DAO, can it be viable?
An exploratory research on the viability of a blockchain based Decentralized Autonomous Organization

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Preface

This master thesis would not have been possible without the help of a number of individuals. Through this way I want to show my gratitude. First, I want to thank my supervisor Hans for having an open mind, letting me embark on such a challenging subject and guiding me in the right direction. Additionally, I want to thank Jan for helping me understand the VSM and giving me some essential feedback in the set-up phase. I also want to thank the very open and welcoming DigixGlobal team for their time and effort, and in particular Kai Cheng for thinking along with who might be best to interview and introducing me to them. Christoper, thank you for the very interesting and helpful talk. Then, I want to thank Lisanne for having the patience and bearing with me throughout this process. Thank you for the motivation, support and numerous pep talks. Last, and certainly not least, I want to thank Roeland for helping me by providing a lot of essential feedback and sometimes even forcing me to make this difficult subject matter more grasable.
Summary

The distinct characteristics of blockchain technology made a new organizational form possible: Decentralized Autonomous Organizations (DAOs). A DAO, deployed on a blockchain, formalizes and automates the governance rules of that organization using software. A lot of technical and societal potential is ascribed to blockchain applications, including DAOs. However, little (empirical) research has been conducted on DAOs from an organizational point of view. This master thesis aims to bring the concept of DAOs into mainstream organizational literature and tries to answer the fundamental question: ‘Can a Decentralized Autonomous Organization be a viable organization?’.

In order to describe the viability of a DAO, the Viable System Model (VSM) is used as the organizational norms which an organization should be able to realize if it is to be viable. An infrastructural aspect is added, because it is the actual infrastructure that realizes these norms. The research strategy is an exploratory, single case study with DigixDAO, one of the first DAOs, being the object of study.

Different knowledge sources, typical to the blockchain ecosystem, are used. For instance, Slack channels, Medium blog posts and a white paper. Additionally, the initiators behind DigixDAO are interviewed to acquire an in depth understanding of what DigixDAO will look like. This led to a comprehensive description on all aspects of the VSM, and how its norms are, or are not, realized by its infrastructure. Essentially, DigixDAO is a large pile of money that can be used to fund projects that contribute to the goal of DigixDAO. The idea is that these funds are governed by all the stakeholders of DigixDAO through automated, tamper proof and completely transparent smart contract on the Ethereum blockchain.

At present, it is concluded that DigixDAO cannot be considered a viable organization, as it does not have primary activities, required by the VSM. However, there are primary activities in the form of projects lined up for DigixDAO. Taking these projects as possible primary activities allowed for the identification of some remarkable features and ways through which norms of the VSM are realized. First, coordination of projects happens through automated code in the form of smart contracts on the blockchain. Second, auditing of projects can be done by anyone at any time transparently on the blockchain. Third, commands and resource bargaining have to be done in advance of projects being formally proposed to DigixDAO. Fourth, since DigixDAO’s community is spread across the globe and operates through the internet, DigixDAO can harness the full innovative power of its community. Fifth, and last, the voting on which projects should be funded, i.e. consolidation of proposals for innovation, happens in a fraud resistant and completely transparent way on the Ethereum blockchain.

These five features concern positive or unique characteristics of DigixDAO. However, since the novelty of DAOs and the fact that DigixDAO does not have primary activities at the moment, this master thesis provides six recommendations for improvement to DigixDAO. These are: rebalance the dependency on Ethereum, allow for sufficient change, find the right metrics to coordinate the intangible projects, clarify the relation with DigixGlobal, find the right metrics for consolidation and create best practice, and communicate the mission of DigixDAO.
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This master thesis concludes by stating that even though DigixDAO cannot be seen as a viable organization at present, it does have the potential for being a viable organization when primary activities are put in place. Many lessons have to be learnt before DigixDAO can live up to the potential that is ascribed to blockchain technology and DAOs.
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1. Introduction

Following the rise of Bitcoin and blockchain technology, a new organizational form called a Decentralized Autonomous Organization (DAO) came into existence. In particular, this new organizational form is made possible through the distinct characteristics of the underlying blockchain technology. Therefore, in order to understand the concept of a DAO, first blockchain technology has to be explained.

1.1 Blockchain technology

Bitcoin is an innovative and disruptive new form of digital money that was first described in 2009 by a pseudonymous person or group called Satoshi Nakamoto (Nakamoto, 2009). According to many, however, the underlying blockchain technology of Bitcoin is the true innovation (Swan, 2015a; McDonald, Allen & Potts, 2016; Garrod, 2016; Umeh, 2016). In non-technical terms, a blockchain can be thought of as a large, completely transparent spreadsheet of, for instance, a bank, that chronologically shows all transactions that ever occurred since the creation of that bank while it simultaneously is being maintained and verified by all account holders in a completely decentralized fashion. It is a chain of blocks where in each block transactions of some kind, over a specific time period are recorded. In technical terms, a blockchain is a “distributed database for independently verifying the chain of ownership of artefacts in hash values that result from cryptographic digests” (Panikkar et al., 2014). A blockchain is useful because: “It enables, for the first time, unrelated people to reach consensus on the occurrence of a particular transaction or event without the need for a controlling authority” (Wright & De Filippi, 2015, p.2). Its uniqueness lies in the fact that these unrelated people do not need to trust each other, or are dependent on a central authority, in order to transact; they only need to trust in the transparent blockchain which can be reviewed on the internet whenever desired (Swan, 2015a; Wright & De Filippi, 2015; McDonald, Allen & Potts, 2016).

Cryptocurrencies, such as Bitcoin, are seen as ‘blockchain 1.0’ applications, but ‘blockchain 2.0’ goes beyond cryptocurrency and gives rise to many more applications such as DAOs (Swan, 2015a). This is made possible through blockchains that have a programming language incorporated, such as Ethereum (Buterin, 2013). By using code, ‘smart contracts’ can be created, which are self-executable contracts, written on the blockchain (Buterin, 2013). These ‘smart contracts’ are “cryptographic “boxes” that contain value and only unlock it if certain conditions are met” (Buterin, 2013, p. 16). In this sense, smart contracts are traditional contracts where the need of a type of trust between different parties is taken away (Swan, 2015a). This is because, once the contract is written in code, it “cannot help but execute the prespecified code” (Swan, 2015a, p. 16). These ‘smart contracts’ have many potential use cases even outside the world of finance (Buterin, 2013; Swan, 2015a).

Given the decentralized and trustless character of blockchain technology, ‘blockchain 2.0’ applications could have a large impact on governance structures of organizations, and
therefore on the organizational world. The current push in society towards decentralized business models is a trend that is likely to persist (Atzori, 2015; Swan, 2015a; Wright & De Filippi, 2015), with blockchain technology being the first large-scale identifiable phenomenon that might change the locus of power from centralized authorities towards decentralized networks in various fields such as communications, politics, law and business (Wright & De Filippi, 2015). Blockchain technology can enable the trend towards decentralized business models, since its most general technological service is that it decentralizes (McDonald, Allen & Potts, 2016). In this sense, it is a decentralized solution for the problems caused by centralization; problems which are traditionally expensive due to, in particular, cost related to trust issues and the abuse of trust (McDonald, Allen & Potts, 2016). The benefits that blockchain technology brings, in the form of managerial and technical advantages for various sectors, makes blockchain-based governance interesting for organizational theory (Atzori, 2015). Within organizations, a blockchain can facilitate coordination and trust so that collective action could bypass existing governance imperfections, such as excessive centralization, delegated decision-making and even corruption (Wright & De Filippi, 2015).

1.2 Decentralized Autonomous Organization
One blockchain 2.0 application is the above mentioned DAO. A DAO is an organization that has had its bylaws formalized and coded, using a blockchain, which can only be altered if a predetermined amount of shareholders of the organization, also known as ‘token holders’, which would traditionally be specified in a bylaw, votes in favor of altering this code. The concept of a DAO stems from the field of artificial intelligence (AI) (Swan, 2015a). However, applied to the field of blockchain, the concept is coined by Buterin (2014) (Glazer & Bezzenberger, 2015). In congruence with AI, Buterin describes the essence of a DAO in an abstract way: “it is an entity that lives on the internet and exists autonomously, but also heavily relies on hiring individuals to perform certain tasks that the automation itself cannot do” (Buterin, 2014, p.7). In a less abstract fashion, a DAO, a decentralized organization deployed on a blockchain, formalizes and automates the governance rules of that organization using software (Buterin, 2014; Garrod, 2016; Jentzch, 2016). It is ‘deployed on a blockchain’ in the way that the decentralized decision-making process and the management function is directly encoded in the software (Buterin, 2014, Wright & De Filippi, 2015; Garrod, 2016). By doing this, it solves two major problems that historically have existed due to the nature of organizations and the fact that people play a central role in them (Jentzch, 2016). The first problem is that people within companies do not necessarily follow the prescribed rules. The second problem is that people within companies do not necessarily agree on what should be done according to those rules. In this way, DAOs can eliminate opportunism through a blockchain (McDonald, Allen & Potts, 2016).

To this date, several DAOs exist. Several more DAOs will be created in the near future. Since the novelty of this concept, and the underlying technology, these organizations are young and mostly in the start-up phase. An example of a DAO is DigixDAO. In its ‘crowdsale’ or ‘initial token offering’, which is comparable to a stock IPO (Glazer & Bezzenberger, 2015), DigixDAO raised its capped target of 5.5 million U.S. dollars within twelve hours (Lamarque, 2016). DigixDAO is a DAO that is deployed on a blockchain and aims to bring the gold standard
to the blockchain space (Eufemio, Chng, & Djie, 2016). It does so, by growing the ecosystem around a trading platform for a gold-backed cryptocurrency (Lamarque, 2016). Another example is the largest DAO so far called ‘TheDAO’. In its crowdsale it raised the equivalent of 168 million U.S. dollars, making it the biggest crowdfunding project in the world so far (Caisley et al., 2016). However, due to a weakness in the code ‘TheDAO’ was compromised (Caisley et al., 2016) and funds were returned to investors. An example of a DAO that is announced, is the Expanse DAO. Expanse is a separate blockchain on which ‘blockchain 2.0’ decentralized applications (Dapps) are possible through smart contracts. This DAO is a proposal to govern the projects around the Expanse blockchain through a DAO (Franko, Clayton, & Conway, 2015). In their own words, these authors see the concept of a DAO as follows: “A decentralized autonomous organization whose bylaws are engraved with the immutable tools of mathematics and logic is the evolutionary next step in organizational governance.” (p.8). According to the core developers of the Expanse blockchain, the goal of the DAO is to decentralize the decision-making, create more involvement from community members, incentivize development and solve problems of institutional corruption and external financing (Franko, Clayton, & Conway, 2015). Another DAO that is coming is called Wings. Wings is a blockchain platform that helps communities who want to back and promote new project proposals through the organizational model of a DAO by seeding and nurturing them (Popov et al., 2016). Essentially, Wings’ platform enables parties to easily create their own DAO. Wings raised almost 2 million U.S. dollars in its crowdsale. More recently, the Aragorn Network finished its crowdsale with raising 27.5 million U.S. dollars. This DAO aims to act as a digital jurisdiction that makes it easy and friendly for organizations, entrepreneurs and investors to operate (Cuende & Izquierdo, 2017).

After its creation, generally facilitated by a team of developers, a DAO does no longer necessarily need its creators to survive (Wright & De Filippi, 2015). This is because when the DAO is created through a crowdsale, all participants of that crowdsale invest money (for example Bitcoin or other cryptocurrencies) and receive voting right in the form of tokens proportionate to the amount of money the investor invested. With these tokens, within that specific DAO, token holders have direct and real-time control over their investments (Jentzch, 2016), are entitled to directly vote on managerial- and investment decisions through the blockchain and they are entitled to obtain dividend (Štrobl, 2016). Important to note here is that, given the characteristic of blockchain technology that all transactions on it are completely transparent, no human intervention or (third party) controlling authority is necessary to verify the available amount of tokens and therefore voting right (Atzori, 2015). In this sense, when investing, hundreds or potentially even thousands investors can together create, own and govern the DAO (Wright & De Filippi, 2015), not necessarily connected to the initial team of developers. By combining this decentralization of control with the formalization and automation of governance (Jentzch, 2016), the organization is autonomous and can continue to exist if it only manages to receive sufficient funds (Wright & De Filippi, 2015).

1.3 Impact and current research
To illustrate the impact that DAOs might have on the organizational field, one should, in the first place, look at the potential that is ascribed to blockchain technology. Due to its decentralized nature, blockchain technology is described as an “equality technology” (Swan,
It has remarkable advantages for “automation, transparency, audibility and cost-effectiveness” (Atzori, 2015, p. 3). Blockchain technology offers the promise that Internet visionaries hoped for, in particular “a more flexible and fairer space of interaction” (Wright & De Filippi, 2015, p.19).

Zooming in on the potential of DAOs on the society, blockchain technology is a “new institutional technology that makes possible new types of contracts and organizations” (McDonald, Allen & Potts, 2016, p.6). Through blockchain technology, the number of centralized organizations within society can be lowered and “unbundled into more decentralized entities” (Wright & De Filippi, 2015, p. 19). In general, decentralized consensus systems, through blockchain technology could “change the very nature of how companies, organizations and individuals are built and interact with each other” (Glaser & Bezzenberger, 2015, p.1).

In particular, it may represent a disruptive innovation for a variety “contracts and business activities” (Atzori, 2015, p.3). Clearly, a lot of potential is ascribed to blockchain technology. However, these previous quotes also indicate a large amount of speculation about the future of blockchain technology and its applications, such as DAOs. This makes it clear that the field of blockchain technology is in its infancy and the future of the blockchain space is terra incognita.

Nevertheless, in remarkable ways, the discourse around blockchain technology leads to new modes of thinking about the architecture of the digital world as we know it (Koonce, 2016). Some even go as far as hypothesizing that blockchain technology, in the form of DAOs, one day might be the basis on which whole societies will function (Swan, 2015a). This vision is countered by authors who are more sceptic about the future of blockchain technology (Atzori, 2015; Ammous, 2016; Garrod, 2016). However it will unfold, development and progress are continuous (Swan, 2015a), and blockchain technology is a fast moving field (Atzori, 2015).

Presently, scientific research does not seem to keep up with this rapid development. There is a general lack of scientific knowledge within the organizational world about blockchain technology. Current literature on blockchain technology mostly looks at technicalities, finance and legalities surrounding Bitcoin (Atzori, 2015), political governance and democracy (Atzori, 2015), and proposed judicial reforms in the form of ‘Lex Cryptographia’ (Wright & De Filippi, 2015). This research is predominantly theoretical, technical or hypothetical. Additionally, several authors are skeptical of the feasibility of blockchain technology and point out technical issues (Czepluch, Lollikke & Malone, 2015) and downsides or risks of using this technology at the level of commerce (Ammous, 2016), government services (Atzori, 2015) and society (Garrod, 2016).

The general lack of scientific knowledge of blockchain applications includes the concept of DAO’s. Current literature about DAO’s consist of technicalities (Jentzch, 2016), collaborations for DAOs (Norta, 2015; Norta, Othman & Taveter), legal issues (Wright & De Filippi, 2015), semantics (Buterin, 2014), and decentralized governance systems (Glazer & Bessenberger, 2015). Adding to the lack of knowledge and understanding about the feasibility of the concept of DAOs, is the fact that some authors already point out problems with DAOs that, if remained unsolved, threaten the possibility for DAOs to be viable organizations (Jentzch, 2016; Štrobl, 2016). Furthermore, practically no empirical research exists about the topic of DAOs. Given the potential disruptive effect that the DAOs might have on the organizational world by providing a new decentralized governance system, organizational
scientists should start looking at the phenomenon of a DAO. This is, however, to the best of the knowledge of the author, not happening at the moment. Respected journals in the field of organizational science, such as ‘Organization Science’ and ‘Administrative Science Quarterly’ do not have any research about blockchain based governance models or DAOs. Articles within these journals that come close to the topics surrounding DAOs are about virtual organizations (Ahuja & Carley, 1999), how to innovate in a digitized world (Yoo et al., 2012), virtual design strategies (Gibson & Gibbs, 2006) and how information technologies can be used for coordination in virtual corporations (Argyres, 1999). However, journals such as ‘Harvard Business Review’ do stress the importance of blockchain technology and the potential that it has on the field of business (Tapscott & Tapscott, 2016), but do not conduct actual research on existing DAOs. This is a gap in existing organizational science that needs to be filled. Some authors have already tried to provide a taxonomy of the several new concepts, including DAOs, which came into existence with the rise of blockchain technology (Glazer & Bezenberger, 2015). However, fundamental organizational questions about DAOs have not been answered, so far.

1.4 Research aim and relevance
The potential disruptive effect on society that is ascribed to DAOs, the lack of research on DAOs in general and especially within the organizational field, on both theoretical as empirical level, different authors pointing out critical faults or problems within the designs of DAOs, the failure of the biggest DAO so far (Bahga & Madisetti, 2016; Ammous, 2016) and the fact that no DAO has been around long enough to be successful, altogether makes it necessary to look at whether a DAO can actually be viable. There is already an ongoing technical discourse on what DAOs should and should not look like, but no (empirical) research has been conducted on DAOs from an organizational point of view. Moreover, a DAO has yet to prove to be a viable organizational form. An organization is viable when it is able to survive (Beer, 1972). Therefore, this master thesis aims to shed light on the feasibility and viability of a DAO. Simultaneously, this master thesis aims to bring the concept of DAOs into mainstream organizational literature.

In order to get a grasp of the viability of an organization, it is necessary to look at whether an organization does what an organization should do. More specific, which functions, according to organizational literature, does an organization have to have in order to be viable? Within organizational science there is one model that immediately comes to mind. A method for looking at the viability is to look at whether the organization has the required Functions, as is described by Beer (1972; 1990; 1996) with his widely respected, and in organizational practice still used (Wilberg et al., 2015; Puche et al., 2016; Leonard, 2016) Viable System Model (VSM). The VSM is a model rooted in cybernetics, which is “the science of effective organization” (Beer, 1990, p. 4). The VSM provides the organizational norms on what an organization should be able to do if it is to survive. The VSM is particularly helpful in looking at DAOs and its decentralized nature, since the VSM has broken away from organizational models that look at diagnosing and designing organizations based on their hierarchical management structures (Hoverstadt & Bowling, 2002; Preece, Shaw & Hayashi, 2013). This master thesis conducts an exploratory study on the viability of DAOs through the use of the
VSM. Additionally, this master thesis adds the infrastructure to its conceptual model to describe a DAO. In this sense, this master thesis looks at whether a DAO can be seen as a viable organization and how it actually manages, or fails to manage being viable on the level of its infrastructure.

