know it is the best for the DAO. Because they're not immediately attached financially.
**Speaker 2**: It reminds me a little bit about how Celeste works, how the arbiters I forget what the word for them is, but the arbiters are judged on how well they actually align with the other arbiters, and if they stand out then it's they sort of like lose their reputation and may not be invited to arbitrate.
**Interviewer**: Very interesting mechanisms.
**Speaker 2**: Yeah, cool, this is awesome thanks. For sharing that, I didn't know that was a thing.
**Interviewer**: Yeah, OK, so that's not there then.
**Speaker 2**: Uh, so conviction voting addresses plutarchy a little bit. By the time that you need to to leave your tokens there and then if a person. Like if someone that has a lot of tokens just put their conviction down when the proposal is about to end and someone who has less tokens put down all their conviction there, with more time and they will actually like there's like a growth of this conviction.

**Speaker 2**: Counteracts little bit the whales. Although still if the whales, if they vote early and they put all their conviction there, they will...
**Interviewer**: It is 1 mechanism for balancing in that. Alright, uh, do you have anything to add for decision making? Anything notable?
**Speaker 1**: I mean, I think we should bring up, Celeste. Are you familiar with Celeste?
**Interviewer**: No, I'm not. Is it something from Aragon? T.: L., do you wanna explain?
**Speaker 2**: Yeah, it's an arbitration tool for like if if a proposal is misaligned with the value, with the mission of the the DAO then people can challenge that proposal using Celeste.
**Interviewer**: OK.
**Speaker 2**: So Celeste is a, challenging arbitration mechanism that. There are the Celeste keepers who are people who volunteer to be judges whenever a proposal is challenged and right now, most of the judges are from one hive. The one hive community, because they've been using Celeste for... they were the first ones who used, and they've been using for longer.
**Speaker 2**: It's still very new.
**Speaker 2**: And you need to stake a certain amount of honey and TEC tokens to become a Celeste keeper, and then whenever a proposal is challenged, you're contacted. And I think there is usually more than one judge, two or more judges per proposal. And then you have to look at the Community covenant to see if that proposal is really against the Community.
**Speaker 2**: So it's not that they're using their own judgment, they are comparing that proposal with the covenant, and seeing if that is aligned. If it is, and if it was a wrong challenging, then that proposal can continue to move on.
**Interviewer**: Uh, OK, so this is at any time during that the proposal has been posted. You can challenge it?
**Speaker 2**: Yes, And the voting period freezes then if the proposal is being challenged.
**Interviewer**: Can it still be challenged after it has passed?
**Speaker 2**: No, that's a good question.
**Speaker 1**: I don't think so, actually. Because after it passes, it'll be executed in one day. So perhaps, maybe before it's executed. But once it's executed, how do you reverse?
**Interviewer**: Yeah, so is there someone that executes proposals?
**Speaker 2**: It's automatetd.
**Speaker 1**: Depends. With TAO voting there may be something that has to happen like. Uh, you know? We've had a number of TAO votes where we've had to change particular permissions in order for the DAO to execute something. So the community would vote to allow something like that user programmer, the admin or the program, certain permissions and then developer would execute that permission change.
**Interviewer**: OK so who would be responsible for doing that then?
**Speaker 1**: So one of the working groups was common swarm and they are close to being retired and they really are a collaboration between common stack and one hive and they'll be technical. They will be smart contracts and the technical base for the down. And the as [Speaker 2] was saying earlier the DAO is based on gardens.
**Interviewer**: I got the concept of working groups. I did not get concept of gardens actually.
**Speaker 1**: Yeah, it's actually just a template for DAOs. one hive gardens is one of the projects by one hive. Which is sort of an easy and customizable DAO and ours

is highly customized. Because it's a Commons. Not a gardens, so the differentiation between a Commons and the gardens is the pieces that have been customized.

## H.4 Leadership and role structure

**Interviewer**: And so yeah, this was a little bit my segue into leadership and role structure. So you have different working groups responsible for different work, different things. Is there any more structure or observable leadership in the DAO?
**Speaker 1**: Yes, it's hard to answer this question. My immediate response is that there is like. One of the important things that I think like the three fundamental characteristics of stewards, is active and present a servant leader in the node. So for for us, I think servant leadership is probably the most important trait of a steward, so it's really not leading from a position of power, but leading from a position of helping lift everyone up together. And so I would say the stewards have a kind of informal leadership, and I think it's something culturally that we've bumped up against because we actually don't want the stewards to be seen as the leaders to tell people what to do and what to work on but rather, just as the people who are carrying the knowledge, have experience and know how things get done. But are really there to serve the community. I don't think there's formal leadership. But definitely there's social capital.
**Interviewer**: Observable, yeah, social capital observable roles. You will have certain people that are more central to the DAO or organization. Naturally, you will have people that are more central to the organization. And more active within and will take on more visibility. So those are just stewards but then from a servant leadership.
**Speaker 2**: Yeah, I like to think that we are non hierarchical but pro leadership. And this means that, uhm? It's not difficult to like... There's no blockers to get to the leadership position. It's do-ocracy, so anyone who wants to become a leader will find the space to do so, and actually, we encourage that a lot and offer a lot of guidance for people to feel comfortable to become leaders and I think this is an important understanding too, that without support like a democracy can only exist if there is intentional space holding and opening up the space because. It's very easy to become intimidated by an overload of information and by people that you don't know, so we can't expect that people would just naturally jump into a leadership role. But for us to want that and want that not not to be hierarchical, we need to support that way and like. Open that path, hold by the hand for a while. So a lot of like the Communitas working group. Uhm, like many working groups. This is in the culture of all working groups to be very welcoming and helping people to find their first issue. What is the first thing they're going to work on? Who are they going to be connected with and and then slowly some people, just get super involved and then get into leadership roles.
**Interviewer**: OK, and then that would be a steward?
**Speaker 1**: There's a process to become a steward. It's pretty straightforward, it's just another steward will nominate a steward, someone to become a steward. And then there's process to basically ask them if they want to. And we've had stewards say no, they can't take on additional responsibilities. But they may know like their constraints. Like I'm really happy with what I'm doing I don't want to take on anymore and I think just requires a little more that I can give. There's an offboarding process for stewards as well. And if the steward accepts the stewardship. Then there is a welcoming onboarding ceremony for them. Uhm, and a number of administrative things that have to happen.

And then for off boarding it is a steward. Nominating someone to be off boarded. And that's a different situation, because then there's the potential for conflict or disagreement, so it's a little more.
**Interviewer**: And it also stems from or comes from a conflict or a disagreement?
**Speaker 1**: No, I think it comes from in the past it's come more from inactivity, so you know we've developed this mechanism to compensate, token compensation, really, for stewards for being really active and presents servant leaders in the know. Once those three criteria are no longer being met, that sort of means for nomination for offboarding. In this case, as we were proposing this funding for stewards, we realized it really wouldn't be fair for the people who are stewards who haven't been in the discord server in two months to be compensated at the same level to the people who were being there. So it went pretty smoothly because the off boardings that we did were well justified and understood. And then there are people who offboarded themselves as stewards. One was with some contention. The others were less contentious I would say. Yeah, I think the off boarding process we developed just last year and I think that like it really helped. It made things so much more clear, I think, for me, but for all the stewards that there is an expectation. As well as like a possibility to exit if it's no longer a role you feel like you want to energize.
**Speaker 1**: Do you want to add anything [Speaker 2] ?
**Speaker 2**: No, I think you covered it well.
**Interviewer**: OK, that's nice. Are there other roles defined roles within the DAO?
**Speaker 2**: Maybe the only thing is that now is a good time to bring back this conversation on how we could not like lose this image of, like the stewards being the connectors of multiple fractals. Like we have all of these working groups that are doing like it's impossible to be in the know of everything. Now we're so big that one person can't like know what's going on in all the working groups and be present everywhere. So having these pieces that are the connectors between all of this information and we were even talking at some point. About would we need two stewards groups? What if it grows a lot like how? How can we continue this fractal image that points are connecting and communicating as much as they need for information should be flowing freely among the whole system.
**Interviewer**: That's that's a concern that you're having now? Or something that you're thinking if it grows to that extent, how do we keep it?
**Speaker 2**: I think now it's growing, it's working really well. But maybe that is a future question of like what if we grow like double of the capacity we have now like. How would that structure be?
**Speaker 1**: Yeah, and I think the the risk there is then there's some kind of hierarchy, right? Like then there's the stewards of stewards who you know. So it's like how do you scale horizontally without introducing outer layers.
**Interviewer**: Yeah, I was just wondering about the roles of if there are any defined roles like just a Community member or a contributor or are there any visible roles or?
**Speaker 1**: We would consider everyone a contributor, even stewards are contributors. Uh, and then we have played around with this subject matter expert role. But I don't think we have really mastered it yet, so it's something that's still like an incubation of how to make that role a little more relevant and.
**Interviewer**: So everybody, everybody is a contributor and might be a part of a working group and may also be a steward?
**Speaker 1**: Yeah
**Interviewer**: And to become a steward you will have to be nominated by another

steward. And you can also be nominated to be off boarded. But mostly that is inactivity or people nominating themselves to be off boarded.
**Speaker 1**: I wouldn't say mostly it's people. There have been both cases where a person has offered themselves and cases where stewards have been nominated to be off boarding. I'd say the only actual nomination of people to be off boarding happened once in bulk. And it was like: Oh, here are the people who don't meet the criteria for the funding that we're proposing stewards should receive. So, we haven't yet had another case where there is another reason to offboard someone. Uh, it's possible omebody violates the terms and conditions or a covenant, and that would be cause for nomination for offboarding. Probably the most likely thing that will happen. Oh, I'm going to say this because it's not implemented yet. But there is, along with the funding proposal, this idea that stewards will automatically lose their stewardship after six months unless they sort of write a forum post explaining that they still want to be stewards. So we're going to also less necessary for people to be nominated for Offboarding. 'cause culturally that's difficult for people to do you know? I don't think [Interviewer] should be a steward anymore. I just don't think he's holding up so rather than that, if you were a steward and you haven't really been active in participating and you know a few months go by and then it's time to reevaluate your commitment to being a steward if you don't take that step to do it, then you're just sort of automatically un-stewarded. It hasn't been implemented yet though, it will start.

## H.5 Project chartering

**Interviewer**: All right! OK. That's it for leadership and role structure, and I want to move on to project chartering. So yeah, you have a nicely laid out mission in the vision and also values I think. So who decides on this and what would be the process to change any of this?
**Speaker 2**: Yeah, we had a collaborative process, so that was the very first thing we did in the in the cultural build. We had a Miro session with a lot of token engineers and we had a little like collective process to iterate our mission vision and values. And that was a bit clunky, it was not so easy to make a decision because we didn't have the decision making process yet. That was actually the first thing we needed. Before I like anything else. We started like that and that was a really cool process and we understood ways of improvement that would be like having a better decision making process and also by the time we wanted to reiterate it, we had a much bigger community so we thought we should involve all of the new members of the Community in that process too. So we use token log and we started with those first drafts. Like that first mission vision values from the clunky process as a base for people to rewrite them. So we had a lot of submissions and we were asking for every person that would submit to submit the three of them, so they were coherent and we were incentivizing forks too so you could see like something that someone submitted but you just wanted to change something. And then you could copy and paste that and then submit the fork and then we had like a bunch of proposals and then we used that curation tool. Token log to pick the top ones and then we had a runoff and then we picked the final one, that's what we're using now.
**Interviewer**: That's so nice. Yeah, that's that's a really cool process. Yeah, that's so nice that you guys have actually succeeded in having a very structured and collaborative process and ultimately deciding on this very core part of your organization. Very cool.

**Speaker 1**: I want to say that's. From a different perspective too, is that. You know the tools didn't really exist to do this and we were building the tools, you know, we worked with [person] from token log to customize Token log to allow us to be able to do this, to introduce quadratic voting into his open source tool so that we could then use our tokens quadratically to vote for these. So it's sort of like and oftentimes the analogy like you know, building the airplane as you jump off a cliff. So there's I mean, there's alot of this because so many other things that the TEC is doing haven't been done before. And this is the sort of like the community bottoms up submissions.
**Speaker 1**: First of all, understanding and then being able to submit and then being able to vote and then being able to like decide right? It's like a big part of token engineering commons.
**Interviewer**: That's huge.
**Speaker 1**: Design principle on common stack.
**Interviewer**: Yeah, but also being able to implement it.
**Speaker 2**: Yeah, I think that's why it took us so long to launch because there was never like. No, we can't do that. It was always like, oh we want to do this thing, but then we need to build a whole tool for it or we need to like bring someone... There was always this huge effort so like, yeah, let's let's do what we think has to be done, even if...
**Interviewer**: But it is well thought out and that's. What I think probably may makes you stand out. Because it's a well thought out process and then also you follow the process that you've envisioned. That's the best answer I've had on project chartering. Are there any release plans for Project Roadmaps in your organization? Those are more related to products actually than and maybe your entire DAO is kind of a product actually.
**Speaker 1**: I think that all different working groups. So we've had many different Roadmaps and I see the last few ones were more about like reaching reaching this critical next milestone, which was the Hatch and then reaching the next critical which is the Commons upgrade and we are currently without a umbrella road map. And I have mixed feelings about this. A lot of it is each working group has to be able to project what their own road map will be in six months. And it seems like a lot what we're doing is very reacting to the context that we're in, and the context that we're in keeps changing. So I think it's ideal for us to build a new one, but. I I feel personally like is a challenge to say to come.... I think some of the working groups now, like gravity's working on some idea for a roadmap for the next 12 months and comms is starting to have an idea for the roadmap. But there's a few things you know. We really moved from build mode to operational mode, which changes a lot of things, right? We're not moving to a target now. We're like in operations, keeping the DAO running. Meaning that individual working groups where it makes sense for them to have a road map will have a road map. But not all of them will anymore.
**Interviewer**: OK, no makes sense. All right. And then the working groups can I suppose decide amongst themselves?
**Speaker 1**: There's a lot of autonomy.