One of the first DAOs, called DigixDAO, is the object of study of this master thesis. Forbes called DigixDAO “a new kind of beast – and one that lives on the Internet.” (Aitken, 2016). DigixDAO, mentioned earlier in this introduction, is explained and justified as a research object in the methodology chapter. The exploratory research focusses on what the organizational form of a DAO brings to the table, instead of focusing on the business model of one particular DAO, in this case DigixDAO. To the best knowledge of the author, such a research has not yet been conducted. Therefore, the main research question of this master thesis is:

*Can a Decentralized Autonomous Organization be a viable organization?*

This question is scientifically relevant because it brings the concept of a DAO, and with it blockchain technology, into organizational literature¹. By doing this, the author of this master thesis aims to answer the most fundamental question that can be asked about any type of organization; can it be? Moreover, within organizational science, the author wants to create a sense of awareness about the existence of DAOs and a sense of urgency to start conducting research on the phenomenon of a DAO. This is because DAOs might have a disruptive effect on a variety of sectors within society and particularly on how organizations will be governed in the future. Practical relevance lies in describing if and how a DAO functions, and how its organizational form adds value to society at large. More practical relevance lies with providing DigixDAO with a description of how it is or is not a viable organization according to the organizational norms set by the VSM and what actually happens on the level of its infrastructure. If applicable, based on the exploratory research, recommendations on possible improvements of certain functions are given to DigixDAO. Additionally, practical relevance lies with other existing DAOs or DAOs that are coming in the future. They can compare the results of this research to their own DAO, and possibly learn from its lessons.

This master thesis has the following structure. In chapter two the research question of this research is embedded in literature. Therefore, the VSM with its five functions, their interrelations and the infrastructure are elaborated on. In chapter three the methods are

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¹ For organizational literature, the concept of DAOs is new. The aim of this master thesis is to bring the concept of DAOs into organizational literature. Therefore, too technical details are out of the scope of this thesis. However, in order to understand the relatively high technical nature of the governance structure of a DAO, basic knowledge about its building blocks can be helpful. Descriptions on these building blocks, besides what was already provided in the introduction, are out of the scope of this master thesis. Nevertheless, the author wants to provide links for further reading about relevant topics. Relevant topics combined with relevant books or articles are as follows; blockchain technology (Swan, 2015a), cryptocurrencies (Swan, 2015a), Bitcoin (Antonopoulos, 2014), Ethereum (Buterin, 2013) and smart contracts (Buterin, 2013).
presented, preceding the results in chapter four. In chapter five conclusions are drawn from the results. In the discussion of chapter six, strengths, limitations, implications, a reflection and theoretical recommendations for future research are given. Finally, after the references section, a glossary with definitions of newly introduced, uncommon or specialized terms and abbreviations is provided.
2. Theoretical background

In this chapter, the framework to describe the subject of this master thesis is presented. As explained in the introduction, the concept of a DAO is new and unexplored. It is unknown whether DAOs can be viable organizations. Therefore, this research describes the organizational form of a DAO by using the Viable System Model. In paragraph 2.1, Beer and his VSM, containing five Functions, are introduced. The subparagraphs 2.1.1 until 2.1.6 encompass these Functions: Primary Activities, Coordination, Control, Intelligence and Policy. Subparagraph 2.1.7 explains the interrelations between Functions.

The organizational norms which the VSM provides can be used as a tool to describe the viability of a DAO. This is not enough for present study, as already stated in the introduction. Because, in order to give credit to the unique characteristics of a DAO, more than just a description of a DAO based on the VSM is necessary. Therefore, in paragraph 2.2 the infrastructural aspect is added which enables looking at the unique characteristics of the DAO under study. Then, in paragraph 2.3, the conceptual model of present study is provided.

2.1 Viable System Model

Stafford Beer made numerous contributions to organizational science. He is often described as one of the innovative thinkers of early organizational science in general, and cybernetics in particular. Beer’s main contribution to organizational science is his Viable System Model (VSM). He explains the VSM in his three major works: Brain of the firm (1972), The heart of enterprise (1990) and Diagnosing the system for organizations (1996). His quest to find out how organizations can be viable, resulting in the VSM, took him thirty years (Beer, 1984). Beer draws the definition of a viable system as ‘being capable of independent existence’ (Beer, 1984).

Scientists all over the world have confirmed the VSM in different modes and situations, some even non-managerial. In 1984, Beer already produced, from memory, a list of different industries on which the VSM is applied, widening from a bakery to the steel industry, from textile manufacturers to banking and even from insurance to government at all levels (Beer, 1984). To this date, the VSM is still being applied in various fields such as supply chain management (Puche et al., 2016), politics (Leonard, 2016) and engineering (Wilberg et al., 2015). A recent metastudy, with the largest sample used so far, showed that the theoretical claim of the VSM versus empirical evidence is still valid (Schwaninger & Scheef, 2016).

Many scientists have contributed to the corpus of theory of the VSM, but Beer (1984) acknowledged Raúl Espejo as the major contributor. More recent authors have also underpinned the contribution of Espejo to the VSM. Achterbergh and Vriens (2010a) describe and summarize VSM. They combine the three major works of Beer with the work of Espejo et al. (1996). This master thesis mostly draws from the description of the VSM of Achterbergh and Vriens (2010a), because they put Beer’s theory in a comprehensive cybernetic, more recent, organizational context. Their book ‘Organizations’ can be seen as a general introduction to organizational cybernetics (Achterbergh & Vriens, 2010b). Moreover, by combining Beer (1972; 1995; 1996) with Espejo et al. (1996), they produce an elaborate and cohesive description about the Functions and their interrelations within the VSM. Achterbergh and
Vriens (2010a) took Beer’s *The heart of enterprise* (1995) as their central text to describe the VSM. Therefore, to describe the VSM, this master thesis mostly draws from the descriptions of Achterbergh and Vriens, (2010a) and Beer’s *The heart of enterprise* (1990).

Beer (1995) described that in order to maintain a separate existence in its environment, an organization has to realize and adapt its goals. In his rhetoric about viable systems, Beer states: “It should not be too difficult to demonstrate that certain features of a system are necessary to its viability. ‘Without this particular sub-system or mechanism’, we should be able to say, ‘no system is survival-worthy’.” (1990, p. 115). Therefore, to be viable, Beer concludes that an organization needs five distinct Functions². These are: Primary Activities, Coordination, Control, Intelligence and Policy. Together, these Functions are not only necessary, but also sufficient for viability (Beer, 1990). Importantly, this means that no fewer, but also no more Functions are needed.

Before diving into the five Functions, one cautionary remark about Functions has to be made (Achterbergh & Vriens, 2010a). When reading about the Functions Primary Activities, Coordination, Control, Intelligence and Policy, one might be tempted to think that we are dealing with specific persons, teams, or departments that perform specific organizational roles. One might say: “Policy, that is probably the Board of Directors”, or “Intelligence, that is definitely the Research and Development Department”. These notions are wrong, and using the VSM like this would be erroneous (Achterbergh & Vriens, 2010a). This is because we are talking about Functions. Functions are desired effects that have to be realized in order for the system to be viable (Achterbergh & Vriens, 2010a). This means that a Function, such as Intelligence, can be realized across different individuals, teams, business units, or even all parts of the organization.

By using the notion of Functions, it becomes easier to identify where in the organization, whether these are things or activities, these desired effects for viability are realized. In the words of Achterbergh and Vriens (2010a, p. 205): “So, it is impossible to make an a priori connection between functions and organizational units in the sense that a particular unit always performs a particular function or a particular function is always performed by a particular unit. In concrete cases, one must always be aware of what a particular unit does in order to interpret which functions it fulfills.”

Before the individual Functions and thereafter their interrelations can be discussed, an introduction in cybernetical terms is required to understand the jargon of the VSM. Moreover, a supportive example of a hypothetical company named Energeco (Achterbergh & Vriens, 2010a) is introduced.

### 2.1.1 Cybernetics and Energeco
The roots of the VSM lie in cybernetics (Vidgen, 1998; Achterbergh & Vriens, 2010a). As stated, cybernetics is the scientific stream of effective organization (Beer, 1990). Cybernetics

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² Beer consistently uses the term ‘Systems’ instead of ‘Functions’. However, in this master thesis this usage is departed from. Beer (1990, p. 3) condones this departure, as he states: “we begin to probe the connotation of the word ‘system’. The target definition turns out to be elusive.” The departure is in congruence with more recent works, such as Achterbergh & Vriens (2010) and Espejo et al. (1996). Moreover, ‘system’ is reserved for depicting the ‘viable system’ as a whole.
is useful because it “provides concepts for understanding the regulation of any kind of system, and, therefore it can help to understand and make explicit the regulation of organizations.” (Achterbergh & Vriens, 2010a).

William Ross Ashby is seen as a pioneer of developing cybernetics as a separate scientific stream. In Ashby’s book ‘An Introduction to Cybernetics’ he develops a manifold of cybernetic concepts, including his famous Law of Requisite Variety (1957). Applied to organizations, this Law follows from the recognition that there is a variety of disturbances (D), in an organization and its environment, which directly affect the goals of an organization. The only way to deal or regulate (R) the variety of disturbances, meaning preventing them to affect organizational goals, is to increase the variety in regulatory potential. In Ashby’s own words: “only variety in R can force down the variety due to D; variety can destroy variety” (Ashby, 1957, p. 207). This essentially means that increasing regulatory potential helps in dealing with a variety of disturbances (Achterbergh & Vriens, 2010). However, since an organization and its management are inherently less complex than their environment, an explanation is required about how organizations can deploy sufficient variety in regulatory potential to deal with this complexity in the environment.

Therefore, based on Ashby’s theory, Beer formulates three ways for organizations to deal with complexity (Achterbergh & Vriens, 2010a). Beer states that first, by selecting specific goals for the organization, environmental variety decreases. By doing this, the total environment of an organization, which is the whole world, is decreased to the manageable, relevant environment, which results in less complexity. Second, within the environment and the organization itself, disturbances take place. To deal with the variety of these disturbances, attenuators and amplifiers can be used. On the one hand, attenuators decrease the variety of disturbances in the environment and within the organization. For example, take an energy company which suffers from fake news on social media that leads to negative publicity and complaints of customers. To address this problem, it designs a piece of software, an attenuator, which automatically locates this fake news on social media, so that its spreading can be stopped. In this way, a disturbance in the environment is attenuated. On the other hand, amplifiers increase the potential regulatory moves for dealing with disturbances. For example, in extension with previous example, by providing employees in the marketing department of the energy company with the regulatory power to discuss the best way to deal with the identified fake news. Third, Beer introduces the concept of recursion to deal with variety. This means that viable systems are nested in viable systems, through which on each level of recursion a part of the variety is absorbed.

To explain recursion Achterbergh & Vriens (2010a) use the example of a fictitious company named Energeco. Energeco’s core business, or primary activity, is supplying renewable energy. Since Energeco selects the goal of supplying renewable energy, it has its own relevant environment with which it interacts. Energeco also has its own management which interacts with the primary activity. The environment, primary activity and management are depicted in figure 2.1. Note the arrows that connect these three elements of Energeco. The upper ones depict amplifiers, and the lower ones attenuators. The middle bi-directional arrow depicts an input-output relation between the primary activity and the environment. As a whole, Energeco is a viable system.
This division in three elements is not enough for Energeco to deal with the complexity and variance of disturbances. To absorb variance, Energeco’s primary activity is divided into three different ways through which it supplies renewable energy. These are: Wind, Solar, and Tidal energy. Now, recursion means that each of these three primary activities is in itself a viable system (Beer, 1990). What this means is that Wind, Solar, and Tidal all have their own primary activity, respectively the supply of Wind, Solar and Tidal energy, relevant environment, management and attenuators and amplifiers. This is depicted in figure 2.2 as three systems Wind, Solar, and Tidal, within the system of figure 2.1. Three viable systems on a lower level of recursion, are structurally equivalent to their meta-system, Energeco as a whole. This is important, because “Recursion allows for designing organizations containing viable systems that both contribute to the goals of the organization and have viable systems, attenuators, amplifiers, and management to absorb a part of the total complexity the organization has to cope with.” (Achterbergh & Vriens, 2010, p. 190). In paragraph 2.1.2, recursion is also explained in the context of Function One of the VSM.
Throughout this chapter, the example of Energeco is used to illustrate the different Functions of the VSM, starting with Function One: Primary Activities.

2.1.2 Function One: Primary Activities

Primary activities are the activities that realize the *raison d’être* of the viable system in focus (Espejo et al., 1996, p.110). The collection of these primary activities encompass Function One of Beer’s VSM: Primary Activities. Energeco, for instance, exists for the supply of renewable energy. Its primary activities are the ways through which it accomplishes the supply of renewable energy: through the supply of wind, solar and tidal energy, see figure 2.3. These are the basic activities “which exist to do what the system does” (Beer, 1990, p. 116). Together, the three primary activities, separated in three business units (Wind, Solar and Tidal Energy) of Energeco, realize Function One of the VSM of Energeco.

![Figure 2.3 Function One; Primary Activities (adopted from Achterbergh & Vriens, 2010a, p. 197)](image)

Beer continues by saying that each of the primary activities, collected in Function One, is in itself a viable system. Thus, each primary activity has its own goals, environment, management, attenuators and amplifiers. In the case of Energeco, the first primary activity exists for the supply of wind energy, the second for solar energy and the third for tidal energy. For Energeco at large, the relevant environment would be the ‘delivering renewable energy’-environment. Also, each viable system within the viable system of Energeco, has its own relevant environment. For instance, the business unit that produces wind energy has its own relevant environment for delivering wind energy. The environment of Energeco as a whole comprises the environments of Energeco’s primary activities. Additionally, Beer’s reasoning explains that the relevant environment of Energeco at large, is wider than the added three relevant environments of the business units (Beer, 1990) Wind, Solar and Tidal Energy.

As stated, each of the primary activities of a viable system can in itself be a viable system. Thus, when, for example, diving deeper into the viable system of Wind Energy, deeper layers of primary activities can be described. For instance the supply of wind energy to the North region separate from the supply of wind energy to the South region. Business units North and South are the primary activities that together are Function One of the viable system of the business unit Wind Energy. Beer (1990) describes these ‘layers’ that are in itself viable systems within viable systems as ‘levels of recursions’. Think of it as Russian Dolls: “In a recursive
organizational structure, any viable system contains, and is contained in, a viable system.” (Beer, 1990, p. 118). This means that on the level of Energeco, a viable system, it contains all five Functions. Additionally, one layer lower, the business unit Wind Energy is also a viable system, so the five Functions can be identified. Next, when you for instance ‘open up’ the viable system Wind Energy, you might find another, lower level of recursion (e.g. supply to the North region) that can be systemically drawn in the same way and has all five Functions sufficient and necessary for viability. This use of recursion is helpful in diagnosing and designing organizations (Achterbergh & Vriens, 2010a).

Together, the primary activities realize Function One of the VSM. However, as stated, four more Functions are necessary to be viable. Therefore, for instance, the business unit Wind Energy, which is a viable system, also contains the other four Functions necessary for viability. Each, of the possibly many, primary activities needs to have autonomy within the larger organization and needs to be encompassed in the coherent whole of the organization (Achterbergh & Vriens, 2010a). The other four Functions can be seen as ‘meta-systemic’: “Whatever else is needed to manage the collection of operational elements [primary activities] is METASYSTEMIC to that.” (Beer, 1990, p. 116). They can be found in the ‘management box’, which is the square on the right (figure 2.3). These other Functions are: Coordination, Control, Intelligence and Policy. In order to explain these and their interactions, hereafter the focus lies on the level of recursion of the organization (Energeco) as a whole.

2.1.3 Function Two: Coordination
Primary activities make up the basis of any viable system. These primary activities have to be forged together in order to make a coherent whole, otherwise they will be misaligned. Beer illustrates this as “if there were zero metasystemic intervention, elemental operations [primary activities] (in pursuit of their individual targets) would inevitably exhibit activities that were not consonant with each other – and which might be downright contradictory.” (1990, p. 158). Therefore, the interdependencies between the primary activities need to be coordinated, which is Function Two of Beer’s VSM: Coordination.

![Figure 2.4 Function Two; Coordination](adopted from Achterbergh & Vriens, 2010a, p. 198)

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3 Note that ‘organization’ and ‘viable system’ are used interchangeably.
Previous theoretical explanation of Function Two of Beer’s VSM requires an example (Achterbergh & Vriens, 2010b). For consistency purposes, the business unit Wind Energy of Energeco is taken as starting point. This business unit requires high voltage specialists (HVPs) to work in the top of the windmills. Energeco has multiple HVPs on their payroll. These HVPs do their work across the three business units of Energeco Wind, Solar and Tidal. The HVPs make sure the primary activities are functioning. However, when there is no coordination between the different business units, the HVPs might get double booked by different business units. For instance, when business units Wind Energy and Solar Energy require the HVPs at the same time. This does not have to be a problem, when it is possible that the HVPs can be redistributed amongst projects. However, when there is no coordination between Wind Energy and Solar Energy, this redistribution will lead to more problems, and so on. When no coordination is present, these business units will get stuck in oscillating between allocating and redistributing HVPs across projects, potentially causing many problems or a waste of resources (Achterbergh & Vriens, 2010a).

In general terms, Beer states that “the necessary System One [Function One] of our viable corporate entity will go into uncontrolled oscillation – unless a sufficient element of ‘damping’ is introduced.” (1990, p. 175). Therefore, a Function that damps or prevents these oscillations by coordinating interdependencies between business units is needed. Function Two, Coordination, facilitates the necessary coordination of interdependencies between primary activities of Function One. In this way, Function Two is a direct service to Function One (Beer, 1990).

Interdependencies between primary activities can take on different forms. The example of HVPs is just one possibility. For instance, primary activities may share different customers, different specialized employees or different equipment (Achterbergh & Vriens, 2010b). These are interdependencies between primary activities that need coordination. Note that in figure 2.4 these interdependencies are depicted as the twisted lines between the little circles that depict the primary activities. Furthermore, note that the box on the right from figure 2.3 is gone, because we are now ‘inside’ it, and made place for triangles and lines between them. A triangle depicts a coordination activity such as planning systems, quality standards, introducing a shared stationery or logo to coordinate markets, or creating an ambiguity resistant vocabulary to facilitate the discussion of problems that occur with coordinating between primary activities (Achterbergh & Vriens, 2010b). The lines between the triangles depict the large amount of communication that is necessary when coordinating activities.

The combination of oscillations that come with interdependencies and the necessary amount of communication per interdependency makes, according to Beer (1990), Coordination a ‘high variety’ Function. This means that much communication about a variety of themes is involved (Achterbergh & Vriens, 2010a). Beer reasons that “we cannot damp this kind of

Note that ‘Coordination’ within the text is capitalized. The reason for this is to make a clear distinction between when the discourse is about the Function: ‘Coordination’ and the activity of coordinating something: ‘coordination’. The same goes for the rest of the meta-systemic Functions: Control, Intelligence, and Policy, and ‘Function’ itself.
oscillation with a few simple regulatory rules.” (Beer, 1990, p. 175). To illustrate this ‘high variety’, Achterbergh and Vriens (2010a) used multiple parallel lines, see figure 2.4.

2.1.4 Function Three: Control

Primary activities that are coordinated is not sufficient for an organization to be viable (Beer, 1990). Primary activities can be opportunistic in their choices, and can try to realize goals that do not necessarily contribute to the purpose of the viable system as a whole (Achterbergh & Vriens, 2010b). Therefore, cohesion and synergy between primary activities has to be ensured. This is the responsibility of Function Three of Beer’s VSM: Control.

Function Three, “is first of all typified by its metasystemic nature, and by the SYNOPTIC SYSTEMIC viewpoint from which it surveys the total activity of the operational elements [primary activities] of the enterprise. It is aware of all that is going on inside the firm, now” (Beer, 1990, p.202). What this means can be broken down into two parts.

First, the Control Function has a metasystemic nature in the way that it has to translate the goal of the total viable system into goals for all primary activities. For instance, translating the goal of Energeco as a whole, the supply of renewable energy, into goals for primary activities, the supply of the three forms of renewable energy: wind, solar and tidal. Moreover, it has to not only regulate, but also monitor whether these goals are actually realized (Achterbergh & Vriens, 2010a).

Second, the ‘synoptic systemic viewpoint’ means that Control is a Function that simultaneously keeps a systemic overview over all activities that constitute the goal of the total system, i.e. the raison d’être, without finding itself preoccupied with specific affairs (Beer, 1990). Control keeps the overview through direct channels with the different management units of the primary activities, therefore supporting synergy (Beer, 1990). Hence, Control has a synoptic viewpoint (Beer, 1990). By having the synoptic view, Beer says that Control looks over the contribution of primary activities, which are inside the viable system, towards the realization of the mission and identity, which is focusing on the now, of the viable system (Achterbergh & Vriens, 2010a).

The Control Function has three different ‘instruments’ through which it can discharge of this task (Achterbergh & Vriens, 2010a). Remember that because we are talking about
Functions, these instruments can be realized across the total viable system. Therefore, it is noted that Control as a Function has or uses the three instruments. These instruments are illustrated in figure 2.5 by a rectangle above the coordination triangles which is connected to different parts of Function One and Two. The three connecting lines depict the instruments and their directions. The instruments are relations between Control and the Functions Primary Activities and Coordination.

The first instrument Control has, links the management box of each primary activity to the Control Function. Control gives commands directly to management of the primary activities about the goals that these activities should realize. In this sense, Control “delegates authority downwards” (Beer, 1990, p. 216). Control then in turn demands ‘accountability’ in the form of management reports about whether these commands are realized. Additionally, Control bargains with every primary activity about what resources the primary activity require, and what resources are then provided. The commands, management reports and bargaining are depicted in figure 2.5 as bi-directional arrows between the rectangle, the Control Function, and the management boxes, the little squares, of the primary activities.

The second instrument Control uses, links the Control Function directly with the Primary Activities. In particular, Control is able to audit the Primary Activities. The goal of auditing is to stay in close connection with what is going at the level of primary activities in order to find out what is genuinely going on at the ‘shop floor’. This is necessary, because management of primary activities only provide a general overview of what is going on, and it therefore may be flawed. This is resolved through auditing, because Control then cuts out the middle-man, which is the management of the primary activities, and gets direct information about how operations on the ‘shop floor’ is conducted. In figure 2.5 this process of auditing is depicted as a curved line towards the primary activities, the little circle. For overview purposes, Achterbergh and Vriens (2010) only drew a line between Control and the upper primary activity. In reality it should go to all little circles depicting primary activities.

The third instrument Control has, links the Control Function directly to Function Two. Unsurprisingly, this means that the Control Function controls the coordination efforts of Function Two. Beer (1990, p. 202) states that Control is “aware of the anti-oscillatory activity” of Coordination. This is depicted in figure 2.5 as a curved line towards the triangle of Function Two.

These instruments and their directions result in Control having a lot of information about the primary activities’ modus operandi and its problems. This enables Control to focus beyond how the primary activities realize the mission and identity of the viable system in focus. Control also focusses on the adaption of its mission and identity. This means that it has a second task, which is to “review proposals for innovation produced by the Intelligence Function (see subparagraph 2.1.5) and to assess whether these proposals can be realized given the potential for change of the primary activities” (Achterbergh & Vriens, 2010, p.200). The Intelligence Function is Function Four of the VSM, which will be discussed next. Intelligence proposes plans for innovation and Control continuously discusses the feasibility of these proposed plans. The specifics of this relation are discussed in subparagraph 2.1.7.
2.1.5 Function Four: Intelligence

Function One, Two and Three, are directly involved with realizing the mission and identity of a viable system. However, an organization should also be able to adapt before it can be considered viable (Beer, 1990). Adaptation follows from scanning for relevant developments in the environment and, consequentially, initiating innovation plans to keep up with these developments (Achterbergh & Vriens, 2010a). These tasks are the responsibility of Function Four of Beer’s VSM: Intelligence.

Intelligence “houses the viable system’s whole apparatus for adaption” (Beer, 1990, p. 235). According to Beer, Function Three lacks the ability to do this, because it is focused on the inside and now, as is elaborated in the previous section. It therefore cannot respond to the larger environment of the viable system. Consequentially, Beer states: “Thus we clearly need a new system, dedicated to the larger environment, and to regulation in its regard, which environment I call the OUTSIDE and THEN” (Beer, 1990, p.227). The Intelligence Function is depicted in figure 2.6 as the rectangle above the Control Function.

![Figure 2.6 Function Four; Intelligence (adopted from Achterbergh & Vriens, 2010a, p. 201)](image)

Each primary activity, a viable system on a lower level of recursion, has its own Intelligence Function, but also the viable system as a whole has an Intelligence Function. There is overlap between the Intelligence Functions on different levels of recursion, because the relevant environment of, for example, business unit Wind Energy, is also relevant for the environment of Energeco at large. The difference between Intelligence Functions on different levels of recursion lies, according to Beer, in the perception of the developments in the environment (Achterbergh & Vriens, 2010a). To give an example, in the world of renewable energy, the environment of Energeco at large, a new technique to acquire renewable energy is found: bio-mass. For individual primary activities of Energeco, this development might be a threat, as it could be a competitor to their own product. However, looking from the perspective of the Intelligence Function of Energeco as a whole, the rise of bio-mass might be seen as an opportunity to add bio-mass to their service portfolio.

This means that one notion can be added to the claim of Beer that the total environment of the viable system consists of more relevant developments or parties than the cumulative environments of the individual primary activities. Which is, according to Achterbergh and
Vriens (2010, p.201) that also “these parties or aspects are relevant to the wider identity and mission of the viable system in focus and not just its primary activities.”. This addition depicts the difference between the Intelligence Function on the level of the total viable system and the Intelligence Function one level of recursion lower (or higher).

Within the total environment, the outside and then, Beer (1990) sets apart the accepted environment and the problematic environment. The Intelligence function interacts with both of these environments, depicted in figure 2.6 as the two lines going from and towards the Intelligence rectangle.

The accepted environment consists of developments that ‘just happen’ in the relevant environment without influence of the viable system (Beer, 1990). Therefore, the viable system can typically only react to these developments. In figure 2.6 this is depicted as the largest ‘cloud-like shape’ that surrounds the primary activities. An example of a development in the accepted environment is when legislation, that affects the viable system, changes. This can only be considered as ‘a given’, “All of this is already apparent to any concerned citizen.” (Beer, 1990, p. 227), so the viable system can only react to it. The job of the Intelligence Function is to identify and assess these developments in order to make adequate responsive plans.

The problematic environment is the environment that the viable system is obliged to shape, according to its mission and identity (Beer, 1990). Beer describes that this environment is “especially concerned with a future that is the specific duty of the Energy Corporation to advance. That is to say that there is an area of concern in the Outside and Then that belongs – in a creative sense – to the viable system’s responsibility.” (1990, p. 227). The problematic environment is depicted in figure 2.6 as the upper little ‘cloud-like shape’. Note that it lies within the accepted environment, but outside the environments of the different primary activities that comprise Function One. Management interest should focus on being purely innovative; on contributing to the ‘invention of the future’ (Espejo et al., 1996). Achterbergh and Vriens (2010a, p. 202) put it like this: “Given the identity and mission of the viable system, intelligence should pick up and filter out those developments in the wider environment of the viable system that can help to shape the future of both the organization and its problematic environment.” An example of this is when Energeco tries to make people more aware of the devastating effects that fossil fuels have on the environment and that they should shift towards renewables. This is a future that, according to the rhetoric of Beer, Energeco is obliged to shape.

2.1.6 Function Five: Policy
The Functions Control and Intelligence have different perspectives on the organization’s identity and mission. Intelligence’s focus lies on the adaption of the identity and mission, the ‘outside and then’, through the initiation of innovative plans (Beer, 1990). However, Control’s focus lies on the realization of the identity and mission, the ‘inside and now’, through the assessment of innovative plans (Beer, 1990). This difference in perspectives requires a fifth and last Function, which coordinates the discussion between Control and Intelligence. This Function completes Beer’s VSM: Policy. It is depicted in figure 2.7 as the rectangle above the Intelligence Function.
There needs to be a balance between the focus on the ‘outside and then’ and the ‘inside and now’ (Beer, 1990). Therefore, Control and Intelligence should have in-depth discussions on how to correctly shape the viable system’s future. Without a Policy Function that coordinates this debate between Control and Intelligence, three problems could occur (Achterbergh & Vriens, 2010).

The first problem occurs if one Function dominates the other; it is an imbalance problem. There are two forms of imbalance, innovatism and conservatism. Innovatism occurs when Intelligence dominates Control. In this case, Intelligence produces many plans for innovation which cannot be realized by the primary activities. This is because the primary activities do not have the capacity to change at the rate that Intelligence requires. Hence, projects for innovation will fail without a Control Function that balances this push towards innovation. On the other hand, conservatism occurs when Control dominates Intelligence. In this case, the organization risks missing opportunities for innovation, because Control is too focused on the inside and now. In paragraph 2.1.7.2, a closer look at innovatism and conservatism is taken.

The second problem occurs when the communication between Intelligence and Control is lacking intensity; it is a connectivity problem. On the one hand, proposals from Intelligence are not sufficiently assessed with regard to the potential of the organization to change. On the other hand, when there is potential for the organization to change, it cannot be used by innovations. This might lead to a stop of the realization and adaptation of the mission and identity of the organization (Achterbergh & Vriens, 2010a).

The third problem occurs when experts do not sufficiently contribute to shaping the future of the organization; it is a problem of lacking complexity. Shaping the future is complex, the discourse between Control and Intelligence should enable this complexity by letting the required experts contribute. Without complexity, ill-considered and shallow plans for innovation are created (Achterbergh & Vriens, 2010a).

To make sure these three problems do not occur, Beer (1990) reasons that a fifth Function has to exist: Policy. The Policy Function “has the tasks of coordinating the interaction
between control and intelligence and consolidating its results by (re)defining the identity and mission of the organization in a way that fits both developments in its environment and its potentials for change.” (Achterbergh & Vriens, 2010a, p. 203). This ongoing discussion of innovation is depicted in figure 2.7 as the curved lines between Control and Intelligence. The coordination of this discussion by Policy is depicted as curved lines going from the Policy Function towards the curved lines between Control and Intelligence. The bi-directional vertical arrows between Control, Intelligence and Policy represent commands and reports through which Policy strengthens the plans for adaption. Note that the Policy Function is not directly connected with the environment or the primary activities. Although Policy does need a general understanding of the primary activities and the environment, detailed knowledge about innovation plans and their influence on the primary activities should reside with Control and Intelligence (Beer, 1990).

The Policy Function concludes the VSM. Remember from the introduction in this chapter that Beer states that no fewer and no more Functions are needed. “Should anyone ask: “What happens beyond System Five? Is it System Six?,” the answer is, no. What is beyond System Five is the next level of recursion, of which this fivefold viable system is an operational element” (Beer, 1990, p. 259). This means that beyond the Policy Function, you find a viable system that is the next higher level of recursion (Achterbergh & Vriens, 2010a). In the following section, the interrelations of the Functions are discussed.

2.1.7 Relations between functions
In the previous subparagraphs, the five Functions needed for viability of Beer’s VSM are presented. However, the VSM also explains how these Functions are interactively interrelated. In a general sense, these interrelations can be best explained when the Functions are divided into two groups: the realization group and the adaption group (Achterbergh & Vriens, 2010a).

The realization group consists of the first three Functions: Primary Activities, Coordination and Control. These Functions together realize the mission and goals of the organization. On the other hand, there’s the adaption group, which consists out of Control, Intelligence, and Policy. These Functions together adapt the mission and goals of the organization. Note that Control is part of both groups, and plays different roles in each of them. Control “in practice really runs the enterprise.” (Beer, 1990, p. 263). In section 2.1.6.1 the realization group is explained, followed by the adaption group in section 2.1.6.2.

Additionally, Beer provides three remarks about these relations between Functions. These remarks are discussed in section 2.1.7.3.

2.1.7.1 Realization group
The realization group realizes the mission and goals of the viable system. The three Functions “are dedicated to the process of internal regulation that will indeed conduce to stabilization of the inside, now.” (Beer, 1990, p. 225). The realization group has four basic relations between Functions (Achterbergh & Vriens, 2010a):

1. Control- Primary Activities: commanding, reporting, and resource bargaining;
2. Control- Primary Activities: auditing the primary activity;
3. Control- Coordination: controlling Coordination;
4. Coordination- Primary Activities: coordinating the interdependencies between primary activities.

In this order the relations are hereafter explained. Achterbergh and Vriens (2010a) summarize these, according to Beer, required relations and their characteristics such as the periodicity, level of detail, level of standardization and focus in table 2.1.

<table>
<thead>
<tr>
<th>Related functions</th>
<th>Relation</th>
<th>Periodicity</th>
<th>Detail Standardization</th>
<th>Focus on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control – Primary activities</td>
<td>Direct commands and reports and resource bargaining between control and the primary activities</td>
<td>Regular intervals</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Control – Primary activities</td>
<td>Audits of the primary activities</td>
<td>Irregular intervals</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Control – Coordination</td>
<td>Controlling the coordination function</td>
<td>Regular intervals</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Coordination – Primary activities</td>
<td>Coordinating interdependencies between primary activities</td>
<td>Continuous</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 2.1 Required relations in realization group (adopted from Achterbergh & Vriens, 2010a, p. 208)

1. Commanding, reporting and resource bargaining relation between Control and Primary Activities

The mission and goals of the organization as a whole need to be translated into goals for primary activities. Only then can cohesion and synergy between primary activities be maintained (Achterbergh & Vriens, 2010a). First, commands are used by Control to translate organizational goals to the level of primary activities. Second, resource bargaining happens between Control and primary activities to make sure the means to realize organizational goals are present in the primary activities. Third, by means of standardized reports (e.g. monthly), Control checks whether primary activities accomplish the goals. When the reports show divergence from organizational goals, Control can again use commands to intervene.

However, Beer states that Control should beware about the frequency of giving commands and asking reports. He says only some intervention is required, because there is a "general requirement to minimize metasystemic interventions that inhibit the variety of management units" (1990, p.203). This translates into Control using commands and reports, only when cohesion and synergy of the viable system is at stake. In cybernetical terms, primary activities attenuate the amount of variety that Control has to take care of. On the other hand, Control attenuates the amount of variety that primary activities have to deal with, by providing the primary activities with the ‘freedom’ to regulate its own activities.
2. **Auditing the Primary Activity by Control**

Beer (1990) suggests that audits at irregular intervals of the primary activities, bypassing its management, are necessary. Suppose that the only information that Control gets about the realization of the goals of the primary activities are the reports of its management. Then it is easy to see that these general reports do not necessarily represent the actual, precise realization of organizational goals. Moreover, when only asking for reports, Control risks setting itself apart from the actual problems and operations in the primary activities (Achterbergh & Vriens, 2010a). To prevent this from happening, audits are necessary.

Auditing can be considered as double checking the management’s reports. Through auditing, scrutiny of actual, measured performance and operations becomes possible. Beer (1990) represents this as a channel directly from Control to primary activities, bypassing its management. This way, it can falsify or verify the management’s report. However, Beer says that in this process, discretion should be exercised because auditing involves in-depth examination of primary activity’s operations. The results are discussed with the management of the primary activities, through which lessons are learned for improving the contribution of the Primary Activities to the viable system. Examples of auditing are looking for bottlenecks in the process or measuring how clients feel about its service (Achterbergh & Vriens, 2010).

3. **Control controlling Coordination**

As stated, Coordination tries to solve problems that occur with the interdependencies of primary activities. This fits within the general aim of Control; enabling cohesion a synergy of the primary activities. This means that “Coordination is not only a service to the primary activities it also makes life easier for control.” (Achterbergh & Vriens, 2010, p. 207). Control should communicate organizational goals for the primary activities to Coordination, so that Coordination can identify, based on these goals, possible interdependency domains between primary activities. In this sense, Control is connected with the primary activities through Coordination (Beer, 1990).

Control also should set targets for Coordination. For instance, when Control sets a maximum target of revenues lost by problems caused by coordination issues. Moreover, as in relation 2, commands by Control should be sporadic (Beer, 1990). In this sense, the relation between Control and Coordination, is similar to the relation between Control and the primary activities, specifically the commands and reports (Achterbergh & Vriens, 2010a).

4. **Coordinating the interdependencies between primary activities**

As stated above, Coordination can be seen as a service to the primary activities. It creates a platform through which problems that occur because of interdependency issues can be resolved. By doing this, the Coordination Function absorbs much complexity (Achterbergh & Vriens, 2010a). To make sure this happens, Coordination and the primary activities have to be in close, continuous communication (Beer, 1990). Additionally, based on the fact that there is a large variety of potential disturbances due to interdependencies, the communication also has to be flexible and detailed (Achterbergh & Vriens, 2010a).
2.1.7.2 Adaption group

The adaption group adapts the mission and identity of the viable system, and has three basic relations:

1. **Policy - (Intelligence-Control): consolidating plans for innovation;**
2. **Intelligence - Control: finalizing proposals for innovation;**
3. **Policy - (Intelligence-Control): facilitating the communication between Control and Intelligence.**

In this order the relations are hereafter explained. Achterbergh and Vriens (2010a) summarize these, according to Beer, required relations between Functions to adapt the mission and identity in table 2.2.