## H.6 Incentives

**Interviewer**: Right, and then if there is nothing else, I would like to move on to incentives. So incentives basically comes from one part where in blockchain you have the tokens which have monetary value. But it also provides some form of utility to vote with. That's from the blockchain space, but then you also have from the open

source software space where there are just a lot of contributors who are interested in the project and just are contributing because they have a use for the project themselves. They have different kinds of motivations and sometimes contributors for open source software projects are actually paid by companies to just develop open source software. And this is where this section comes together for DAOs and open source software. So I wonder about the incentives of contributors from a token perspective, but also from, why do they want to be with the DAO? What are their altruistic or intrinsic motivation? And also as a DAO that develops software how do you ensure that people contribute to developing software.
**Speaker 2**: The reward system we have now is born kind of that. Also at the very beginning, having to figure it out like OK if we want people to come pay tribute, what are we offering them? And then we decided to use the praise system that was also used in giveth and in the common stack.
**Speaker 2**: But both for giveth and commons stack was being used more as a reputation system and then we decided to insert this like financial layer to it. There was a little system that [person G.] built in the beginning that the more we would raise in the Hatch, the more impact hours would have value. Impact hours were the measure from praise, like from the praise classification before we had a token we were using impact hours as this kind of this internal token.
**Interviewer**: So impact hours have is no longer being used?.
**Speaker 2**: Yeah, now we're changing the the system because we won't need the impact hours anymore. But before we had a token, it was also a way to measure impact. So how are you quantifying [inaudible] So thinking of the impact that they provided next to like an estimate time. So kind of having some sort of a time reference just to make it easier to quantify it, but it was really how much you impacted. Uhm, so in the end of the Hatch, people would have a total number of impact hours that came from all the rewards they received up until the Hatch from praise. So up until the Hatch, the impact hours had no value. But they have a potential value and that was the psychology of the incentive, it's like. You're gonna see that your every two weeks we had a leaderboard that was releasing what was the score was that every person had, but nobody knew how much that would actually be. And then by the Hatch we could see, depending on how much we raised, how much each impact hour would be worth, according with each... ...economy does a hatch design that was also decided collaboratively.
**Interviewer**: So you earned impact hours, which comes from praise and currently praise and source cred. Translate into TEC tokens.
**Speaker 2**: So there was an evolution of the reward system. In this moment of the Hatch this particular visualization of how much impact power would be valued created a lot of discussion in the community of like: Was the distribution fair? Let's look into all of the data. Uh, we need to pay attention these tokens are not only financial, they also hold governance power. So we had a whole debate and and we did a lot of analysis in the data that was there and we started to look into improvements of the reward system. To cover all types of contribution and also to have an easier and less time consuming process for quantification and distribution and all that. So now we are creating a dashboard and then we decided to integrate with source cred, because then praise can be worried just about very subjective contributions and then source cred can capture more objective ones, like likes and posts, time and calls. All of these things that don't need a human giving value to them. So that's the system that we're using now and tomorrow actually, we'll have the first quantification. It's going to be the first time that we're testing this new system, and it has a new dashboard. Before we were using just spreadsheets. So this is a big product that the commons stack

is backing because praise was a commons stack idea from the beginning so. Yeah, that's the incentive mechanism we have now and we have been talking a lot about this, especially in soft Gov. about what motivates people participating and we hear that a lot of the motivation actually comes from the vibes in the community about how well you feel, how you feel like you belong. How much you're learning. People have have learned so much that actually if they go look for a job after the time they were here, like a more traditional job in crypto, for example, they would be super well equipped with so much information that it was like a great learning opportunity that was big on my why people were here. And just feeling that they are being part of something that is revolutionary somehow or is in the forefront of something so also that impacts motivation.
**Interviewer**: OK, yeah awesome.
**Interviewer**: I do wonder, how does the source credit and praise translate into the tokens? Is that like a conversion and then you lose the praise and the tokens or is that? Yeah, how does that work? So is it also like a measure of reputation, having source credit and. . . ?
**Speaker 2**: It's like 2 backlogs that emerged at some point. So the praise backlog, all of the price that is dished is being stored in this dashboard and then there are a few quantifiers. And the quantifiers are. . . So the quantifiers are assigned to quantification periods that they will quantify. So every two weeks will have this process of quantification and. And there is this line of value. Here, I can show you actually.
**Speaker 1**: A, uh, I tried to get the live tool, but I couldn't. I could really find a screenshot of it.
**Speaker 2**: Yeah, here it is.
**Speaker 2**: Now here is the how the quantification happens.
**Speaker 2**: So here is all the praise. It's like it's not real praise. And and then you can. Yeah, this is a Fibonacci slide that you can like. Pick what is the value that you want to give. To this praise. Before we had this like it was a random value, but that was really time consuming, so here you can kind of gauge the importance of different contributions. And then like saying this is worth this lunch, there's like an amazing contribution. So it's worth this much. And then by the end you submit the quantification. When, when all of the praise is quantified, we have a meeting and this all happens async and then we have a meeting with all the quantifiers to look into like cultural insights of all of this, because when you're reading all of this stuff you get a lot of insights into how the community works and it would be a shame to waste all of these insights that all these quantifiers are having. So we want to have a talk to go through them and then after this. All the praise is sent to the rewards DAO. It's a sub DAO from the TEC and that DAO holds TEC tokens. So all the praise arrives there and then there is source cred happening on the other side. Uhm, the source cred is capturing data from the forum, from GitHub, time in meetings and from Twitter. And then we have to decide the parameters of how each one of these things are being valued. And then all of this is automatically quantified by source cred. And then there's two values. The total from praise and the total from source cred is automatically separated between users. So you will have a final score of praise plus source cred and then the reward DAO will distribute those funds to each person in TEC tokens.
**Speaker 1**: I wanna try to paraphrase it without the details, I guess it's just the praise is identifying hidden work, invisible work and the purpose is nobody knows that we just had this meeting except if I praise you and [Speaker 2] on our channel now right? So that's kind of work that's not seen. And, the source cred system is rewarding people who are closing GitHub issues, posting on our forum. And perhaps other