<table>
<thead>
<tr>
<th>Related functions</th>
<th>Relation</th>
<th>Periodicity</th>
<th>Detail</th>
<th>Standardization</th>
<th>Focus on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence - Control</td>
<td>Generating finalized proposals for innovation</td>
<td>Continuous</td>
<td>High</td>
<td>Low</td>
<td>Balancing and integrating proposals for innovation and potentials for change into plans shaping the organization’s future</td>
</tr>
<tr>
<td>Policy - Intelligence and Control</td>
<td>Facilitating communication between intelligence and control</td>
<td>Continuous</td>
<td>Low</td>
<td>Low</td>
<td>Balancing, interconnecting, and amplifying intelligence and control (Redefining the organization’s identity and strategy)</td>
</tr>
<tr>
<td></td>
<td>Consolidating proposals for innovation</td>
<td>Irregular</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.2 Required relations in adaption group (adopted from Achterbergh & Vriens, 2010a, p. 212)

1. **Consolidating plans for innovation by Policy**

As stated in subparagraph 2.1.6, detailed knowledge about innovation plans to adapt the mission and identity of a viable system should reside with Control and Intelligence. Together, Control and Intelligence generate the plans for the organization’s future. This is a complicated job, and Policy should only give ‘closure’ to this process by consolidating its results (Achterbergh & Vriens, 2010a).

In cybernetical terms, Beer (1990) states that “Five [Policy] cannot deploy sufficient variety to absorb the variety of Three-plus-Four [Control-plus-Intelligence], which is multiplicative, without that enormous degree of filtration” (p.261), meaning that Policy should be a low variety Function (Achterbergh & Vriens, 2010a). Separately, Intelligence and Control produce detailed information that, together, shape the organization’s future. Policy cannot produce these plans by itself, nor should it try to fuse the separate information (Beer, 1990). This is because when Policy tries to fuse the information, it has to negotiate, since the information provided is complex and “its processing so overwhelming” (Achterbergh & Vriens, 2010a, p. 209). Negotiating inevitably leads to prioritizing one piece of information over another, eventually leading to neglecting other information; potentially leading to mistakes. Therefore, Policy needs to look for alternatives to attenuate the bulk of information provided by Intelligence and Control.
In order to do this, Policy should abstain from planning the future of the organization itself (Achterbergh & Vriens, 2010a). Moreover, Policy should let the high variety Functions, Intelligence and Control, that can deal with the involved complexity, take care of planning the future. From the perspective of Intelligence and Control, their job is to generate the plans for the viable system’s future, and combine these into proposals. In this way, they generate the variety needed for adaptation. Now, Policy can consolidate the proposals, because Intelligence and Control also absorb the variety needed for adaption.

Now, let us dive deeper into the preferred characteristics of the relation between Policy and Innovation-Control. This relation, in order to consolidate the plans for the future of the organization, should be a low variety one. Initiative to communicate proposals to Policy should lie at Innovation and Control, because these highly interconnected Functions should do the complex, real work (Beer, 1990). Moreover, this communication should focus on essentials, and not get lost in details. Only then is Policy able to consolidate the plans for the future of the viable system, and effectuate its metasystemic role.

Beer adds an ethical argument to the metasystemic role of Policy by stating that Policy should not attempt to produce innovation plans on its own, using information provided by Intelligence and Control, and force these plans on the organization. He illustrates this as: “Such an arrangement may be thought (ethically) to be immoral. Certainly (cybernatically) it is extremely vulnerable, unless the boss (Five) [Policy] is God Himself. Sooner or later, five [Policy] will make a destabilizing mistake. That is because his requisite variety (in administering closure) depends on a much attenuated input.” (Beer, 1995, p. 261).

In summary, Policy should only consolidate innovative plans for the future of the organization and leave making them to the Functions equipped for it; Control and Intelligence. The quality of these plans, however, depend on the quality of the debate between Control and Intelligence. Remember that Policy should also facilitate and monitor this debate. The quality of the debate needs to meet the criteria, proposed by Beer, for inventing the future of the organization. Therefore, the next section is about the relation between Control and Intelligence.

2. Finalizing proposals for innovation by Control and Intelligence

Beer (1995) provides three requirements of the communication between Control and Intelligence that should be met in order to adapt the mission and identity of the organization.

The first requirement is balance. Remember from subparagraph 2.1.6, that misbalanced communication between Control and Intelligence can lead to conservatism or innovatism. To illustrate, Beer states: “It will be a matter of Three [Control] versus Four [Intelligence] – and one of them will WIN, as a matter of power.” (1990, p. 258). To prevent this, a balance has to be found between identifying relevant developments in the environment of the viable system, and the internal potential for change. More concretely, the contributions by Control and Intelligence have to be balanced in order to finalize proposals for innovation (Achterbergh & Vriens, 2010a). As stated in paragraph 2.1.6, here, a closer look at conservatism and innovatism is taken.

Innovatism might occur when Intelligence has a larger influence within the debate with Control than Control does. When this is the case, Intelligence is unimpeded in generating innovative plans. Additionally, because of Intelligence’s prevalence, Control is unable to
sufficiently scrutinize these plans. This leads to, as Achterbergh and Vriens (2010) put it so vividly, “an avalanche of possibly unrealizable plans” (p. 210). On multiple levels, this will lead to waste. For instance, the resources that are wasted when yet another innovative project fails, or the demise of motivation of primary activities to start unrealizable projects that do not fit their capacity to change over and over again. Clearly, innovatism is not a desirable state when finalizing proposals for innovation.

Conservatism, on the other hand, occurs when Control has a larger influence within the debate with Intelligence than Intelligence does. When this is the case, Intelligence becomes unable to defend the need for innovative plans, because Control’s scrutinization of these plans does not allow for it (Achterbergh & Vriens, 2010a). Consequentially, if Intelligence proposes plans to address issues or developments in the environment on which the organization’s survival depends, Control might abhor from these plans by for instance stating that the plans do not fit the internal potential for change. In conclusion, an imbalance is “a signpost for disaster” (Beer, 1990, p. 258) and a balance of the contributions of Control and Intelligence not only prevent innovatism and conservatism, but also enable finalizing proposals for innovation.

The second requirement is interconnection. This means that for a good debate or discourse between Control and Intelligence, these two Functions have to be highly interconnected. Only through a continuous and intense debate can adequate plans for innovation be generated and finalized (Achterbergh & Vriens, 2010a). In this way, Intelligence and Control not only create variety because of reviewing potential for change and plans for adaption, they also absorb it. In other words, the debate between Intelligence and Control creates complexity, but because of a high level of interconnection, and this complexity is also absorbed by the debate. Hence, the following requirement is complexity.

The third requirement is that the debate between Control and Intelligence needs to have a sufficient level of complexity, since planning an organization’s future is not easy. It requires bringing together the perspective of Control with the perspective of Intelligence, often having opposing initial interests (Beer, 1990). This is because Intelligence focusses on the relevant environment and Control on the internal organization. These interests are nested within various specialists that focus on either the environment or the internal organization. In order to adapt the mission and identity of the organization, these specialists need to be able to contribute to the debate between Control and Intelligence so that the required complexity of the debate is covered (Achterbergh & Vriens 2010a). Moreover, the possible many perspectives within the debate need to be integrated. This requires the following: “Many-faceted-plans for innovation must first be projected on many-faceted-potentials for organizational change and then be integrated to become the balanced finalized plans that can be consolidated by policy. Both projection and integration need amplified communication between intelligence and control.” (Achterbergh & Vriens, 2010a, p. 211).

Only when these three requirements for the communication between Control and Intelligence are met, can the mission and identity of the organization be adapted. It is Policy’s job to facilitate and regulate this debate between Intelligence and Control, hence the next section elaborates on the final relation within the adaption group.

3. Facilitating the communication between Control and Intelligence by Policy
As stated, Policy’s job is to attenuate the communication between on the one hand, itself, and on the other hand Control and Intelligence. Policy only needs a general understanding of the inside of the organization and its environment. Essentially, Policy has to facilitate and monitor the complex debate between Control and Intelligence. Moreover, it has to “reap its benefits, the finalized plans for adaption” (Achterbergh & Vriens, 2010a, p. 211).

Detailed knowledge about innovation plans and their influence on the primary activities should reside with Control and Intelligence. After complex debate, these Functions together shape the plans for adaption. Policy only takes on a low variety activity by facilitating this debate. This means that Policy creates and safeguards conditions, which are less complex tasks, for the necessary communicative processes to make these plans for adaption (Achterbergh & Vriens, 2010a).

In order to realize these tasks, Policy should do three things (Achterbergh & Vriens, 2010a). First, Policy should try to identify and consolidate the main topics of debate between Control and Intelligence. By doing this, the range of possible topics is attenuated, because Policy narrows the range of topics by choosing a balanced subset. This, in turn, structures and opens up the debate. Second, Policy should monitor the level of cohesiveness between Control and Intelligence. Third, the communication channels’ capacity between Control and Intelligence should be monitored by Policy. In particular, Policy should monitor whether the channels have the capacity to generate and absorb the necessary complexity needed for shaping plans for the future.

2.1.6.3 Additional remarks
Table 2.1 and 2.2 explained the necessary relations between the Five Functions of the VSM for the system’s viability. Extra remarks about the VSM are provided, that transcend the relations within the realization and adaption group and answer possible questions (Achterbergh & Vriens, 2010a). Here, these remarks are presented as questions that one might have about the relations between Functions are hereafter answered.

1. There is no direct relation between Primary Activities and Policy, does this mean that when something happens with the Primary Activities, this does not affect Policy?
To answer this question, the term resonation is introduced (Achterbergh & Vriens, 2010a). The Functions and their interrelations form a communicative network that is ‘closed’. Consequentially, complexity can resonate through the viable system. This means that when something happens at the level of primary activities, this can keep Control busy. For instance, when the reports from the primary activities’ management and audits are not congruent with actual performance, different kinds of audits may be required. When a multifold of similar disturbances occur at the level of primary activities that influence Control, Control may be ‘overloaded’ (Achterbergh & Vriens, 2010a). This may in turn cause Control to have less time to focus on the adaption group, leading to a substandard debate with Intelligence which Policy needs to improve again. In conclusion, the answer to the question is ‘no’; disturbances can resonate in other Functions, possibly affecting the viability system as a whole.

2. How does a viable system deal with the concept of resonation?
Besides being a closed communicative network, the viable system as a whole is “also “built” to attenuate “resonating” complexity.” (Achterbergh & Vriens, 2010a, p. 212). This is because, at each Function, complexity is attenuated. In particular, all primary activities are able to deal with a large part of its own complexity. The remainder of complexity is then attenuated by its metasystem; Coordination, Control, Intelligence and Policy. Remember that Policy is also a meta-system of the relation between Control and Intelligence. Consequentially, Policy attenuates leftover complexity from Control and Intelligence. This means that, as Beer describes it, the viable system as a whole can be seen as a “complexity attenuator”, maintaining the “calm” the system needs to survive (1995, p. 406). To answer the question, because the system is closed and built as a complexity attenuator, resonation of disturbances is attenuated.

3. **What if something devastating happens within a particular primary activity, how will the system as a whole be able to react on time?**

To answer this question, an elaboration of the previously mentioned calm is required. When the Functions work accordingly, all disturbances are attenuated, then systemic calm is reached (Achterbergh & Vriens, 2010a). This is a dangerous state, because “Then at the level of System Five, nothing much will ever appear to happen. Therefore sleep supervenes. If we are not very careful, sleep turns into coma; and coma becomes death” (Beer 1995, p. 406). This means that too much calm can be lethal. To deal with this, Beer introduces an additional relation between Functions, the algedonic mechanism. The algedonic, meaning pain and pleasure, mechanism is “an alerting system orthogonal to the calming system” (Achterbergh & Vriens, 2010, p. 213). This means that that the algedonic system is a direct line of communication that cuts through all the different levels of recursion (Vidgen, 1998). To answer the question, this means that if something devastating happens within a particular Primary Activity at any level of recursion, immediate signals can be sent toward the Policy Function of the highest level of recursion of the whole viable system (Achterbergh & Vriens, 2010a). The Policy Function, within the realization group, can than immediately alert Control and Intelligence of that level, enabling the creating of adequate action.

Together, all Five Functions, their interrelations within the realization and adaption group, and the concepts of resonation, complexity attenuator, systemic calm and algedonic mechanism encompass Beer’s Viable System Model. In order to acquire specific explanations on Functions, in the next section, an infrastructural aspect is added to the VSM.

### 2.2 Infrastructure

In the previous section, Stafford Beer’s Viable System Model is explained. Its Functions and their interrelations provide a tool to describe the viability of a Decentralized Autonomous Organization, because any system can be interpreted in its terms (Chan, 2011; Achterbergh & Vriens, 2010a). Since the VSM is a functional model for viability, the explanations on the Functions and their interrelations within a DAO provide us with a sense of viability of that particular DAO. However, as Achterbergh and Vriens (2010a) point out, the VSM falls short in respecting the unique structures and elements of different types of systems. This is because the VSM provides the norms for viability, but the explanations of these norms remain functional
explanations. In this way, it does not provide a model for what an actual infrastructure of an organization should look like, but only what an organization should be able to do (Achterbergh & Vriens, 2010a).

It is the actual infrastructure: ‘human resources’, ‘division of work’ and ‘technologies’ that does what an organization should do. Since the novelty of a DAO, and its technical nature of using a blockchain to organize, more than a functional explanation is required. Therefore, it is particularly interesting to see how a DAO potentially realizes to be viable on the level of its infrastructure. Since supplementing the VSM with further methodologies is appropriate (Vidgen, 1998) and in order to get an answer to the research question of this master thesis, within the explanations on the Functions also the actual infrastructure of a DAO is taken into account. By adding a description of the infrastructure to the VSM, this explanatory master thesis uses a model that does justice to the unique characteristics of this new organizational ‘beast’ which is a DAO.

In the following paragraphs, what an organizational infrastructure actually consists of is elaborated on. Hereafter, the infrastructural aspect is combined with the VSM, from which the conceptual model follows.

2.1 What is an infrastructure?
In order to realize organizational goals, adequate infrastructural conditions should be installed. Achterbergh and Vriens (2012b) describe three classes of conditions that comprise the infrastructure of an organization: ‘human resources’, ‘division of work’ and ‘technology’.

First, an organization should have the right people to contribute to its existence. The organization has to not only recruit the right personnel, but also motivate and develop them. The development aims to making personnel knowledgeable and skillful. Together, these conditions comprise the ‘human resources’ condition for an adequate infrastructure (Achterbergh & Vriens, 2010b).

Second, the division of work, also known as ‘organizational structure’, between the different members of the organization should be adequately handled. This means that the necessary tasks and responsibilities should be defined and allocated to the right personnel based on their capacities (Achterbergh & Vriens, 2010b).

Third, in order for the personnel to carry out their tasks, necessary technology should be put in place (Achterbergh & Vriens, 2010b). Through technologies, operations can be realized and regulated. Examples of technologies are machines and ICT.

2.2 Combination infrastructure and VSM
In order to not only realize, but also adapt organizational goals, the VSM states what an organization should be able to do in order to survive. Any viable system should have monitored, coordinated primary activities that realize what an organization does and should adequately evolve in its environment in congruence with its internal capacities. In short, this description describes all Five Functions. However, in order to carry out these Functions, infrastructural conditions need to be met. Because, for instance, without the human resources and a division of work that contains which tasks should be done by whom, clearly the coordination of primary activities cannot be accomplished.
When an adequate infrastructure is designed that only enables the realization of organizational goals, not all Functions are properly realized. This is because the system also should be able to adapt its organizational goals, and therefore its infrastructure. What this means, is that the infrastructural conditions are necessary to adapt infrastructural conditions (Achterbergh & Vriens, 2010b). This reasoning is depicted in figure 2.8. As shown, the infrastructural conditions, human resources, division of work and technology enable all Functions to be realized which in turn adapt organizational conditions.

Figure 2.8 Infrastructure as a condition for realizing and adapting organizational goals

2.3 Conceptual model

By combining the VSM with the model presented in figure 2.8, the research question: "Can a Decentralized Autonomous Organization be a viable organization?" can be answered. This leads to the conceptual model depicted in figure 2.9.

Through the addition of the infrastructural conditions to the VSM, not only whether a DAO can be a viable organizational form can be explained, but also in what way it manages to be viable in terms of what actually happens on the level of its infrastructure. By proposing this conceptual model, an infrastructural explanation on top of the explanations acquired for the Functions and their interrelations, is possible. In this way, it is possible to look at who, how, and through which technologies the Functions are realized which in turn, adapt the who, how and technologies. Due to unique characteristics of a DAO and, in particular, in combination with the autonomous character of blockchain technology, the ‘division of work’ and

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5 This reasoning is adapted from a similar reasoning of Achterbergh and Vriens (2010b, p. 14-15). Instead of the cybernetical division in: setting goals, designing infrastructural conditions, operational regulation and realizing the transformation process as norms for realizing and regulating transformations in organization, this master thesis uses the cybernetical VSM as norms for realizing and adapting organizational goals.
‘technology’ of the infrastructure are particularly interesting. Therefore, within looking at the infrastructure in this master thesis, the focus lies on acquiring an explanation on the ‘division of work’ and ‘technology’ within a DAO over ‘human resources’.

In the next chapter of this master thesis the methods for acquiring these explanations are introduced.

Figure 2.9 Conceptual model
3. Methodology

In this chapter the methodology, through which the research question of this master thesis is answered, is elaborated on. In paragraph 3.1, the research form and strategy is explained which are respectively mainly practice oriented and an exploratory single case study. Additionally, the research object and reasons for choosing DigixDAO are explained. In paragraph 3.2, the selection of sources and the instrument are elaborated on. The respondents are interviewed based on a relatively unstructured interview guide. In paragraph 3.3, the operationalization, which is the basis for analyzing both types of sources, is provided. In paragraph 3.4, the procedure of getting an answer to the research question is divided into two phases and explained. In paragraph 3.5, the way to analyze the sources, in congruence with the operationalization, is explained and a data-matrix is provided. In paragraph 3.6, the reliability and validity of this research is reflected upon.

3.1 Research design

In this paragraph the design of present study is elaborated on. First, whether this master thesis is theory or practice oriented is discussed. Second, the research strategy is explained. Third, and last, the object of this study is explained and motivated.

3.1.1 Research form

In general, two research forms can be identified. These are practice oriented and theory oriented research (Vennix, 2010). Practice oriented research focusses on solving a practical problem. Theoretical research is about creating, testing or applying scientific theory. This master thesis is both practice and theory oriented. The emphasis lies on the practical orientation, hence this is discussed first.

This master thesis is practice oriented in the sense that it helps DigixDAO to look at whether its organizational form is a viable one, by providing a description based on the VSM. By doing this, this master thesis can help DigixDAO identify the lack of (parts of) necessary Functions, or identify risks for where disturbances can have a negative impact, i.e. bottlenecks.

Practice oriented research typically works through the DOVE cycle (which translates into Diagnose, Design, Change, Evaluate) (Vennix, 2010). This master thesis focusses on the first step of this cycle, diagnosis. However, importantly, not an actual diagnosis is done, but an exploratory study is conducted to describe this new organizational beast, a DAO. Through the explanations acquired on the Functions and their interrelations with a specific focus on the infrastructural conditions, recommendations for improvements are given to DigixDAO. With these recommendations, DigixDAO can take a closer look at (parts of) its organizational form, by initiating an actual diagnosis or (re)design.

This master thesis is theory oriented in the way that an analysis of existing literature on the blockchain space, in general, and DAOs in particular has been conducted. As previously stated, in order to understand the concept of a DAO, knowledge is helpful about all different aspects and concepts that make up and surround the concept of a DAO, e.g. Bitcoin, blockchain technology, smart contracts and Ethereum. Therefore, the author of this master thesis had to study and emerge himself into this field of work and the scientific literature about it. This has
led to a comprehensive overview, the introduction of this master thesis, of existing literature on the blockchain space with a focus on DAOs. To the best of the researchers’ knowledge, such an analysis of the works of many authors in the blockchain space has not been conducted so far. Moreover, because the aim of this thesis is to bring the concept of DAOs into mainstream organizational literature, the basis is lain for this stream of research.

3.1.2 Research strategy
The research strategy for this master thesis is the exploratory single case study. A case study is a research strategy through which a phenomenon is studied in depth and from different angles (Vennix, 2010). This strategy is chosen because of four reasons.

First, the case study is used for researching a large number of aspects of a limited amount of study objects (Vennix, 2010). The single case study focuses on only one study object. The object of study is one DAO, named DigixDAO. Through the use of the VSM and the infrastructure many different aspects of this phenomenon can be researched. The large amount of aspects is compatible with the choice for a single case study.

Second, the case study is used for studying a phenomenon in its natural environment (Vennix, 2010). To answer the research question of this exploratory research, DigixDAO has to be explored in its natural environment. Moreover, the VSM allows for explaining the relevant environment. Hence, the most suitable research strategy is a case study.

Third, the single case study is used, instead of a multiple case study. In a multiple case study more research objects are integrated in the research (Vennix, 2010). In this master thesis, only the DAO DigixDAO is studied. More research objects would make this research out of a master thesis’ scope. In the next paragraph an elaboration on the choice for DigixDAO as research object is provided.

Fourth, this research is exploratory, because exploratory research is used when a new, sometimes inaccessible, phenomenon is present which needs to be studied in depth. DigixDAO is one of the first DAOs and not yet described. This research goes in depth to get a sense of how this phenomenon can be viable. Therefore, this research is exploratory.

3.1.3 Research object
In this subparagraph, the research object DigixDAO is further introduced and the justification for choosing this particular DAO is provided. The justification is based on the conventional principle that a case should be representative of the phenomenon under study (Buchanan, 2012).

One of the first DAOs ever created, called DigixDAO, is the object of study of this master thesis. DigixDAO is an organization that is deployed on the Ethereum blockchain that aims to bring the gold standard to the blockchain space (Eufemio, Chng, & Djie, 2016). It does so, by growing the ecosystem of a trading platform for a gold-backed digital currency or cryptocurrency (Lamarque, 2016). This means that when you buy physical gold through the Digix platform, the platform creates an equal amount of a customized cryptocurrency – a token
which is called DGX- that represents actual real life gold that is kept safe in a vault. People can then keep or sell these tokens, with the benefits that cryptocurrency provides.

As stated in the introduction of this master thesis, the creation of a DAO follows from a team of developers that create all the underlying code of the DAO and subsequently deploy the crowdsale. In theory, the crowdsale puts ownership of the DAO to all investors, not necessarily tied to the initial team of developers. During its creation through a crowdsale on 30th of March 2016, DigixDAO raised its capped 5.5 million U.S. dollars (Lamarque, 2016). The crowdsale was set to run from the 30th of March to the 28th of April. However, the maximum amount of 5.5 million U.S. dollars was raised in under 12 hours after the start of the crowdsale. After this target was reached, no more ‘new’ investors were able to join the crowdsale.

In this crowdsale, 675 different identities invested money in DigixDAO. In return, these investors received a proportional amount of shares, called DGD, of DigixDAO. The top eight investors together accounted for close to 50% of the total DGD. Notably, there is a distinction between DGX, which is the token that is received after purchasing gold through the Digix platform, and DGD, which represent the shares of the organization DigixDAO (Eufemio, Chng, & Djie, 2016). Two million DGD were distributed in the crowdsale. After the end of the crowdsale, DGD became available on exchanges and since then increased in value over 3000%.

Following this description of DigixDAO, there are four reasons for selecting this DAO as the object of the exploratory single case study. First, DigixDAO is one of the very first DAOs that ever came into existence. DigixDAO has therefore been around the longest, which makes it a more suitable study object than newer DAOs, since it has had more time to evolve and document its ecosystem and therefore it is more accessible for researchers. Second, DigixDAO received enough funds, in a short time, to be self-fungible for years to come. It therefore has the time to evolve and adapt its system. Third, DigixDAO has a business model that is graspable because it has an identifiable goal and primary activity, in comparison to other DAO projects.

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6 These benefits are briefly explained in the introduction of this master thesis. In short, cryptocurrency enables cheap, instant, trustless, censorship resistant, decentralized, transactional and transnational payments (Nakamoto, 2009; Antonopoulos, 2014; Swan, 2015a).

7 The team of developers of DigixDAO consist of five people with different functions and three advisors. They are identified as ‘DigixGlobal’.

8 Capped means that there was a preset ‘roof’ of possible inflow of funds. If this roof wasn’t reached, there automatically would be less funds in the DAO. Additionally, a minimum amount to raise was set, in order to make sure enough funds would be raised to start operations. If the minimum would not be reached, the DAO automatically would not be created, and already gathered funds would be automatically sent back to investors.

9 On https://etherscan.io/token/digix, all information regarding DigixDAO’s crowdsale can be transparently viewed.

10 The exact percentage is 49.36%. However, after the distribution of DGD at the finish of the crowdsale, it became possible to trade these shares of DigixDAO, DGD, on exchanges such as https://bittrex.com. This means that there presently are more owners of DGD. On 2017-2-6 the total addresses of DGD holders amount to 1540 unique ones, see previous footnote.

11 On http://coinmarketcap.com/assets/digixdao/ the value of DGD is shown through time. On 6-6-2017 one DGD is worth around 88 U.S. dollars, leading to a market cap of 175 million U.S. dollars.
whose goals are more illusive\textsuperscript{12}. This is particularly helpful because the VSM requires the identification of a primary activity in order for a system to be considered viable. Fourth, the researcher of this master thesis purposefully participated as an investor of the DigixDAO crowdsale and therefore has been present in its ecosystem even before its beginning. The researcher therefore also has knowledge about and access to necessary sources, which are elaborated in the next paragraph.

3.2 Data gathering
In this paragraph the method of gathering relevant data is explained. In case studies, the phenomenon itself and the context in which it operates decide which sources are relevant (Buchanan, 2012). The cryptocurrency community exists throughout the world\textsuperscript{13}. Communities therefore have to communicate through relatively unorthodox, digital platforms. These platforms are for example Slack channels, Telegram groups, Reddit or Bitcointalk channels.

DigixDAO’s crowdsale took place on the internet and people from all over the world have participated. Therefore, DigixDAO’s community is spread across the world and communicates through most of these digital platforms. Additionally, DigixDAO has its own core developers, white paper\textsuperscript{14}, blog, press releases and webinar series. In the next subparagraphs, the knowledge and data sources that are used for this master thesis are explained. Through the use of a variety of sources, data triangulation is accomplished (Vennix, 2010).

3.2.1 Knowledge sources
Multiple documents or knowledge sources are used for this master thesis. First, a literature study has been conducted in both the introduction and the theoretical background of this master thesis. Second, a manifold of knowledge sources about DigixDAO is available. A selection is made to reduce the large amount of sources. This selection is based on an analysis of selection criteria ‘importance’ and ‘level of data reduction’ for each possible knowledge source. The selection process is explained in appendix 1. The used knowledge sources, after selection, are presented in table 3.1.

<table>
<thead>
<tr>
<th>Knowledge Source</th>
<th>Importance</th>
<th>Level of data reduction</th>
<th>Content</th>
<th>Where to find?</th>
</tr>
</thead>
</table>

---

\textsuperscript{12} See for example the announced Expanse DAO, which, as stated, has the more illusive goal of decentralizing the decision-making, creating more involvement from community members, incentivizing development and solving problems of institutional corruption and external financing (Franko, Clayton, & Conway, 2015).

\textsuperscript{13} For instance, interest in Bitcoin and therefore the cryptocurrency ecosystem has spread over most parts of the world. See Google Trends’ search ‘Bitcoin’: https://www.google.nl/trends/explore?q=%2Fm%2F05p0rrx.

\textsuperscript{14} The term ‘white paper’ is used in the cryptocurrency ecosystem to depict the initial scientific explanation and documentation of a new cryptocurrency.
In the second column of table 3.1, an indication of importance of the sources to answer the research question is provided. These indications are based on the researchers’ knowledge about the content of these sources. For instance, the webinar series and slack channel contain much communication about how specific Functions of the VSM are potentially realized.

A general problem in qualitative research is that the researcher can easily get lost or ‘drown’ in the large amount of available data (Vennix, 2010). As shown above, there is a lot of existing data on DigixDAO. Therefore, to come to meaningful study of these various sources, it is important to reduce the bulk of information (Vennix, 2010). Therefore, in table 3.1, the third column shows how selective the researcher is in reducing which data to encompass in this study. For instance, in the various topic channels in the Slack channel, a lot of communication between community members of DigixDAO is simply ‘chatter’. These long dialogues are not relevant for present study so will not be encompassed in the study. Additionally, there are many blog articles, which are not all relevant for this master thesis because much information is repeated in subsequent blogs, and are therefore not encompassed in the study.

In the fourth column of table 3.1 the content of the various sources is explained in short. ‘Various topics’ means that not one specific subject can be identified, because the source contains a wide variety of topics. These contents of the knowledge sources are drawn from the websites in the fifth column.

Two notes have to be made about specific sources. First, the DigixDAO webinar series contain four episodes which amount to over 2 hours of audiovisual material. These episodes are

<table>
<thead>
<tr>
<th>Knowledge sources</th>
<th>Indication</th>
<th>Importance</th>
<th>Description</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DigixDAO/ DigixGlobal website</td>
<td>+++</td>
<td>High</td>
<td>Driving force behind DigixDAO, FAQ, general information</td>
<td><a href="https://www.dgx.io/dgd/">https://www.dgx.io/dgd/</a></td>
</tr>
<tr>
<td>Whitepaper Digix</td>
<td>++</td>
<td>Medium</td>
<td>Technical explanation of Digix</td>
<td>(Eufemio, Chng, &amp; Djie, 2016)</td>
</tr>
<tr>
<td>Slack channel DigixDAO</td>
<td>+++</td>
<td>High</td>
<td>DigixDAO’s community centered communication</td>
<td><a href="https://dgx-public.slack.com">https://dgx-public.slack.com</a></td>
</tr>
<tr>
<td>DigixDAO webinar series</td>
<td>+++</td>
<td>Low</td>
<td>DAO governance, project proposals and general ideas for improvements</td>
<td><a href="https://webinars.digix.io/">https://webinars.digix.io/</a></td>
</tr>
<tr>
<td>DigixDAO/ DigixGlobal blog articles</td>
<td>+++</td>
<td>Medium</td>
<td>Various topics concerning DigixDAO</td>
<td><a href="https://medium.com/@Digix">https://medium.com/@Digix</a></td>
</tr>
<tr>
<td>Press releases DigixDAO</td>
<td>++</td>
<td>Medium</td>
<td>Updates on developments</td>
<td><a href="https://www.dgx.io/">https://www.dgx.io/</a> section ‘press releases’</td>
</tr>
</tbody>
</table>

Table 3.1 Knowledge sources (after selection)
transcribed in order to be suitable for analysis. Second, it is important that the Slack channel of DigixDAO is further divided into channels with different topics, such as ‘techquestions’, ‘privatepledgers’ and ‘general’. Only the channels that have a sufficient amount of participants, with the ‘general’ channel being the largest with around 1430 members, and have regular activity, are subject to analysis. The researcher has been keeping a record of these channels since June, 2016, which amounts to over 700 pages of communication. To reduce this amount, no further back than four months of the ‘general’ channel communication is encompassed in this study. Earlier communication does represent the actual state of DigixDAO and would therefore provide misdirected information for answering the research question. Four months is chosen as a broad range, but can be iteratively adjusted if deemed necessary.

3.2.2 Data sources
In qualitative research the choice for data sources is constrained by who are available and what is practicable (Saunders, 2012). In this research, limited suitable interviewees are available, because of the novelty of the phenomenon under study. Therefore, a non-probability sampling technique is used, which is based on the researcher’s judgement (Saunders, 2012). The researcher selected the persons who have contributed to DigixDAO the most. This is based on the knowledge of the researcher about the preparation, launch and development within the community of DigixDAO. Since this selection is crucial for explanatory research (Saunders, 2012), care has been taken in selecting and approaching the persons. This process leads to the following selection of available data sources:

- The DigixDAO core team consists of (name- function):
  o Teo Hye, Chng (Chairman)
  o Kai Cheng, Chng (CEO)
  o Anthony Eufemio (CTO)
  o Shaun Djie (Marketing / Business Dev)
  o Chris Hitchcott (Front End / UI UX Developer).
- The DigixDAO advisors:
  o Phillip Carl Mullan;
  o Peter W C Tan;
  o Tony Wong.
- The lead developer of Expanse: Christopher Franko.

However, not all these data sources from DigixDAO appeared relevant for present study. Alvesson and Ashcraft (2012) distinguish two guiding principles in selecting participants: ‘representativeness’ and ‘quality’. Representativeness means that it is good practice to have variation and breadth among interviewees so that they can fully cover the phenomenon under study. Quality, in general, means that the interviewees are suited for the goal of the research. Therefore, in close consultation with the CEO of the core team, the most relevant sources are identified and selected. The core team is generally located in Singapore, hence Skype is used to communicate. In a preliminary skype call with Kai Cheng Chng the researcher explained the VSM and asked which persons have the most relevant information. Kai Cheng responded that the whole core team is relevant, increasing the ‘representativeness’ of the selection, and in
particular Chris Hitchcott or Anthony Eufemio, increasing the ‘quality’ of the selection. Therefore, initially the focus lies on the CEO and the Chris Hitchcott to gather the data from. Thereafter on the rest of the team until saturation is reached. If no saturation is reached, the advisors are also interviewed. These type of sources are generally known as ‘respondents’, because they share their own experiences and perspectives on the research phenomenon (Lindlof & Taylor, 2002). By selecting these respondents, the researcher believes that representativeness and quality of the selected participants is sufficient to generate an answer to the research question.

The lead developer of Expanse is chosen as a respondent because he has much experience with blockchain technology. Moreover, he is currently developing a DAO for the Expanse blockchain. Therefore he can be considered an expert on the subject matter and is included in this master thesis as such. Lindlof and Taylor (2002) describe this type of expert as an ‘informant’. An informant’s inclusion helps with fact checks, understanding the phenomenon of DAOs and judging which skills are necessary to contribute to a DAO. Moreover, it will help with improving the credibility of this research, which will be elaborated in paragraph 3.6.

The selection of the respondents; the core team and Christopher Franko, for the present study is on the lower boundary of acceptance for qualitative research (Kvale & Brinkmann, 2009). In this research, this is not a problem, since the knowledge sources provide the majority of information. The data sources are only used for in-depth analysis.

### 3.2.3 Instrument

The instrument for acquiring the relevant data for answering this master thesis research question is twofold. For the knowledge sources a selection of available sources, as explained in subparagraph 3.2.1, is used. For the respondents, the semi-structured interview based on an interview guide is used. This subparagraph explains the choice for the instrument to gather information from the respondents and goes into research ethics.

Interviews are seen amongst organizational scholars as reliable gateways to look at what goes on in organizations (Alvsesson & Ashcraft, 2010). A relatively unstructured type of interview is the interview guide. In the interview guide the researcher selects a list with interview topics and sets the order and formulation of these topics (Patton, 1980). This instrument is chosen for present research because of two reasons. First, it allows for a conversation, instead of a question and answer interview. In this way, the interview allows for a wide variety of in-depth topics to be covered. This is necessary, given the procedure, because the interviews are used to clarify, go in depth, or add knowledge about the found peculiarities, discrepancies or lack of information about Functions and their interrelations that are gathered from the analysis of the knowledge sources. Additionally, relatively unstructured interviews can create surprising encounters and new perspectives or questions (Alvsesson & Ashcraft, 2012). Second, given the explanatory nature of this research, the interview guide allows for a conversational approach with a low level of structure. The only structure that is needed, is the

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15 See paragraph 3.4 for the procedure.
logic of the sequential Functions of the VSM as depicted in the operationalization of paragraph 3.3.

3.2.3.1 Research ethics
The CEO of the DigixGlobal team was approached by the researcher through the Slack channel. In a preliminary skype call, the researcher explained the goals of this master thesis and explained that he would like to interview team members of DigixGlobal. The CEO then introduced the researcher to the rest of the team, which allowed for a smooth approach to the other team members. Christopher Franco was approached through the Expanse Slack channel. With each interviewee, appointments for Skype calls were set based on their individual agendas. This was done, because the interviewees are located around the globe, and time differences exist. Before the interviews, the interviewees were asked permission to audio record the interview. It was stressed that the record is only used for research purposes and handled with care. At the start of the interview, the VSM was briefly explained to provide the interviewees with relevant contextual knowledge. Moreover, the infrastructural aspect was explained, because then the interviewee is able to give specific answers. After the interview, audio files and transcripts are made available to the interviewees. Moreover, as a favor, the researcher sent all the transcripts of the webinars and other knowledge sources to the DigixGlobal team. The results of this master thesis are sent to each interviewee.

3.3 Operationalization
Even though the VSM is a respected and relatively old model, it remains difficult to use due to many subtleties and complexities that it contains (Espejo et al. 1999). Although it is often regarded as a powerful tool to describe organizations (Achterbergh & Vriens, 2010b), it remains difficult to operationalize. The reason for this can be that when operationalizing the VSM, one must go and look at the actual infrastructure of the system in focus. However, this is exactly what the VSM does not aim for, since it is a functional model. Therefore, in much research the VSM is applied as a conceptual tool (Vidgen, 1988; Devine, 2005; Leonard, 2009; Chan, 2011) or meta-language (Espinosa & Walker, 2013) to describe a system, rather than actually operationalizing it. However, due to the large amount of available data in this master thesis, some sort of standardization to analyze this data is required. Consequently, in this research an operationalization of the VSM is made based on the conceptual description of Achterbergh and Vriens (2010a) of the VSM, as presented in chapter two of this master thesis. Thereafter, an operationalization of the infrastructure is added.