kinds of automated things. There's a certain amount of tokens that will be rewarded in each praise and that it gets distributed between the people that have earned those two different kinds of rewards. And it's the community that decides. The community doesn't decide how much each person gets, but the community decides the value of the qualitative data. So basically like OK that [Interviewer], [Speaker 1]]and [Speaker 2] had a meeting. There might be 5 quantifiers, 1 might think that's really important. One might think it's a little important. And then sort of the average of those five quantifiers. So it's the community that's deciding how valuable these praises are.
**Interviewer**: [Interviewer] thinks this is very important.
**Speaker 1**: Me too. Let's hope we quantify this. The miracle of praise is actually is it's not algorithmic, it's community driven.
**Interviewer**: Yeah, OK, cool I think I understand and how it how it all matches together. Let me see. So tokens are issued following the augmented bonding curve?
**Speaker 1**: Correct, so tokens will be issued based on.... So you can mint and burn tokens by buying them from or selling them to the bonding curve so that's the primary market. However, there would be secondary markets where tokens would be traded outside of the primary market. And the idea being that will also create some sort of arbitrage opportunity between the primary market and the secondary market. But if you were buying or selling directly to the bonding curve then the price would be fixed to based on the outstanding supply.
**Interviewer**: Yeah, OK and then you had a subdao that manages the funds?
**Speaker 2**: Uhm, no. The DAO has the reserve pool, which is the underlying assets for the bonding curve for the augmented bonding curve. And the A in augmented bonding curve is basically the reserve pool. Anytime anyone buys or sells against the augmented bonding curve, a percentage of that goes into the Commons. That funds the projects.
**Interviewer**: And that is then also used for issuing TEC as a reward?
**Speaker 1**: No, the rewards board have their own multisig. So we have an initial pool of tokens that the community has voted to purchase for special purposes, we call them. The rewards board and another multisig we're calling laser tag. Essentially it's for creating liquidity and secondary markets and for partnerships or any other use of that token setting that the community deems important and or beneficial. So if you think about just the DAO, the DAO only has the common pool, which is the funding for conviction voting for proposals to advance Token Engineering. And then the reserve pool to be the underlying asset for the augmented bonding curve and then there are tokens that have been acquired already. So actually technically haven't been, as soon as the bonding curve goes live the millisecond after, the very first purchase is a TEC purchase. And these tokens will go to two multi six and one is the rewards board, to be distributed in our first or however many distributions they think is necessary and the 2nd is this special purpose pool of TEC tokens that we can use for liquidity in secondary markets and special partnerships.
**Interviewer**: Alright, awesome thank you for this excellent quick, technical explanation. So I'm just revisiting the incentives questions.
**Speaker 1**: I'm looking at them too.
**Interviewer**: I think we've covered them.
**Interviewer**: All right, then there are two big topics or two topics left which are community management and software development processes, and I think Community management is a huge one.
**Interviewer**: Uhm, we've covered a lot already, I think. In between. So yeah, community management is about How are new members attracted? Is there a formal process that they have to go through?

**Speaker 1**: Do you really feel like the incentives have been covered? How are development activities incentivized?
**Speaker 1**: I guess we would think of it as like how are activities incentivized, like participation, engagement, contributions?It feels like there's still something there. Because these questions are really good. So does the DAO have a token model. So that's kind of yes. Extrinsic or intrinsic motivations for DAO members to participate. I mean, I know the incentives. Maybe this isn't going to be the correct answer, but there's something that's particularly unique about the culture in the TEC and has been one of the motivations for participation. There's more than one [inaudible] long time contributors in our organization that the reason they're there is for our culture. It's the way that we are organizing ourselves is something new and the way that our culture is very welcoming, radically open, inclusive, transparent is something that attracts them. So I think that there's also this one of the incentives for people to participate is the rewards that you would receive from actively contributing either through source cred or praise, and I think the other one is like it's a culture that's attractive to a particular kind of people looking for an alternative to previous organizational cultures. I think it's maybe worth noting that.

How are tokens issued? I guess that's a pretty straightforward question.
**Interviewer**: It's the augmented bonding curve.
**Speaker 1**: Yeah, but how they were first issued was through the bootstrapping process that [Speaker 2] was mentioning. At the time that they were also purchased there was this amount of tokens that were earned, so sort of like a debt. Like this cultural debt. People are contributing and being rewarded with impact hours and then the first distribution of hatcher Tokens, which will convert to TeC Tokens, was awarded through people's effort. What utility do tokens provide?
**Interviewer**: Monetary value and...
**Speaker 1**: Governance rights.
**Interviewer**: Governance rights.
**Speaker 1**: Mechanisms that take tokens out of circulation? I guess that's burning the tokens. Does the DAO have a reputation model?
**Interviewer**: So can praise or source cred be seen as a form of reputation or is that not?
**Speaker 2**: If source cred could be seen as a reputation? Well, kind of with this. Leaderboard, I think it creates like a reputation dynamic that people can see. And we'll also have an analysis process that I forgot to talk about that will show the graphs of how... Who dished praise to who, how were the interactions there and from source cred. So that is kind of a reputation when people see who are more active in that period and for what? What are the areas they're working on? It's not a tokenized reputation. It's more social.
**Interviewer**: Yeah, and then you rate the praise contributions. So there's not disputing the praise, but rather rating the praise. That's how I would interpret it if you were asking about removing reputation or praise or.
**Speaker 1**: I don't know if we could remove reputation.
**Interviewer**: No, right you rate the contribution
**Speaker 1**: Uhm, but it's still net positive. So it's not removing, it's just rating and it's... I guess for the last one, I'd say there's probably not a mechanism for removing reputation.
**Speaker 2**: I think it's impossible to remove reputation, that's like a social layer present in anything in life like even in a family circle you have some type of reputation. It's just how people perceive others inside of a social structure.

**Interviewer**: It's slightly different when you quantify it.
**Speaker 2**: Well, that quantification is just for the reward. Yeah, I don't... Yeah, that's a good point. I don't know if the quantification is attached to. So maybe it was more before, attached to reputation. But now for this process we are removing names so people are quantifying an anon.
**Speaker 2**: I think that makes it more fair, because before maybe you were quantifying someone that you like and then you're like. Even if it's not malicious, but you're inclined to give a bigger value to them.
**Speaker 1**: Maybe there's something else we can add to this section around like POAPs. You know these, sort of like badges of accomplishment of different things in the TEC.
**Speaker 1**: The conflict management working group has an entire 8 to 10 week series of nonviolent communication, mediation and every time you complete a course, you receive a PAOP that you are now a graviton in the community, so that's a kind of reputation.
**Interviewer**: Sorry, what do you receive?
**Speaker 1**: P A O P
**Interviewer**: Oh, I see, OK.
**Speaker 1**: So sort of like people who have these POAPS have some sort of reputation. We recently did a I voted poap. So you can see who voted and who didn't, So maybe that these ideas of using POAPs is some sort of incentive mechanism is also something true too?
**Speaker 1**: Are you familiar with POAPs?
**Interviewer**: I've heard of them.
**Speaker 2**: It's like an NFT that is a proof of attendance, so you can redeem a token that usually has no value. Besides some type of reputation, but then there's a lot of people creating, airdrops for people who hold a certain POAP.
**Speaker 2**: And there are possible possibilities with that, and I feel like people like the idea of having a token that proves that they did something.
**Interviewer**: Yeah, it's some kind of badge
**Speaker 1**: Yeah, I think there's definitely people who are just trying to get as many POAPs. As that's some way that they can maybe try to get something. And I'm not explaining, expressing that well, but I also think. POAPS have like a real power in terms of credentials? Like the way that graviton uses it. I've completed 6 of the 10 weeks of these courses. So now I'm a graviton. I've acquired the skills, like sort of skill management and it's kind of reputation.
**Interviewer**: Sorry I missed this, is POAP something that you use?
**Speaker 1**: Yeah, I mean, we use it a lot.
**Speaker 1**: I don't know if I can send you this screenshot I just.....
**Speaker 1**: But you'll see all my POAPs are TEC. I'm a TEC steward. Like oh, you have a TEC Stewart POAP for 2021? This one is hatch POAP so only hatchers have this one. The params parties is like, you've attended a params party. Params is a debate, which is a common stack [inaudible]. which means you're a member of the trusted seed. And this is our new one, we voted in the commons upgrade. And then all of these are there the graviton ones? So it's kind of a reputation incentive. It is an incentive mechanism and I think maybe we'll see how successful it is or isn't.
**Interviewer**: I think it's cool, it definetely looks cool.
**Speaker 1**: It's super cool. Yeah, in our on-boarding experience we're starting to talk about how we can incentivize participation through POAPs. Do a forum post and you get a POAP. This is sort of using POAPS which are free and collectibles and unique to incentivize engagement, participation.