The purpose of operationalizing the VSM is to be able to systematically analyze the relevant sources. The operationalization in table 3.2 can therefore be seen as a topic guide with codes that are used to label parts of texts of all sources. In order to get a comprehensive explanation on each code, these codes or topics are also used in the construction of the interview guide and the analysis of the transcripts.

<table>
<thead>
<tr>
<th>First order codes</th>
<th>Second order codes</th>
<th>Third order codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Goal</td>
<td>1.2 Management</td>
<td></td>
</tr>
</tbody>
</table>
In order to apply the VSM, first, the system in focus needs to be determined (Vidgen, 1988; Espinosa & Walker, 2013). In this master thesis, the focus lies on the level of recursion of DigixDAO. However, since multiple entities (DigixDAO, Digix and DigixGlobal) exist, their exact relation needs to be precisely determined. Therefore, the division of the second order code 1.3 into four third order codes depicts the next lower level of recursion to determine the difference in levels of recursion between DigixDAO, Digix and DigixGlobal.
6.3 Coordination- Primary Activities

6.3.1 Coordination interdependencies between primary activities

7.1 Intelligence- Control

7.1.1 Generating finalized proposals for innovation

7.2 Policy- Intelligence & Control

7.2.1 Facilitating communication between Intelligence and Control

7.2.2 Consolidating proposals for innovation

8. Others

8.1 Resonation

8.2 Algedonic mechanism

Table 3.2 Operationalization Viable System Model based on Achterbergh and Vriens (2010a)

One general note can be made about the operationalization as presented in table 3.2. In points 1-5, the Five Functions are operationalized. Because each Function has its unique characteristics and Functions are inherently interrelated, a problem in operationalizing arises. This is because the interrelations are in themselves unique characteristics of Functions. However, when operationalized per Function, interrelations would be duplicated for the specific Functions of the interrelation. For instance, 6.1 then would be operationalized in both the Functions Control and Primary Activity. To prevent this, the realization group and adaption group are separately operationalized in point 6 and 7, and only focus on interrelations between Functions. In this sense, the operationalizations of Functions (1-5) focus, as much as possible, on characteristics that are specific to the Function, reserving the interrelations between Functions to be operationalized in 6 and 7.

This separation between the individual Functions and the ‘two groups of interrelations’ requires additional remarks. First, Policy, in point 5, is operationalized based on the problems that could occur in the Intelligence- Control relation as stated in subparagraph 2.1.6. If these problems do not occur, Policy can be considered adequate when this Function is also adequately identified in the adaption group. Because what the Policy Function actually should do is interrelated with Control and Intelligence and is operationalized in the realization group.

<table>
<thead>
<tr>
<th>9. Infrastructure</th>
<th>9.1 Human resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.2 Division of work</td>
<td></td>
</tr>
<tr>
<td>9.3 Technologies</td>
<td></td>
</tr>
</tbody>
</table>

| 9.1.1 Personnel recruitment |
| 9.1.2 Personnel development |
| 9.1.3 Personnel motivation |

| 9.2.1 Defining tasks and responsibilities |
| 9.2.2 Identifying capacities personnel |
| 9.2.3 Allocation task and responsibilities to capable personnel |

| 9.3.1 Technologies for realizing operations |
| 9.3.2 Technologies for regulating operations |

Table 3.3 Operationalization Infrastructure based on Achterbergh and Vriens (2010b)
As stated in the introduction, the exploratory research of this master thesis also looks at the infrastructure of the DAO under study, because it is the infrastructure that realizes the Functions. Therefore, the infrastructure needs to be operationalized, resulting in table 3.3. The focus lies on the division of work and technologies. The operationalization is based on the definitions of ‘human resources’, ‘division of work’ and ‘technologies’, as defined in subparagraph 2.1.1, following the description of Achterbergh and Vriens (2010b).

3.4 Procedure
In this paragraph, the procedure to get an answer on the research question is explained. As this research is of a qualitative nature, an iterative approach is necessary. The procedure of this research can roughly be separated into three phases which contain different steps. Because of the iterative approach, these parts and the steps overlap. In phase 1, the system in focus is determined and a preliminary understanding of all entities involved is acquired. In phase 2, a general understanding is acquired about the research phenomenon, before an in-depth approach is taken in phase 3.

The knowledge sources are used first, because these are at all times available and only require the researcher’s time (Lee, 2012). The respondents are scarce and have limited time, so are only used in the last phase. Additionally, in order to grasp the bulk of data, the procedure of analyzing the knowledge sources is divided into two parts. By doing this, the bulk of coded data is significantly reduced. It is inefficient and would demand too much of the analyzing skills of the researcher to analyze six sources at the same time. Moreover, the researcher can learn from the first coding process and can improve in the second phase of analysis.

3.4.1 Phase 1: System in focus
In the first phase, a general understanding of the entities involved in DigixDAO is acquired, to determine the exact system in focus of this master thesis. The first three knowledge sources of figure 3.1 are used: the website, whitepaper and the slack channel. Three steps are undertaken.

First, the knowledge sources are prepared for analysis. This means that the relevant information on the website is combined in one document, the English part of the whitepaper is selected, and the previous four months of communication from the different channels within the slack channel are selected. All documents are set in the same format.

Second, the three sources are analyzed in ATLAS.ti. This is elaborated in paragraph 3.5. The second order codes and, where immediately identifiable, the third order codes are applied to parts of the sources based on the data-matrix that is presented in paragraph 3.5. However, since the goal of this phase is to determine the exact system in focus, the focus lies on the primary activity in this phase.

Third, when an understanding of the system in focus is acquired, all the codes are revalued. This is done, to make sure that the codes depict the correct level of recursion. Hereafter, a draft of results that depict the different levels of recursion and the level of recursion in focus is made. In this phase, the infrastructural aspect of the research question is only touched upon.
3.4.2 Phase 2: All knowledge sources

The goal of the second phase is for the researcher to acquire an understanding about the Functions, their interrelations in DigixDAO and the infrastructure based on the knowledge sources. In order to reach this goal, three steps are undertaken.

First, the knowledge sources are prepared for analysis. This means that the webinars are transcribed, the relevant blog articles selected and combined in one document and the relevant press releases are selected. The acquired texts are then placed in ATLAS.ti. The second and third order codes are then applied.

Second, ATLAS.ti groups the results with the same codes and the researcher revalues whether the codes, also from phase 1, actually contain information about that code. This means that an iterative approach is taken while coding the knowledge sources. Whenever the researcher notes that, when a third order code is applied to the text, and the code does not fit with the congruent first or second order code, the first or second order codes are reevaluated. Additionally, the infrastructural codes are applied whenever a part of a source depicts the characteristics of the organizational DAO structure.

At the end of this step, the researcher analyzes whether the results encompass a description on all parts of the VSM and the infrastructure. By following these three steps, an understanding of the way through which DigixDAO is or fails to be viable is gathered and a second, adjusted, draft is made of the results.

3.4.3 Phase 3: Interviews

The goal of phase three is for the researcher to acquire in-depth understanding about the peculiarities, discrepancies or lack of information that followed from phase 1 and phase 2. Moreover, the goal is to present the results on all Functions and their interrelations and an infrastructural explanation, in order to answer the research question. To reach these goals, four steps have to be undertaken.

First, based on the results from phase 2, peculiarities, discrepancies or lack of information about Functions and their interrelations are identified. This is done in, respectively, three ways. First, by identifying peculiar results of phase 2 that could be due to the unique characteristics of a DAO. Second, by reviewing the results of phase 2 on discrepancies within results that are labelled with the same codes. Third, by identifying results that are not consistent with the VSM or the lack of results based on the operationalization.

Second, based on the results from the first step, an interview guide is compiled. The interview guide aims to cover the topics where an in depth look is necessary. Therefore, the interview guide focusses on the peculiarities, discrepancies or lack of information, found in the previous step. The topics from the initial operationalization which are congruent with the found peculiarities, discrepancies or lack of information are then encompassed in the interview guide. For instance, when no coordination activities are identified (2.2 of the operationalization) in phase 1, the congruent codes of the operationalization (2.2.1 until 2.2.5) are encompassed in the interview guide as topics. In this way, the interview guide is a customization of the operationalization as presented in paragraph 3.3. In this step, the topics of the operationalization of the infrastructure are encompassed in the interview guide to understand the peculiarities, discrepancies or lack of information. The interview guide is presented in appendix 4.1.
Third, the interviews are conducted. Importantly, the interviews focus on the aspects about which the interviewees are thought to have the most knowledge, as presented in the data matrix of the next paragraph. Noteworthy, an iterative approach is taken towards the interviews. This means that after each interview, the researcher analyzes whether sufficient understanding or answers are gathered on specific aspects of the VSM and the infrastructure. The analysis occurs through the process of transcribing each interview and coding it. When the researcher notes that possible saturation is reached on topics, the acquired explanations on these topics are only presented for confirmation to subsequent interviewees, instead of elaborately discussing the topics. On the other hand, whenever the researcher notes that there is a lack of understanding on specific items, the researcher conducts additional, focused interviews with the interviewees or with the expert Christopher Franko.

Fourth, the most illustrative quotes on all topics from the operationalization are selected in order to present the complete results.

### 3.5 Data analysis

The analysis of the texts and transcripts derived from the knowledge and respondents is elaborated in this paragraph. Since there are many available sources and codes, a data matrix is presented for overview purposes. Thereafter, ATLAS.ti is explained.

<table>
<thead>
<tr>
<th>Data Matrix</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second order codes</td>
<td>Website</td>
</tr>
<tr>
<td>1. Primary Activities</td>
<td>1.1 Goal</td>
</tr>
<tr>
<td>1.2 Management</td>
<td>x</td>
</tr>
<tr>
<td>1.3 Primary activity</td>
<td>x</td>
</tr>
<tr>
<td>1.4 Relevant environment</td>
<td>x</td>
</tr>
<tr>
<td>2. Coordination Activities</td>
<td>2.1 Interdependencies</td>
</tr>
<tr>
<td>2.2 Coordination activities</td>
<td>x</td>
</tr>
<tr>
<td>3. Control</td>
<td>3.1 Systemic goals</td>
</tr>
<tr>
<td>3.2 Systemic overview</td>
<td>x</td>
</tr>
<tr>
<td>3.3 Synoptic overview</td>
<td>x</td>
</tr>
<tr>
<td>4. Intelligence</td>
<td>4.1 Scanning</td>
</tr>
<tr>
<td>4.2 Initiating plans</td>
<td>x</td>
</tr>
<tr>
<td>5. Policy</td>
<td>5.1 Imbalance</td>
</tr>
<tr>
<td>5.2 Connectivity problem</td>
<td>x</td>
</tr>
<tr>
<td>5.3 Lacking complexity</td>
<td>x</td>
</tr>
<tr>
<td>6. Realization group</td>
<td>6.1 Control – PAs</td>
</tr>
<tr>
<td>6.2 Control- Coordination</td>
<td>x</td>
</tr>
<tr>
<td>6.3 Coordination- PAs</td>
<td>x</td>
</tr>
<tr>
<td>7. Adaption group</td>
<td>7.1 Intelligence- Control</td>
</tr>
<tr>
<td>7.2 Policy- Intel &amp; Control</td>
<td>x</td>
</tr>
<tr>
<td>8. Others</td>
<td>8.1 Resonation</td>
</tr>
<tr>
<td>8.2 Algedonic mechanism</td>
<td>x</td>
</tr>
</tbody>
</table>
Figure 3.1 Data matrix

Figure 3.1 depicts the data matrix of this research. This data matrix serves as a general overview of which information is expected to be found in which sources. Vertically, all first and second order codes are listed in congruence with the operationalization. Note that not the full names of the second order codes are used. The infrastructure is not included in the data matrix, because it is expected to be found across all Functions, in congruence with the conceptual model. Additionally, the third order codes are not captured in this data matrix, because they are too specific to be expected to be find in specific sources. This means that a general expectation of what information can be found in which documents suffices for the data matrix; whenever a second order code is connected to a source, it is expected that most of the third order codes can be found in the same source.

The data matrix shows in which order the knowledge sources and transcriptions of the interviews are analyzed. The vertical order of the codes depicts the order through which the VSM is compiled according to Beer (1990). Therefore, the sources that are thought to be of value to the primary activities are analyzed first, and thereafter the sources for coordination and so forth. This order, combined with the importance of the sources leads to the horizontal order of the sources as shown in the top row of figure 3.1. This means that the website of DigixGlobal is analyzed first and the whitepaper second and so forth.

The total amount of sources connected with codes amounts to a large amount of combinations and therefore text per code. To make this graspable, the analysis of subsequent sources on individual codes is iterative. First, this means, in congruence with the procedure of paragraph 3.4, whenever the researcher notes that saturation on codes arises, further data with the same codes are left out of the results. Second, whenever the researcher during the analysis notes that sources contain other information than the preselected codes per source, the researcher adds these codes to that specific source in the data matrix.

The texts that are derived from the knowledge sources and the transcriptions are imported into the software program ATLAS.ti. This is easy to use, qualitative data analysis software. The codes of the operationalization are also imported in ATLAS.ti. This makes it possible to code the texts in ATLAS.ti, which in turn groups the texts with the same codes, making it suitable for data analysis.

3.6 Reliability and validity
In qualitative research, different assessment criteria are necessary than the concepts of ‘reliability’ and ‘validity’ which are traditionally used in quantitative research (Symon & Cassell, 2012). This is because interpretation, subjectivity and emancipation may be crucial elements of qualitative research (Duberley, Johnson & Cassel, 2012). Therefore, other

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17 Note that for ‘Primary Activities’ and ‘Intelligence’ sometimes the respectively the abbreviations ‘PAs’ and ‘Intel’ are used for overview purposes.

18 For instance: ‘4.1 Scanning’ actually depicts ‘4.1 Scanning the environment’ in the operationalization. This is done for overview purposes.

19 See table 3.1.
assessment criteria are needed. These are ‘credibility’, ‘transferability’, ‘dependability’ and ‘confirmability’ and together comprise a list of universal criteria to assess qualitative research (Guba & Lincoln, 1989). In this paragraph each assessment criteria is discussed for this master thesis and techniques that support the corresponding criteria are elaborated on.

First, ‘credibility’ is defined as a good fit between the respondents’ reality and the researchers’ reconstructions of the respondents’ reality (Guba & Lincoln, 1989). Therefore, the gathered data should be rich enough to answer the research question. In order to accomplish credibility, three methodological means are applied in this master thesis. First, ‘progressive subjectivity’ is used, which is the record keeping of the researchers’ initial understandings of the research with the aim to show whether the original constructions are challenged and changed based on the interviewees’ constructions (Symon & Cassel, 2012). The procedure of this master thesis is split in two phases, wherein the first phase an initial understanding of the research phenomenon is elaborated. This understanding is then challenged and possibly changed based on the interviewees’ constructions in phase two. The sense making process is encompassed in appendix 6. Second, ‘member checking’ is used, which is checking the researchers’ interpretation with the research participants during the research process to make sure the respondents’ reality is accurately captured (Symon & Cassel, 2012). In this master thesis, easy access to the research participants is ensured through direct contact within the Slack channel of DigixDAO. The researcher is part of the community of DigixDAO in the Slack channel, because he purposefully invested in this DAO. In this way, the researcher can continuously check his interpretation with the respondents’ reality through asking question in the Slack channel. Moreover, an expert is used, Christopher Franko, to check the researchers’ understanding of complex aspects of the research phenomenon. Third, methodological triangulation is used, which is using at least two methods of data collection (Duffy, 1987). In this master thesis, two methods of data collection are used through the two phases of the procedure; through the knowledge sources and through the respondents, as is explained in paragraph 3.4. The combination of the use of ‘progressive subjectivity’, ‘member checking’, and ‘methodological triangulation’ create the credibility of this master thesis.

Second, ‘transferability’ is about providing a thick enough description about the research case to enable the reader to judge what other contexts might benefit from the findings (Symon & Cassel, 2012). The ‘transferability’ of this master thesis is an issue due to the newness of the research phenomenon and therefore the explorative character of the research. Recommendations are initially only relevant for DigixDAO, limiting the degree of ‘transferability’. However, since this research aims to answer the most basic question that one can ask about organizations; ‘can it be viable?’, the lessons drawn from this research could be used by communities from other DAO projects, since the underlying blockchain technology is comparable. Additionally, a thick description of the research phenomenon is provided based on multiple sources and because the researcher submerged himself into the ecosystem of cryptocurrencies, terms are used that other DAO projects understand. Together, it is too early to say whether the results from this master thesis are transferable.

Third, ‘dependability’ is about describing, in detail, the process of the research so that future researchers can assess the extent to which adequate research practices have been carried out (Shenton, 2004). In present study, the dependability is to some degree guaranteed, because
a detailed description is provided about the research design, its implementation, and the procedure of data gathering. Furthermore, the effectiveness of this process is evaluated in the discussion of chapter 6. Important to note here is that the researcher plays a large role in the interviews and the interpretation of the data, limiting obtaining similar results when the study is repeated. However, the acquisition of similar results is not necessary when speaking about dependability (Shenton, 2004). The provided detail of the research process and insight in transcripts enables the reader to judge why decisions were made and how understanding of the research phenomenon was achieved, therefore realizing ‘dependability’ (Symon & Cassel, 2012).

Fourth, ‘confirmability’ is about enabling the reader to check where the data came from and how the data is transformed into results (Symon & Cassel, 2012). Present research has a high degree of ‘confirmability’ due to the close description of the knowledge sources and where they come from in paragraph 3.2.2, references to those sources throughout the results chapter, the provided transcripts of the interviews and the close description of the results from the two phases of data gathering.
4. Results

The results from the three phases of the procedure are presented in this chapter. All the knowledge sources of subparagraph 3.2.1 are analyzed and these are encompassed in appendix 3. The transcripts of the interviews are encompassed in appendices 4. More specific, this includes interviews with Shaun Djie, Kai Cheng Chng, Chris Hitchcott and Christopher Franco. After the analysis of the knowledge sources and these four data sources, saturation was reached.

In this chapter, the results of this master thesis are transparently presented by referencing in brackets to specific quotes of sources. This is done, for example, as following: “The DigixGlobal team understood the implications of the blockchain technology (1:19)”. The first number in the brackets depicts the source, see table 5.1 in appendix 5, and the second number depicts a numbered quote in that source, see appendices 5.1, 5.2 and 5.3. Hence, (1:19) refers to the 19th coded quote of the 1st source, which is the DigixGlobal website. In appendix 6, an overview of the sensemaking process of the researcher is added.

The first phase of the procedure was to find the exact system in focus. This phase resulted in a distinction between three levels of recursion. DigixDAO is the system in focus and results on this level of recursion are presented in this chapter. However, DigixDAO is closely related to the Digix platform and the company DigixGlobal. The results from phase 1 on the other two levels of recursion ‘DigixGlobal – DigixDAO – Digix’ and ‘Digix’ are elaborately presented in appendix 2.

This chapter is structured as follows. First, in order to put the results on the viability of DigixDAO into perspective, a short overview of how DigixDAO came into existence and an explanation of the relationship between DigixGlobal, Digix and DigixDAO is presented in paragraph 4.1. In paragraph 4.2, the results of the VSM on the goal, primary activities, management and relevant environment of DigixDAO are presented. The results on the metasystemic Functions of the VSM are presented in paragraph 4.3, and the infrastructural aspect in paragraph 4.4.
4.1 Origin DigixDAO and relation with Digix and DigixGlobal

In figure 4.1, the following relation between DigixGlobal, Digix and DigixDAO is depicted. ‘DigixGlobal private limited’ is a company in Singapore that deals in gold bullion. They are doing this in innovative way. DigixGlobal is building Digix, a trading platform to buy and sell a gold backed, digital token called DGX. Essentially, this means that they put physical gold in a vault in Singapore, assign a cryptocurrency (DGX) to individual bars, and let people trade this cryptocurrency on their trading platform. The benefits of the Digix trading platform and DGX are discussed in appendix 2.2. DigixDAO was created to grow the DGX ecosystem and therefore create more usage of the Digix platform. In essence, DigixDAO contains a lot of funds (in Ethers), which are dispersed to projects that aim to grow the DGX ecosystem. This is done through a decentralized and automated governance structure which is a new organizational beast called a Decentralized Autonomous Organization. In return for growing the DGX ecosystem, DigixDAO gets a part of the revenue (in DGX) from the Digix platform and, if applicable, direct revenue from the projects that it funds.
4.2 Level of recursion: DigixDAO

Figure 4.2: Level of recursion: DigixDAO

4.2.1 Goal
The raison d’être for of DigixDAO is to increase the user base and adoption of DGX and therefore grow the DGX ecosystem (3:322). In return, DigixDAO and its stakeholders receive revenue from the Digix trading platform (1:25). DigixDAO consists out of funds, raised in the crowdsale, which should be used to directly increase the adoption of DGX in the Ethereum ecosystem (4:8). These funds are allocated by the DGD holders to projects that aim to grow the DGX ecosystem. The blue square in figure 4.2 depicts the level of recursion of DigixDAO.

4.2.2 Primary activities
The primary activities of the DAO to grow the ecosystem consist out of the possible projects, either regular project proposals or third party peripherals, which can be funded by the DAO. The term peripherals is used to depict project teams or startups that are not directly linked to the DigixGlobal team and have project proposals that have a direct incentive to DGD holders (4:7). The projects aim to scale the DGX adoption and provide more or other revenue streams to the DAO and therefore the DGD holders. At present, no projects or peripherals are actually
funded by the DAO, as the Digix trading platform is not yet finished. Only when Digix is finished, can the smart contracts for the governance structure for DigixDAO be put in place, and are all the funds transferred by DigixGlobal into these smart contracts (10:34). Nevertheless, multiple peripherals are lined up and have already introduced, discussed and concretized their proposal with the DGD holders. Moreover, project proposals from both community members and DigixGlobal are also lined up (4:12). Even though these project proposals are not yet primary activities at present, they have been thoroughly discussed and would only need the governance contracts to be put in place to be funded and become primary activities. Therefore, in this subparagraph, possible primary activities of DigixDAO are introduced.

Primary processes of DigixDAO can be divided into projects that have tangible and intangible rewards for DigixDAO. Tangible means that the primary process has its revenue structure directly encoded into smart contracts. In smart contracts, decisions are made through code on the blockchain. For example, a peripheral, which is funded by DigixDAO, receives revenue through the use of the Digix platform. A portion of this revenue, in DGX, is automatically allocated to DigixDAO by using smart contract. This reward for DigixDAO is tangible, because it is directly expressed in an amount of DGX. Attores and Innocoin are examples of projects that have tangible rewards. Intangible projects are projects that, in some form or another, increase demand for DGX and boost trading volume on the Digix platform, but where it is difficult to express a precise number of gained revenue for DigixDAO (10:13). An example is a marketing project proposal that needs, for instance, 10,000 USD for DGX Facebook advertisements. It can be assumed that this will increase demand for DGX and therefore grow the DGX ecosystem, but it is difficult to put an exact number on the extra revenue this project gains for DigixDAO.

The team members of DigixGlobal can be considered as ‘the parents’ of DigixDAO, since they hosted the initial crowdsale and are in charge of making the governance contracts of DigixDAO. Once the governance structure is in place, DigixGlobal will most likely propose the first project proposals for DigixDAO (10:12). These projects will be small and demand little to no funds from the DigixDAO and are only meant to allow DigixDAO’s community to become familiar with the governance model (10:8). Moreover, these proposals will probably be directly related to the Digix platform itself. This means that the first proposals will not be peripherals, but, for instance, a proposal to add a silver backed cryptocurrency to the Digix platform (4:12, 10:12). DigixDAO would then pay for the expanses to implement silver, and in return would get the revenue gained from the fees that are paid by customers (4:12).

Hereafter, four possible project proposals are presented to get an idea of what kind of primary processes DigixDAO will have once the governance contracts are in place. First, two peripherals are presented. These are InnocoIn and Attores. Then, an internal DigixDAO project proposal about a possible ETC withdrawal is presented, followed by an example of a marketing proposal. Since some project proposals have been formed up to a year ago, after each primary process the current status of this project is added.
4.2.2.1 Peripherals

Peripherals have their revenue streams written in smart contracts. This means that rewards flow automatically to DigixDAO’s smart contract on the Ethereum blockchain (10:31). Kai Cheng notes that DigixDAO will not have influence on what happens in the day to day operations of peripherals. This means that ideally, DigixDAO only funds parts of operations of peripherals that are tied to DGX, because otherwise agreements about legalities and obligations would have to be made in the real world. This would require DigixDAO to have a real world entity to execute these agreements (10:13). To illustrate this point, Kai Cheng notes: “I think that projects like MyEtherWallet would be an ideal candidate to be part of DigixDAO, if they are still interested in the future. Because they have a working project, it’s all there. DigixDAO could even fund it and perhaps find a way to weave rewards or it could just help to sponsor and help the ecosystem. Projects like that, we are not fully funding, we fund parts of it or fund things that are working already.” (10:31). In this section, the peripherals Attores and Innocoin are discussed.

Attores

The goal of Attores is to provide Smart Contracts as a Service (SCAAS) (6:6). Attores provides these smart contracts as open source (6:9). Attores wants to build a smart contract employment platform which allows to deploy contracts directly on the Ethereum blockchain and also visualize the change of the states of the contracts on the blockchain (6:10). This means “that you’re going to be able to employ various types of contracts that are going to allow you to swap you’re Digix tokens for other Ether or other crypto assets such as Ether and hopefully BTC” (6:12).

Attores already made a lot of smart contracts for DGX tokens, DGD and DGDb (6:10). For instance, swap contracts for swapping these tokens over the counter (OTC), without trusted intermediaries getting in the middle of the user’s transaction (6:10). Attores is planning to build more contracts. An example is a forward contract that will allow users to swap DGX in the future, based on the price of another asset such as Ether or Bitcoin (6:13). Other examples are binary options, where you’re going to be able to make a prediction or speculate on the price of something happening in the future (6:14), or pari-mutuel binaries, where you can make a series of predictions of events happening in the future (6:15).

Mist is the Ethereum blockchain interface or wallet from where typically smart contracts are being deployed. However, using it can be difficult or troublesome in verifying that somebody actually deployed a contract on the blockchain. Therefore, Attores want to make “what we call a trusted platform, deploying trustless contracts” (6:18). Although Attores will be deploying the contract, users can directly verify the contracts themselves using Etherscan (6:18). Attores is going to use an Oracle to provide the external information in order to settle the contracts (6:20). An Oracle is used because “contracts on Ethereum don’t know what’s going on in the outside world, you have to submit information to the contract, so, you do need an outside feed for that.” (7:4). Then the contract will execute and pay out according to its preset terms (7:4).

The benefit of DGD holders, when they fund Attores, are multifold. First, by using DGX within the smart contracts, trading volume for DGX on the platform will go up and eventually also the rewards for DGD token holders (6:22). Second, Attores will provide an API to the order
book and contract creation so developers can create their own projects on top of it (6:23, 6:32). Third, DigixDAO would receive a percentage of the fees involved when someone deploys a contract (6:25). Fourth, the Attores smart contract platform provides a decentralized, p2p exchange for DGD holders, DGDb holders and DGX users (6:27).

The management of Attores consists out of a team of three persons knowledgeable in the cryptocurrency and blockchain ecosystem (6:2), information systems (6:7), and financial products (6:3). Additionally, the team has a number of advisors amongst which a lawyer and a start-up entrepreneur (6:4). This team has the technical capacities to be in charge of the maintenance of the system (6:28).

The direct relevant environment of Attores lies in Singapore, since they are located there. This is a benefit, because in legal terms, DGX and other Digix assets are considered intangible asset, which means that they are not regulated and therefore no personal information is required from customers to trade on the platform (6:26). Additionally, Attores joined an accelerator in Singapore, called FinLab, to help quicken their development (6:8). They speak with various financial institutions, insurance companies and all sorts of other interested companies that are interested in blockchain technology and how smart contracts and blockchain technology could be used in their industry (6:5). The relevant environment is also the community of DigixDAO, since they are the customers who are likely to use these contracts and are the input for what kind of contracts are demanded (6:16). Ethereum lies in the relevant environment, because changes of Ethereum’s code require maintenance for the Attores platform (6:29).

At the time of writing, Attores has pivoted away from DigixDAO and focused their business activities elsewhere in the cryptocurrency ecosystem (9:19, 10:12). Specifically, on doing document verification on the Ethereum blockchain (9:18). However, once the governance structure of DigixDAO is in place, they might return to DigixDAO to ask for funding for their project proposal (9:19).

Innocoin

Innocoin’s goal is to help people get money in and out of the Ethereum ecosystem easily (5:3). Innocoin does this by offering a cryptocurrency conversion service which enables partners to monetize their website or weblog and to offer decentralized cryptocurrency exchanges (5:2).

Innocoin’s core advantage for doing so is their themeable affiliate widget which can be embedded in websites (5:2). Partners can put the widget on their site, which contains the cryptocurrency conversion service, and starts earning a part of the margin on each sale that is made through the widget. The sales come from secondary market exchanges such as Poloniex or Kraken (5:16). This leads to the following scenario: “A prominent gold blog that runs on WordPress places a post about DGX gold tokens. He really becomes excited and he wants to invest. In the side bar, it is possible to immediately buy DGX tokens with bitcoin or ether through the Innocoin widget. He immediately concludes the sale on the same spot he reads about it. 20% of the margin is immediately transported to the DAO.” (5:5).

At the time of the pitch, Innocoin was already operational, since they had the widget already on different websites from partners (5:6). However, Innocoin approached DigixDAO, because they needed funding for development (5:7). In return, DGD holders would get benefitted in different ways. First, the DGX logo would be “on every corner of the web” and
third parties will write content to promote buying DGX and other Ethereum tokens, leading to a lot of exposure (5:10). Second, twenty percent of the margin earned from each sale will be transferred to the DigixDAO smart contract (5:10).

The management of Innocoin consists out of two persons (5:14). The tasks of the two team members are divided in the front-end and back-end tasks and are divided based on the work experience of the members (5:15).

The relevant environment of Innocoin consists mainly of ‘partners’, which are blog owners (5:5), regulations, the cryptocurrency ecosystem as a whole and in particular the secondary market exchanges such as Kraken or Poloniex (5:16). In the future, fiat to crypto exchange widgets on every corner of the web might be an extension of the current business plan of Innocoin (5:13).

At the time of writing, DigixGlobal team members believe that Innocoin is no longer in existence, since they have not heard from the Innocoin team members in a long time (9:18, 10:11).

4.2.2.2 ETC withdrawal proposal

After ‘theDAO’ hack (not DigixDAO), mentioned in the introduction of this thesis, the Ethereum core developers hard forked the blockchain (3:8; 8:65), which lead to a split of the blockchain in two separate blockchains. This resulted in the dominant Ethereum blockchain and a new blockchain, which was named Ethereum Classic. In this process, all Ethers (ETH) were automatically duplicated in Ethers Classic (ETC), which are the native tokens of the Ethereum Classic blockchain (8:65). DigixDAO contained 465.134 ETH after the crowdsale. After the hard fork, DigixDAO contained both 465.134 ETH and 465.134 ETC (8:63). ETCs have value and one ETC traded around 15 U.S. dollar at the time of writing. DGDs were theoretically also duplicated by the Ethereum hard fork, however DGD Classic is not honored by the DigixDAO (8:63). A proposal was made with the goal of allowing the DGD holders, who invested ETH in the DigixDAO, to do a proportionate withdrawal of the ETC from the DigixDAO.

This proposal was made a while after the hard fork, because inadequate on-chain governance tools were available at the time of the hard fork (8:66). Multiple options as to what to do with the ETC were discussed with the community, from which one option remained (8:68). The proposal allows DGD holders to reclaim their ETC (8:69), without presenting significant legal and financial difficulties between DigixGlobal and DigixDAO (8:68). The DigixDAO governance model for voting is not available, so a temporal alternative to vote for this proposal was presented (8:70). This alternative is called a ‘CarbonVote’ (8:71). A CarbonVote “is the best balance of convenience, security and simplicity, whilst removing the risk of the vote process being “hacked” (as DigixGlobal will simply ignore the results should any unforeseen exploits be used in the voting mechanism).” (8:72). The proposal contains several milestones, including a community discussion time frame, necessary smart contract and user interface development, the voting of one month itself, a time period when the votes are “tallied, verified and withdrawal processing script to be initiated”, processing of withdrawal transactions timeframe, implementing the contract for non-participants smart contract (8:75).
The CarbonVote has an additional goal of being a precursor to the governance model of DigixDAO. The CarbonVote “will allow all DGD holders to publicly ‘beta test’ and gain valuable insights on DGD voting, interest and participation in the near future.” (8:73). This means that the ETC CarbonVote also serves as a low risk proposal to better understand and improve the DigixDAO governance model (8:73).

The creators of this proposal are DigixGlobal team members, following a number of requests from within DigixDAO’s community (3:311, 3:317, 10:8). The proposal is improved by the community and only executed if third party auditors have positively audited the involved code (8:64). The code is reviewed by Vincent Eli, co-creator of StableCoin from Consensys (10:15) and DigixGlobal’s CTO Anthony Eufemio (11:2). And could take up to 45 working days (8:79). The DigixGlobal team members are the executors of this proposal.

The execution contains an issuance of a redemption token on the ETC blockchain (10:1). The redemption tokens allow for a refund of ETC out of DigixDAO. DGD holders’ addresses are credited with these redemption tokens, proportionate to the amount of DGD the address contains at a certain point in the future (10:1, 10:2). Using Spectrum, the lightwallet user interface, the redemption tokens can be used to receive actual ETC in one click (10:1).

At the time of writing, the code for the ETC withdrawal is being reviewed and the point from where the redemption tokens are issued has been set.

4.2.2.3 Marketing project proposal

The goal of DigixDAO is to grow the DGX ecosystem. Therefore, many different marketing proposals to promote the Digix platform and raise awareness about DGX will likely be proposed to DigixDAO. Community members frequently discuss their wishes to release funds of the DAO for projects that market the DGX platform (3:18, 3:84, 3:177, 3:179). Marketing proposals can take on many different forms. For instance, a payment to TedX to acquire the opportunity to do a Tedtalk about DigixDAO, or a certain amount of paid ads on Twitter or Facebook (9:9, 10:21). However, rewards for DigixDAO that are derived from a marketing project are intangible (10:21). So, the right metrics have to be found to judge when a projects has accomplished its goals (10:21). Many marketing proposals can be funded by DigixDAO at the same time, as funding for marketing proposals will not be expensive in comparison with for instance a strategic consulting project (9:13).

At the time of writing, possibilities for marketing are discussed in DigixDAO’s community, however none have materialized into project proposals since the governance structure is not ready yet.

Essentially, the DAO is a pile of money, which can be used to fund projects such as the four discussed above. In theory, the DAO can run out of money when simply all money is spend on projects and no revenue stream is encompassed to rebuild the stash of money. Different scenarios are possible to prevent the DAO from running out of money. First, the management (DGD holders) could approve a project proposal to initiate a subsequent crowdsale to refill the DAO’s funds (3:192). Second, a permanent revenue stream in the form of profits of for instance demurrage fees from Digix could refill the DAO’s funds (3:235). Third, in the scenario that the
internal funds (Ethers) of DigixDAO become more valuable over time, no action has to be taken since the funds would grow in a passive manner.

### 4.2.3 Management

The ‘management’ of DigixDAO consists of two tiers: badge holders and DGD holders. The investors that invested over 15,000 U.S. dollars in the crowdsale received a special ‘proposer badge’, which allows them to submit proposals for vetting to DigixDAO (1:26, 3:152). The founders of DigixGlobal also received four badges and can directly submit proposals (9:14). In total, there are 385 proposer badges, also known as DGDb\(^{20}\). At least one individual of the management of a project must own a badge, or have access to another individual who does, in order to be able to submit proposals to DigixDAO. When the DGDb holders ‘whitelist’ proposed proposals, meaning that the project proposal is deemed suitable for DigixDAO purposes, voting becomes open to all DGD holders. The DGD holders decide on whether a project proposal receives funding. Together, the founders, DGD holders and the badge holders comprise the management of the DAO.

In figure 4.3, the different assets and what capacities they have are summarized (8:19). The ‘Founder’ depict the DigixGlobal team, the ‘Proposer’ depict the badge holders and ‘Token Holder’ depict the DGD holders. The DGD and DGDb holders are various investors who are distributed around the world. This figure is shown here for overview purposes, and will be more elaborately discussed in the infrastructure paragraph. Every 24 months there will be a vote for DigixDAO to increase the amount of DGD in existence (3:151, 9:17). This was agreed upon by the initial batch of investors and DigixGlobal (9:17). Essentially, this means diluting the supply of DGD and allowing more investors to participate in DigixDAO. The crowdsale was hosted more than a year ago, so the 24 month period will probably start either when the Digix 2.0 platform or the governance contracts for DigixDAO are in place (9:17; 11:1). What the vote on increasing the DGD cap will look like is still up in the air (9:17).