**Interviewer**: Oh, that's really cool. Good that we landed on POAPs.
**Speaker 1**: Incentives oh yeah, good yeah.
**Interviewer**: Uhm, OK, uhm.
**Interviewer**: Can we continue this conversation next week, perhaps?
**Speaker 1**: Oh it's already 59. Good Lord yes. So Speaker 2, what looks good for you? Uh, if it's just one hour, maybe I can do this next wednesday.

[Further scheduling of follow up meeting and end of this meeting.]

## H.7 Additional questions at start of second meeting

[Short introduction and recap of the topics that were discussed in the previous meeting. Now moving on with the interview] **Interviewer**: I had a few questions that still popped up for me. So maybe we can go to those first and then we move on with the rest that we have. And so, Tao voting to just clarify, is for any proposal that alters the DAO? Right, and in other words, that is altering the smart contracts of the DAO?
**Speaker 1**: Smart contract, something like stopping or starting the bonding curve, parameters.
**Interviewer**: OK.
**Interviewer**: Yeah, and then conviction voting is for mostly other things, which is mostly funding, yeah.
**Speaker 1**: Mostly funding.
**Speaker 1**: In fact, is there any other use case for it [Speaker 2]?
**Speaker 2**: No, not right now, probably, uhm, I mean. As this abstein proposal that is there, is a type of a signaling proposal, but it's just to influence the outcome of the funding proposals, so. Technically, you can use conviction voting for signaling also, but we don't want to have that happening, because that would be noisy. So we can do that on Snapshot while not like influencing the outcome of the financial proposals by having signaling proposals there.
**Interviewer**: OK. And also, uh. So I looked at the Tau voting parameters again. Is there an option to retract or change the delegate votes?
**Speaker 1**: So to change the delegate votes? So we have never done this. Because it doesn't make sense for it, so I'm going to see what I believe to be true. And then I'm going to look to [Speaker 2] to see if I'm lying or not. My understanding is that the period that we have at the end of the delegate vote. Would actually allow people, who want to change the vote, from what their delegate voted for them to, then change the vote.
**Interviewer**: Yeah, OK.
**Speaker 1**: So there is this period where the delegate vote stops and then people can be like, OK, it's fine. People can also be like: Oh no wait! My delegate voted the wrong way. I want to change it. It, but it doesn't necessarily mean that it would switch things. It's just if enough of the delegates on that one person, who's been delegated changed the vote, then it would be a signal that something was...
**Interviewer**: Yeah, and then you have the extension period?
**Speaker 1**: That's right, and we were supposed to get back to you about whether there was a yes and no. My my belief is there's a yes or no, but I did not find the answer. I could believe you could vote no for something you know. Conviction voting is very special because there is no no vote, but most votes you can vote no for.
**Interviewer**: Yeah, OK. And are funding proposal actually enforced or? Yeah, so if it passes, does payment happen automatically?

**Speaker 1**: [Interviewee nods yes]
**Interviewer**: OK, is that possible with snapshot?
**Speaker 2**: No, that's just with conviction voting. So no funding proposals go to snapshot. Just with conviction voting.
**Interviewer**: OK. So, is snapshot still used then?
**Speaker 2**: Yeah, snapshot is used for everything else and I think that's a common misconception of DAOs.. We only need to vote for financial proposals or for something that will change the code. But actually, there's a lot of other things that the decision is not so easy, that it would be great to have a vote that still doesn't have to ignite anything on-chain or to send funds to anyone, but still has an important cultural component.
**Interviewer**: OK, so snapshot is separate from Tao voting and conviction voting?
**Speaker 2**: Yeah
**Interviewer**: So Tao voting is specifically for Meta or DAO changing decisions, conviction voting purely or mostly for funding and then snapshot is there for other decisions.
**Speaker 2**: Yeah, like cultural decisions. For example, we had a vote for deciding. Who was going to be in the multisig that would control the funds of the initial buying and that's a cultural decision, you know, like who are the people that are going to be there? There's no funds involved in that decision. Nothing, no parameters are being changed. So we had a vote there and then we decided that... For the Covenant, for example, we voted on snapshot and then that that was a signal that the Community is agreeing with that. So then we could integrate with the commons upgrade.
**Interviewer**: And what kind of voting weight, assigned? So one token, one vote?
**Speaker 2**: On snapshot? Quadratic token weighted.
**Speaker 2**: So we submit our proposal on snapshot to decide the parameters on snapshot. So like what does it mean for when the proposal passes? How many people or percentage of tokens needs to be involved in the voting? And one of the decisions of these parameters was that we would use quadratic voting only. So only quadratic voting and quadratic ring trace voting.
**Interviewer**: OK, and you vote with the whole token weight. And then it's quadratically weighted?
**Speaker 2**: [Affirmative] Hmhm
**Interviewer**: OK.
**Speaker 1**: Another good example is whether the TEC should have done this initial buy. So it has officially launched the augmented bonding curve, the TEC used part of its own funds to purchase TEC tokens, so it got the TEC tokens at the lowest price possible.
**Speaker 1**: So that was a cultural decision that not doesn't necessarily need it to be... Didn't necessarily like that was.... Yeah, so that's another great example of what we would use snapshot for.
**Interviewer**: And then in order the people who hold the multisig that executed that buy?
**Speaker 1**: So once we decided that we wanted to use funds, we came up with 250K, to buy those TEC tokens. Then we needed to put it in a multisig. So then there was this discussion around on our forum and Be like, hey, how about these people and then somebody was like how about these people and I was like: oh no, what do we do? We have to vote on this somehow. So it ended up being a vote on Snapshot and we ended up building something. So as far as we know, no one has ever used quadratic ranked choice voting. There's like custom code that we needed to build on Snapshot for it to work, so we ended up using different lists of seven people, I think it

was and then people would rank these lists. So that one, was just the one that ended up being the multi sig for that initial buy of tokens.
**Interviewer**: OK, and some other decisions that need execution, who would execute on that? Would it be a working group or would that be specifically somebody? I mean changing things in the DAO or...
**Speaker 1**: So it's a great question right? 'cause like we voted for it on snapshot, but it doesn't mean it's automatically executed. So then somebody has to actually do the execution. So for the case of the the 250K buy it was sort of programmed into the run script of the Commons upgrade launch. And then for the execution of creating the multisig and then creating the groups so we can all talk to each other, that was one of the stewards who just took on that responsibility to do that. So there's like the social contract you know, [inaudible] like a social kind of community And because everything is so transparent, you know it's sort of very easy to see that that work got done.
**Interviewer**: OK, Yep.
**Speaker 1**: And then I would like to think that we would follow up at the forum with the resolution of the snapshot vote.
**Interviewer**: Uhhh?
**Speaker 1**: The multi SIG started a conversation in the forum, went on to snapshot for a vote and then the result is these people are the multi-sig and a steward created the multisig for that group of people.
**Interviewer**: OK and then how would you define the role of a working group within the whole DAO? And are there other other internal row structures or roles the team members take on within a working group? Or are there some team dynamics that you can observe there.
**Speaker 1**: There's there's two kind of formal roles. One is the steward and then one is sort of working group coordination.
**Speaker 1**: I can send you the community stewards manifesto and that sort of came about, because we needed to have somebody present in like the transversal coordination for working groups and it wasn't always going to be the steward, sometimes the working group was too large for the steward to meet every little piece and sometimes the Steward was great at stewarding, but not so great at the organizational detail and there was somebody on the team that was a lot stronger and they could sort of represent the coordination. Like the Omega working group, the steward and working group coordination leader actually are actually two different people.
**Interviewer**: OK.
**Speaker 1**: And then I would say work working groups really represent... You could imagine just a work of stream. They have some objective that's really independent, mostly independent on the other working groups, it is its own work stream, and they focus primarily on achieving that. I think if you're a little bit from sort of traditional structures, organizational structures. It's like they're different divisions.

And sometimes there's an overlap and that's why the transversal coordination becomes so important. So that everyone sort of knows what everyone else is doing and it ends up being complementary. It might go out of sync for a while but then it comes back and it's been complementary rather than duplication of effort.
**Interviewer**: Alright, thank you.
**Speaker 2**: Yeah, I think it's interesting too that initially the working groups weren't supposed to be forever groups.
**Speaker 2**: And we intended it to be more like, oh, there's something we need to achieve, and what is that? And then have a clear mission for it. Like a clearer piece

of work and what are the things that are wanted to be achieved. And that's why we had the manifestos in the beginning. But then it kind of worked like that. Some of them started to show how they were foundational, so they needed to be there for the whole structure to be functioning and then some working groups would come to an end and. Then some other have started, so there was a good fluidity of working groups and a base layer of some that are just there.

## H.8 Community management

**Interviewer**: OK. Umm, should we move on to the questions on the list, then move on to Community management? Yeah, it's uh, pretty self explanatory, what rules and what things do you have in place that deals with managing the community and then the first question is how do new Members get involved with the DAO? If I were a new member, how would I start to contribute or start to get involved and learn more about you. Are there active things in which you try to attract people and give people things that they can do?
**Speaker 1**: Yeah, I'm gonna take this one. Mostly, there's an entire working group dedicated to the on boarding experience and community management, and that work group is communitas And so this working group I would say there's a lot of.... of soft Gov and gravity that are really all concerned with... Many are conservants or the health of the community and the Communities working group is sort of also really like their main objectives are to create social cohesion in the existing community. So to sort of balance all the work things. Like now there's the lounge. And to try to have the existing community to have some nice times together I'm probably not describing this very well. And then for new people more specifically, uhm, there are some things that we've been doing, so I would say that they were born out of soft gov. Commuintas itself was born out of soft gov. And I'd like [Speaker 2], to explain this more to you. But like it's a very warm personal DAO, right? So when people arrive. We'd like them to be greeted by somebody so the communitas has a role called guides. We are now sort of formalizing this process where the guide is making sure everyone is welcomed, individually almost or in a group. And then there's a way for each person who joins our discord to be invited to the orientation call, which happens once a week. To the Community call that happens once a week. And then to be invited to have a one on one sync with one of the guides. So that you know they don't get... People will still get lost, but so that we can make it as soft landing as possible into all of the information overload and curiosity about what token engineering commons is. So there's a lot more we can do, but I would say that, we're making... Some of the feedback we've gotten from people is that it's the most open and welcoming community that they've joined because of this focus on this personal touch. And sort of like individually bringing people along and the onboarding experience right now is being evaluated or designed for these sort of milestones. Somebody lands and then we have a touch point with them in three weeks. And we have another touch point and then another three weeks to sort of see how they're how they're progressing. So there's actually a lot of care given to people who join.
**Interviewer**: Yeah, you're very active at attracting and getting people.
**Speaker 1**: And if you want to add something about that [Speaker 2], because it really came from the cultural build. These processes are all based on that.
**Speaker 2**: Yeah, I think there's certain practices that we always had to try to maintain. Like always giving space for everyone to speak in a call. For example, like when arenew and you arrive to a call. It's usually intimidating or there's that

like a longer period that you're just lurking around and you don't really jump into something. But then, if you're speaking from the very first time, and you're somehow included, and what's happening in the working group. Then you're more likely to be proactive about how you engage. And I think this personal onboarding is very important, and that's something that took a long time to develop this onboarding journey and Communitas has been doing a fantastic work now. Especially because it's not easy to onboard many people who have different needs and skills and are coming from different places and wanting to do different things and. I think once the working groups were more mature it was easier also to onboard people because there were places to send them. You know, like oh, if you're coming for this reason, you can join that group. If you're coming for this reason, you can help out with this. And still has been a challenge to find very easy and approachable tasks that people can do as soon as they jump in. But I think this will slowly work better and better with time too. They will find these things for people to jump in.
**Interviewer**: OK, that's a really cool process.
**Speaker 1**: Yeah, I just thought I'd reiterate 'cause I think what [Speaker 2] said maybe isn't that evident, unless you experience it, but you know, imagine being in a new call and then somebody would be like. Oh hey, welcome [Interviewer] Welcome to our call. Do you wanna try to introduce yourself? Like nothing stops. But it's just acknowledgement that somebody new is there and offering this space to say... It's a huge, different psychological dynamic. When you're like: we're happy you're here. You're welcome. So that feels really yeah..
**Speaker 2**: And also something that is always on my mind and we used to talk more about it. A long time ago, maybe, it's a good thing to bring up again, but it's happening organically actually, that there's a lot of people that are super quiet. But they are so observing and it's almost a rule that if there's someone that is quiet in many, many calls, but keeps showing up. That person has so much to contribute. Because they're good observers, they probably are just shy to speak up, but then approaching these people personally is always really interesting, and I think this has happened many times with us. To have this observation about someone and then reach out more closely. And then all of a sudden, this person is so important in the community.
**Interviewer**: Yeah, that's radically different than any other organization I think.
**Speaker 1**: Yeah, but we've gotten that feedback a lot.
**Interviewer**: The next question is there are formal proposals for Members to join the DAO, and when would someone be considered a member?
**Speaker 1**: So technically, if you buy tokens you're part of the DAO. But maybe the DAO and the active community are two different things. This is a great question actually. It's a existential question, yeah, existentialism, right? Like when are you part of the DAO 'cause you're a token holder and you've never attended a discord meeting, or because you're present in the discord meetings, but you don't have any tokens? So it depends on what we mean. I think there's no formal process for anyone to join. It's open to everyone. All of our meetings are open to everyone. We don't have meetings that aren't open to anyone.
**Speaker 2**: I would say having received praise is somehow comprehensive. Having maybe a combination of being a token holder, having received grace and being... Yeah, because that means that you're in our discord chat, for example.
**Speaker 1**: I think the lines are so blurry, right? It's like people coming out. I like the crazy idea but also, that's an indicative indication of like participation.
**Interviewer**: Yeah, it's there's no formal process for members to join, it's just: are you active in the community, and if you want to have a say in the governance, then

there are the tokens too, through which you can do that. And you can also be rewarded in tokens, so you will have...
**Speaker 1**: You earn them eventually.
**Interviewer**: Do new members need to prove their knowledge, technical competence or alignment with the values of the project?
**Speaker 1**: No, but I'm gonna see what [Speaker 2] is going to say.
**Speaker 2**: Well, uhm. Alignment with the values might be the closest one just because. When you enter on discord, you have to check that box that you're agreeing with something and also to participate in the gardens you have to sign up the covenant, but beyond that I think this onboarding process, like everything we've been talking about, it's kind of onboarding into the values of the project. So it's also a way for us to protect ourselves in a sense. So since I am treating you like this and I am onboarding you like this, because this is how we do. And it's kind of passing this knowledge forward, but there's no proof of knowledge or technical competence.
**Interviewer**: No, but so you have to sign the covenant if you want to participate in the gardens and there's this agreement thing in discord when you join.
**Speaker 2**: Yes, the checkboxes on discord, the on boarding of discord.
**Interviewer**: So it is kind of members do need to agree on values alignment.
**Speaker 2**: Yeah, that's like a disclaimer. For if something happens and we need to contact them about it, we have a something to state that that was said or agreed on, something like that.
**Interviewer**: OK.
**Speaker 1**: I mean I. I think people are going to come with like little to no knowledge and little to no expertise and everyone is welcome. But people who aren't aligned with the idea of commons. The number go up, people just aren't going to be interested in being here. So that misalignment should naturally resolve itself.
**Interviewer**: Is there any verification of the identity of members? I mean how do I know [Speaker 1] is [Speaker 1]?
**Speaker 1**: No
**Interviewer**: No, OK.
**Speaker 1**: And intentionally too, I mean your name, your Ethereum address, your Twitter handle, this kind of thing. People could be as open or anonymous as they like.
**Interviewer**: OK.
**Interviewer**: Are there any protocols for preventing or resolving conflict?
**Speaker 2**: Yeah, there's there's gravity working group. It's not easy, you know, like we have it and we've been working a lot on it, but there's still a lot of work to be done. Especially because we are a very diverse group of people. And this is part of our design pattern. That is one of Ostrom's eight principles is having conflict management easily available. So we have the Gravity working group and also the Graviton trainings. So gravity working group is understanding how to create graduated sanctions. So how to have many types of responses to many types of actions without having, like oh you are banned, or you are this. So understanding the granularity of it.
**Speaker 2**: And also gravity is also there to manage any conflict that might arise in the DAO.
**Speaker 2**: And then the graviton training came because we need to have more people who can facilitate conflicts. So let's make a training for having these conflict mediators in the community. Not only people that will do that more professionally, but also for anyone in the Community to have access to this language, to some tools, such as nonviolent communication. For example.
**Interviewer**: Yeah, so that is another thing that you have taken very seriously.

**Speaker 1**: I just want to say two things. It's one of Elinor Ostrom's 8 principles for robust, sustainable Commons that there is a way for resolutions... An affordable way for conflicts to be resolved. So and then I guess the other thing I want to just add to what [Speaker 2] said about having about two dozen people who are gravitons now. And the training courses, there have been two training courses. They are around 8 to 10 weeks each and they cover topics, like nonviolent communication, mediation, role playing, leadership. So the idea is not just to have this one working group that can respond immediately when there's a conflict. So when there's a conflict between you and myself. One of us might make a gravity form and then we'll have a mediator talk to you, talk to me. And try to figure out how to resolve our conflict. I agree with Speaker 2 it's not so easy or so simple and it's definitely not perfect. But it's something that exists.
**Interviewer**: Yeah, it's something that exists and is something you are still working on.
**Speaker 1**: I think it's always gonna be worked on. But then more importantly, these trainings that they do, try to bring the level up in the community itself, right?
**Speaker 1**: So that the community has people, like many people all around who had at least some exposure to these different kinds of communication, effective communication.
**Interviewer**: And so the Graviton training is meant to train Gravitons and those are conflict mediators for your DAO then.
**Speaker 1**: They can be, or they could just be people interested in this subject and there's. And it was very successful actually and brought a lot of people to the TEC specifically. Because conflicts within DAOs was something that happens a lot. And lots of DAOs don't know how to handle it and don't actually have a way to address it. Other DAOs have requested that gravity become involved in other DAOs as well. So there are plans for outside TEC work.
**Interviewer**: Okay. I think the [answer of the] next question is yes, there are graduated sanctions? Right?
**Speaker 2**: Yeah, they are still being worked on. The most severe ones would be like being banned for a day for a week. I think they're delicate because we haven't tested them. And it feels like what would happen with someone that has been banned for a day? Would they come back nicely? All of these things have to be kind of experimented with, but also warnings... Just reaching out to someone and saying, you broke the code of conduct here. I actually did that once, as a graviton to someone that made a post in the forum that was very aggressive and I reached out to that person: You broke the code of conduct, I'm deleting this post. If you have any objection, we can continue to talk about this, but it worked. It was fine and the person felt sorry, understood and whatever. So I think there's also the graduated sanctions will start appearing as we need them. We'll be more refined in a sense.

## H.9 Software development processes

**Interviewer**: Then if you don't have anything to add, I would like to move on to software development processes. So how are responsibilities for development tasks distributed amongst DAO members? Or are they freely decided within working groups or?
**Speaker 1**: The people that have actively developed code up until now has mostly been the commons swarm, which is a working group in the TEC, but it's really a

collaboration between commons stack and one hive. Sort of like all of the organizations, that were involved. And then the one that I think that's developing code now is probably the rewards group. TEC Labs might be doing some modeling and simulations that could be available for public consumption. I don't think any of these groups are doing anything that different from what you would expect. There's a GitHub repository and the GitHub repository is public and the working group has a GitHub repository for allocating work to people who can pick it up. A code reviewer and then a merge process.
**Interviewer**: OK, there's a code reviewer and then there is a merge process?
**Speaker 1**: Well, just sort to incorporate that change.
**Speaker 1**: So yeah, I've seen a few different groups who use what you would expect.
**Interviewer**: Pretty standard, yeah, but then within the working group. But there's, not necessarily anything defined overall from the DAO.
**Speaker 1**: That's correct, that's for sure.

## H.10 Evaluation

**Interviewer**: I I think. I'll leave it at that. If you have nothing to add. Then we go to framework evaluation. Uh, so maybe [Speaker 1], you can scroll back to page 66 for us. I want to review our meetings and ask you a couple of questions about what your thoughts are on this framework, and the first question is, does this framework provide any new insights for you?
**Speaker 1**: I don't know if it provided new insights, but I feel like it provides such a clear thinking. It actually immediately looked really helpful. My initial reaction was like oh wow, it was mapped out so nicely. How did we not have this already, so my initial thinking was like the clarity it provides is really welcome.
**Speaker 2**: Yeah, my first my first look at it too, when Speaker 1 shared with me, uh, before we talked was that wow, it's so good I really appreciate graphs and just visuals.
**Speaker 2**: And having everything organized and well put, I think it helps a lot for onboarding. Too, just for people to have a quick view of everything and understand things.
**Speaker 2**: I think this is more or less how we've been mapping out ourselves too. In these different categories. One thing that I I was offered this reflection by [2 people] and and I have been thinking about it: if it makes sense on decision making to separate on chain and off chain processes like that like that. I've been thinking more and more about how much importance kind of we give on-chain in our narratives and maybe it's just the execution type. What would be other ways to describe decision making if it didn't have that division and how does that affect the way we relate with governance? Do we find things that are off chain less important?
**Interviewer**: Not necessarily, but I think the focus comes a lot from the concept of a DAO being decentralized but also autonomous. And on chain is what kind of facilitates that autonomous part. I think I spoke to a researcher on Monday and he was very adamant about that.
**Interviewer**: He thought, DAOs that claimed to be DAOs who are voting on snapshot are not really DAOs, because there's no autonomy part to it, as proposals are not enforced.
**Speaker 2**: Yesterday I saw a really good tweet, that was: The way you describe the A in Your DAO tells a lot about your DAO. And there are so many papers about this now about this philosophical difference of automation and autonomy and. And

if we're talking about autonomy of individuals or automation of machines and what is the relationship between them? I think it's not something set in stone and that's why I'm just offering that reflection because it was also helpful for me to think about. But this is good, it's really amazing and I really enjoyed this process with you.
**Interviewer**: Thank you also.
**Speaker 1**: I'm gonna bring this up and you two are the right people to bring it up with maybe. There's a tweet that I came across recently and it was something around: There's a community vote to, essentially fire an entire team. I think it was the communications team and it was a DAO and it was a very close vote but essentially, they just voted to fire the team. And it is very interesting, we talk about how the working groups are structured, but we don't talk about: what about when a working group fails to achieve? What does that look like? You know we on-board, off-board stewards. But how about on-boarding... And we have retired working groups once they've reached their mission. Like we had the Hatcher Outreach working group and we hatched and then we retired the working group, but we had a sort of little ceremony for. The parameters and Commons swarm are 2 working groups that are being retired right now because they have achieved their goal. But there's something very interesting about, when a working group is not... Like nominating a steward for Offboarding is one of the ways we off-board stewards. How does that work for an entire working group? I don't remember the DAO, it is super interesting actually. It was just fascinating that.
**Speaker 2**: Was it bankless? I saw that there was a whole thing... But that was different I think.
**Interviewer**: But yeah, so I suppose voting is always an option.
**Speaker 1**: I don't know. I don't even know what we would do, but it was the first time it came across. Like I guess what would happen is they wouldn't have their funding renewed, but it's hard to know right. I've never, I guess maybe no one has ever seen there being a vote to let go of an entire team.
**Interviewer**: Your working groups have their own individual funding?
**Speaker 1**: Correct
**Interviewer**: Also, thank you that contribution on on chain and off chain, this distinction [Speaker 2] was nice.
**Speaker 1**: Just I want to throw it in because, maybe it just really got me thinking about how working groups will evolve from here actually?
**Speaker 2**: I think the challenge with that situation would be, like what if the Community doesn't want that, but then internally things work so well without the working group there. Then, if the community votes for a working group to like not receive funding anymore, then the whole structure it might be wombly because of that.
**Interviewer**: OK, I want to move on to the next question. In what way do you think this framework is useful?
**Speaker 2**: I think like I said, it would help onboarding a lot and maybe just the clarity for everyone in the. In the community.
**Interviewer**: That would be if you were to answer all the questions and create a diagram out of it, but also more like looking at just this picture of this overview of the governance. Would that be useful to anyone?
**Speaker 1**: I mean, it's super compelling from a comparing contrast perspective, right?
**Interviewer**: Sorry, what perspective?
**Speaker 1**: Like compare and contrast. Like different DAOs, yeah, it provides a comparison, it provides a framework to be able to compare on specific points. So

that's actually super interesting to facilitate analysis. And then if it were just a single one organization I think it may be. I think it helps people who are not used to how DAOs are structured see how DAOs are structured. So people who are new to DAOs could look at it and think, oh OK, I get it, there are these and these components. And maybe even find their own interest within.
**Speaker 2**: Yeah, maybe it might be helpful for DAOs that are starting. Oh, those are the check marks that I need.
**Interviewer**: OK. Yeah, next question? What would be the best moment to use the framework in a DAO lifecycle? Would it make sense to look at this at the beginning or later?
**Speaker 2**: Maybe it's something that goes with you, like something that you see your evolution. If all of these things were checkboxes, then when you have all of them checked, you can see how they are interacting. Maybe the next step would be: what are some health measures for each one of those boxes?
**Interviewer**: Do you think, if there are any elements of governance that were not covered by the framework or do you think it's complete? And would you have any suggestions for changes to this framework?
**Speaker 2**: I think it's very helpful for, I don't know if you're familiar with the work of Elinor Ostrom.
**Interviewer**: Uh, yeah.
**Speaker 2**: I think it would be very helpful to add, even if not all the principles, but to add some of them like monitoring. I think it's really important and the second principle, that is congruence between appropriation and provision. That is, are you spending more than what you have? And all ways of the resources, even culturally. Are people being stressed more than what they can give? Like how can you bring equilibrium to the system? And I think something that could be added to is some type of data analysis. Most DAOs aren't even aware of how to store their data or how to manage their data, and we have a whole transparency working group just making everything transparent and accessible. And then there are all types of data that can be used to analyze the DAO in periods of time.
**Interviewer**: So from the operational perspective, but also on understanding how your DAO is performing? Or understanding how your DAO is working.
**Speaker 2**: Also something about people too. Like how are people feeling? What is the sentiment? Is there something to measure the sentiment Of the community?
**Speaker 1**: I might add, maybe something that is missing is funding. Like where are the money flows? Something like that.
**Interviewer**: Yeah, I, I understand that.
**Speaker 1**: How is money governed, how we will get paid, something around that.
**Interviewer**: How do you? Yeah, how is money governed. I thought about that too. How that part is a bit missing, but then I also thought maybe money is not part of the governance process itself. But now, how you're putting it is, maybe a bit more compelling.
**Speaker 1**: I guess it just has to be governed somehow, right?
**Interviewer**: It just has to be governed.
**Speaker 1**: I think it's more about compensation. How are those decisions around compensation? I mean, maybe it falls on decision making processes but, it's big enough that it sort of earns its own thing.
**Interviewer**: Thank you for pointing this out because nobody has pointed this out before, but I have thought about it.
**Speaker 1**: This was great, [Interviewer], I just want to say thank you. Thanks for your interest in this. This is so awesome that people are interested in wanting to

know more and want to help build frameworks for DAOs to do better. So so exciting.
**Interviewer**: Yeah, I did not imagine that my journey would bring me here and I'm very happy actually. And thank you so much, both of you and I think you properly embody the culture of your DAO. And that's incredibly incredible. And thank you for that.
**Speaker 2**: Thank you, thank you so much.
**Speaker 1**: Yeah, and feel free if you have any questions or want another whatever 20 minutes or another hour or something, just let us know if you.
**Interviewer**: Yeah, yeah, I'll get back to you about any results.
**Speaker 2**: Looking forward to it.
**Speaker 1**: And good luck with your studies.
**Interviewer**: Thank you.
**Speaker 1**: See you soon, I hope.
**Interviewer**: Yeah bye.
**Speaker 2**: Fine, [Interviewer], thank you bye.