#### Badge Types:

<table>
<thead>
<tr>
<th>Badge Type</th>
<th>Can directly submit proposals?</th>
<th>Can submit proposals for vetting?</th>
<th>Can vet proposals on?</th>
<th>Can pledge on proposals?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founder</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Proposer</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Token Holder</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
</tbody>
</table>

Figure 4.3: Badge types (8:19)

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\(^{20}\) See [https://etherscan.io/address/0x54bda709fed875224eae569bb6817d96ef7ed9ad#readContract](https://etherscan.io/address/0x54bda709fed875224eae569bb6817d96ef7ed9ad#readContract).
DigixDAO heavily relies on individuals to carry out tasks that the automation in the code cannot do. Therefore, the DigixGlobal team will act as the default service provider for the DAO (8:18). Being the default service provider contains several things. First, it means that for instance if a marketing proposal is accepted by DigixDAO, the specific funds would be automatically allocated to an address controlled by DigixGlobal (10:9). Only then would DigixGlobal sent the funds to the project proposers (10:9). Another reason to insert a ‘default service provider’ is to prevent malicious attacks (10:9). This means that no one can liquidate large amounts of the funds from DigixDAO to themselves, because of the safety hedge (10:9). DigixGlobal would then always be able to ‘restart’ DigixDAO if a malicious attack happens (10:9). The chance of DigixDAO being maliciously liquidated is small, since a proposal to liquidate DigixDAO would require around 80 to 85 percent of total DGD (9:5, 10:10). Moreover, people in the cryptocurrency space can ‘smell a rat’ from far away, so they won’t pledge their DGD to malicious proposals. Second, being the default service provider to DigixDAO means that DigixGlobal commits to developing the voting platform for DigixDAO in terms of providing proposals, insuring that incentives are aligned such that proposals are submitted and hosting a pool for claiming rewards (9:5).

In a sense, the service provider is merely a trusted third party that is serving to help the DAO (9:5). It could be the case that DigixDAO wants to have another default service provider. Badge holder(s), for instance, could step up and present themselves as a possible new default service provider (9:5, 10:10). The transition to a new service provider could be done, in theory, but would require a lot of work in order to allow the transition to securely happen (10:10). This is because then DigixGlobal would have to hand over its private keys to the next provider, which “can be worked out, but that’s just a lot of risk that hasn’t been fully fleshed out yet” (10:10). Another scenario would be when DigixDAO decides that DigixGlobal is no longer capable to being the default service provider and they therefore decide, with an 80 to 85% majority vote to dissolve the DAO (8:27).

It is repeatedly stated that although DigixGlobal prepared the launch of the DAO, the DAO does nog have the purpose of a feeder income or feeder fund for DigixGlobal (8:18). DigixGlobal will operate as the default service provider for the DAO, but does not expect to make an ‘income’ from the DAO’s funds (8:18). DigixGlobal looks to include, if resources permit it, a consulting based model for DigixDAO. This would mean that people get hired to work on a certain project, probably with a project manager in place, and funds are released to the parties involved and to cover all costs that are required to run the project (9:6).

Currently, the management or governance model of DigixDAO is undergoing a “careful planning, development and auditing process” (1:27). This means that the DAO does not do anything at the moment. The first proposal on which the DGD holders will function as management, is when a DAO internal decision of what to do with the ETC\(^{21}\) that the DAO contains. DigixGlobal works with the DigixDAO community to complete the development of

\(^{21}\) ETC stands for ‘Ethereum Classic’, which is the result of a split of the Ethereum blockchain into the dominant Ethereum branch and the Ethereum Classic branch. This split led to a duplication of the amount all ETH (ethers) into ETC. After the split, DigixDAO also contained 465.134 ETC, which has a value of around 8 million U.S. dollars on 08-06-2017.
the governance contracts for the DAO. The DigixGlobal team takes the lead in this and the community provides feedback to improve the development (8:52). Anthony Eufemio, for example, reports about the draft of the DigixDAO governance that will be available for community feedback (8:52).

4.2.4 Relevant environment
The relevant environment of DigixDAO encompasses the whole cryptocurrency ecosystem combined with the relevant environment of the different projects of the DAO. The cryptocurrency ecosystem can be divided into the Ethereum ecosystem including blockchain specialists and developers, the secondary market, the DigixDAO’s community, other cryptocurrencies and other DAOs. The relation between DigixDAO and the cryptocurrency ecosystem, starting with the Ethereum ecosystem, is hereafter elaborated. The environments of the possible different projects, the primary activities of DigixDAO, are explained in subparagraph 4.2.2. Thereafter, the internet as relevant environment for DigixDAO is discussed.

First, DigixDAO aims to grow the DGX ecosystem. The Digix platform works through the Ethereum blockchain and DGX is visioned to be the main ‘store of value unit’ within the Ethereum ecosystem (1:21), because the Ethereum ecosystem needs a unit of exchange that allows the users of the Ethereum blockchain to store value over time (1:21). The primary activities of the DAO directly use the Ethereum blockchain for immutability, transparency and auditability purposes (1:7). The DigixDAO and Digix development is directly related with the Ethereum development (3:19). Problems with Ethereum directly influence Digix (3:37). Therefore, the Ethereum ecosystem is not only directly integrated in the primary process of the DAO, but also encompasses a large part of the relevant environment of DigixDAO. The DGD, for instance, are stored in Ethereum wallets. Therefore, the token holders of the DAO are directly dependent on changes that happen in the Ethereum token wallet (2:11).

Second, the secondary market is important in the relevant environment of DigixDAO. The secondary market encompasses cryptocurrency exchanges22, such as Bittrex and Yunbi, and their customers. DGDs are traded through there (3:35). This means that ownership of DGD, shares in DigixDAO, is transferred between persons on the exchanges. The primary activities of DigixDAO have an input-output relation with this relevant environment through interchanging DGD. When Digix launches, DGX will also be traded on these exchanges, so DGD holders can trade their earned DGX for other currencies if desired. Moreover, the Digix platform initially will not support other payments than cryptocurrency, but the secondary markets will eventually provide DGX/USD and DGD/USD trading pairs (3:123). Although what the centralized exchanges do is out of the scope of DigixGlobal (3:271), the DigixDAO community is actively being motivated to send requests or tweets to exchanges to add DGD by a bot in the slack channel (3:247). However, only a small part of DGDs resides on exchanges (3:172). The exchanges expose new customers to DGX so that is a great input from the relevant

22 Many different cryptocurrency exchanges exist. For an up to date list see the following link: https://www.cryptocoincharts.info/markets/info. To see on which exchanges DGD is traded, see: https://coinmarketcap.com/assets/digixdao/#markets.
environment of DigixDAO (3:271). Additionally, DigixDAO receives feedback from exchanges. For instance, when an exchange stated that DGX should be transaction-fee free to allow for more adoption (3:238).

Third, DigixDAO’s community lies in the relevant environment of DigixDAO. The community is larger than just the DGD holders, since more people than account holders of DGD are present in the different communication channels, such as the Slack channel, Twitter or Reddit (3:190). Sometimes, in the slack channel and on Reddit, DigixDAO and the DigixGlobal team are being discredited by impersonators trying to manipulate the market or even trying to acquire DGD from other investors by framing them (3:94, 3:181). In order to amplify dealing with these disturbances, the community responds that these impersonators are fake and alerts the DigixGlobal team to respond to the FUD\(^\text{23}\). For instance, on Reddit a false message was posted that said that a Digix founder was “trying desperately to sell his funds” (3:94). This was put in the Slack channel and adequately handled by the Digix founder.

Fourth, the whole cryptocurrency ecosystem lies in the relevant environment of DigixDAO. Reports from cryptocurrency media outlets happen in the relevant environment of DigixDAO. Also, well-established media outlets such as Forbes play an important role in the perception of DigixDAO and Digix (3:154). Furthermore, events within the cryptocurrency/blockchain ecosystem happen (3:169, 3:188). Events are: symposiums (3:169) and conferences such as Devcon (3:273).

Fifth, there are other DAOs in the environment of DigixDAO from which DigixDAO can learn, such as MakerDAO (3:148), REIDAO (3:207), Wings, Dash and the Expanse DAO. However, DigixDAO’s structure differs from the other DAOs, because the other ones get instant access to the acquired funds from their crowdsales (3:135). DigixDAO’s funds are still untouched and the development of Digix is privately funded (3:134). Only when the Digix platform is in ready, and then the governance structure for DigixDAO is in place, can the funds be used.

DigixDAO does not have an office in a specific country, since it lives on the internet. Its community members communicate internationally and DigixDAO does not have a specific country’s legal system to abide by. However, it might be useful for DigixDAO to get legal recognition for this kind of organization, as this would facilitate real world agreements and contracts between DigixDAO and possible partners. At the moment, it is unclear how this can be done. For every peripheral, there could be legal risk involved for DigixDAO (4:15). DigixGlobal is “actively discussing with various lawyers both in Singapore and Hong Kong on how to move forward. There is simply no precedence for such a novel organization” (8:40).

Living on the internet in a completely transparent and for anyone accessible manner creates a peculiar input-output relationship between DigixDAO and its relevant environment. For instance, a proposal to DigixDAO is proposed about using funds to get DGX or DGD listed on a new secondary market exchange. Kraken, a Europe based cryptocurrency exchange, could be an example of such an exchange. Then, since project proposals are done in a user interface

\(^{23}\) FUD stands for ‘fear, uncertainty and doubt’ and is typically used to drive the market price of an asset down.
that is openly accessible to anyone, Kraken could be aware of such a proposal being proposed. It could then charge DigixDAO an unfair amount. Since all communication within DigixDAO is open, it could lose a competitive advantage by having a high degree of disclosure (9:1, 10:32).

4.3 Metasystemic Functions DigixDAO

4.3.1 Recap primary activities

At the level of recursion of DigixDAO, different future primary processes can be identified. These primary activities of DigixDAO are projects that aim to increase the DGX usage and therefore grow its ecosystem. There are two types of possible primary activities. First, there are projects from which the revenue is tangible, namely the peripherals. Second, there are projects from which the revenue is intangible, such as marketing or branding proposals. As previously stated, these primary activities are not yet implemented by DigixDAO, since the governance structure is not yet finalized. However, by giving a description of possible primary activities (Attores, Innocoin, ETC withdrawal and marketing), it is possible to look at the meta-systemic Functions of DigixDAO’s level of recursion. In the next subparagraphs, results on the meta-systemic Functions are presented. The infrastructure is included in these sections by discussing in what way the Functions are realized.

4.3.2 Coordination

4.3.2.1 Interdependencies between primary activities

Equipment

For the different project teams of DigixDAO, the Ethereum blockchain is a shared technology in two ways. First, formally proposing the proposals, pledging to them and the allocation of funds is done on the Ethereum blockchain, through the lightwallet Spectrum. Therefore, this is considered to be an interdependency between primary activities. This lightwallet user interface is being developed by Chris Hitchcott of the DigixGlobal team (8:14). Second, DGX holders can store and trade their DGX on various different wallets. For instance, the Ethereum wallet Mist is used to store DGX or open smart contracts applications of DGX (6:17). Third, the API of Digix is an interdependency between primary activities, since peripherals will directly use the API for the integration of the Digix platform in their primary processes (6:19). What this means, is that the project teams can use an open source access to the Digix platform to carry out their own project ideas (1:20).

Spectrum is not only an interdependency for peripherals and projects, but also for users, investors and developers (8:56). A lightwallet contains a piece of software that provides a full spectrum of tools in a user interface to interact with a certain blockchain, and it is available in the browser (8:55). The critical requirement of the lightwallet is a ‘zero-install’ entry point, which means an entry point with the Ethereum blockchain without friction (8:56). Spectrum enables new DigixDAO experiences to be rolled out faster, and these experiences will reach the users within one click in the lightwallet (8:57). After all the functionalities were added to the alpha demo of Spectrum, the DigixGlobal team announced a demo of Spectrum on their website (8:58). A number of parties in the community have contributed to the creation of Spectrum (8:59). The projects will use Spectrum for proposing proposals, and DGD holders will vote in this lightwallet.

Wilt, J. de (s4034627)
Customers
The DGD holders and community are shared customers for the primary activities, since often the desire to buy and use DGX is expressed in, for example, the slack channel. This holds especially for the tangible primary processes (peripherals) such as Attores and Innocoin, since peripherals build applications to give DGX more functionality. The customers for these peripherals are DigixDAO community members and other cryptocurrency traders. Additionally, an increase in DGX adoption leads to more profit for DGD holders, since more revenue flows to DigixDAO. DGX customers are therefore also incentivized to buy DGD.

Specialized employees
As previously shown, DigixDAO has many different DGD holders and badge holders. Both DGD holders and badge holders are interdependencies between primary activities (9:21). First, DGDb and DGD holders, provide feedback on proposals through different channels, and help shape the projects (9:21). The DGDb and DGD holders can be seen as being entrenched in the Ethereum ecosystem. Therefore, they have the knowledge about what applications are needed and are best suited to provide feedback and making proposals. Moreover, DGDb whitelist the initial proposals, upon which the voting becomes open to all DGD holders (9:23). Second, the badge holders can propose proposals to the DAO. In this sense, the badge holders are shared specialized employees between the primary activities, because projects proposals need access to a DGDb to be able to propose project proposals to DigixDAO. DGD holders can together create a proposal for the DAO and ask a badge holder to formally propose it. Third, DGD holders have to approve project proposals by pledging, upon which funds for this project and achieved milestones are allocated (9:21). The involvement of the DigixDAO as an interdependency between projects and peripherals is that the DigixDAO governs the release of funds when peripherals and projects reach milestones in concurrence with what was noted in the proposals (4:13).

The DigixGlobal team members are shared specialized employees for the projects in various ways. They are the default service provider, provide resources to let peripherals adopt DGX in their line of business (4:13) and they act as “an angel investor or seed fund kind of a role” (4:29). This team also enables proposers to live pitch their proposal on Digix’s YouTube channel (5:1, 6:1). DigixGlobal coordinates when and who can pitch (9:23). Additionally, Shaun Dije is the smart contract developer, who the project teams might need in their development or integration with the Digix platform (3:280). Chris Hitchcott is the front end developer of the user interface Spectrum. Together, the team members of DigixGlobal promised the DigixDAO to finish the governance smart contracts and user interface, so that possible primary activities will be able to formally propose their proposals to DigixDAO. Finally, when DigixDAO decides to fund a project, the budget is released to an address controlled by DigixGlobal (10:13). The budget is in congruence with the amounts necessary to reach the milestones of that project, as stated in the project proposal. DigixGlobal then needs to allocate the right amounts to the projects in congruence with the milestones.
4.3.2.2 Coordination activities
Out of the interdependencies, the Ethereum blockchain is likely to be the most prominent interdependency. Since the governance of DigixDAO happens on the Ethereum blockchain, by various individuals around the world, each project proposal has to stand alone in order to be funded (10:17). This is because the tangible projects will be proposed from teams all over the world, which would make it difficult to coordinate them if this was not done by automated code in Spectrum.

Spectrum will be used as the DGD governance user interface to vote on proposals. Additionally, Spectrum is a coordination activity or automated system, because it enables all proposers to propose their proposals in the user interface (3:102). In this sense, the Spectrum platform serves as a ledger to record voting in a completely transparent, fraud resistant manner (9:36). To illustrate the necessity of Spectrum as the main coordination activity between peripherals such as Innocoin and Attores, Kai Cheng says: “I think the simplest way where they [projects] can be interdependent with Digix without much friction would be to have a protocol level interdependency with DigixDAO.” (10:3). This means that Innocoin and Attores would have to weave their reward structure in an open sourced manner into the DAO, using smart contracts on the Ethereum blockchain, so that this process is completely transparent and automated (10:3; 10:17). Simply: “the best is to prove everything by code” (10:17). If this process was taken out of coded smart contracts, peripherals could underbook or overbook profits, and sent an unfair, non-equivalent amount of revenue back to DigixDAO token holders (9:29). When this process is coordinated in code on the Ethereum blockchain, fraud is prevented: “the code is law in this case” (10:18). This means that there will eventually be little to no coordination activities between the tangible primary activities necessary, other than Spectrum (11:7).

Planning systems
Different project proposals are made at different points in time to DigixDAO. To prevent these project proposals from having overlap, requiring many actions of DGDb and DGD holders, overflowing the Spectrum user interface or draining the DAOs funds too quickly, a planning system will be introduced wherein projects can be proposed, vetted, whitelisted and pledged on. The whole process of proposing, vetting, whitelisting and pledging is set on a quarterly basis and each step or ‘window’ will contain around a week (10:13). This means that it takes around a month from proposing a proposal to the DigixDAO until receiving funds to execute the proposal.

The revenues from Digix to DigixDAO are set to pay out after the last window ends. This means that only when DGD holders vote during the pledging window, they are eligible for receiving the revenue from Digix (10:13). This revenue flows to DGD holders in an automated and transparent manner tough the smart contracts in Spectrum (9:36).

Quality standards
In order to make sure the different proposals fit a certain standard and are proposed in the same manner to DigixDAO, a checklist for a proposal is available (3:300, 4:2, 8:35, 10:20). This is necessary for the DGDb and DGD holders to judge the proposals and give feedback. According to the checklist, the proposal should have the following things included: a business plan with
key highlights of what the peripheral is, a proof of concept in the form of a whitepaper or an open source code, features of the project, main revenue stream, how DGX adoption and volume directly or indirectly is boosted, the reward structure and the technical implementation of the reward structure, timeline of the project, cost/benefit analysis, breakeven analysis, amount of funds needed, a range of milestones that can be achieved, key performance indicators, risks involved, team structure and ways to get in touch with the team (4:14). The reward structure based on the milestones is technologically integrated in the blockchain for integrity and transparency purposes (4:16).

Additionally, since Spectrum and the Ethereum blockchain is a technological interdependency, DigixGlobal, DGDb holders, DGD holders and proposers need to work together to form best practices (3:303). This includes setting up a test net sandbox for proposals to test on, installing bug bounties and run code audits (3:303). In order to prevent the DGD holders from being technically unable to vote for the proposals, and therefore preventing the DGD holders as an interdependency from uncontrollable oscillations, instruction blogs or YouTube videos are available with detailed instructions (8:28, 8:29, 8:30). Also, in order to coordinate correct usage of the Ethereum wallets, such as Mist, detailed user instructions are provided (8:6).

**Shared stationary or logo to coordinate markets**

All projects use the same DGX symbol, since all projects are formed around DGX and the Digix platform. In this way, possible customers in markets immediately recognize Digix.

**Ambiguity resistant vocabulary**

A lot of ambiguity resistant vocabulary is used. Most of the vocabulary is blockchain jargon or coder jargon. This is used to make sure all DGD holders, developers and non-developers, understand what is meant, and to make proposals clear and ambiguity resistant (8:60). This is necessary because funds for the project are released the moment the project is approved by DigixDAO. In addition, the already mentioned checklist for proposals, that all project teams need to use to explain and propose their proposals, is meant to take away any ambiguity. In this way, the proposals become clear and ambiguity resistant for other projects and all DGD and DGD holders. Furthermore, the community of DigixDAO consists out of developers and non-developers, who have a different level of understanding of technical jargon (8:60). The non-developers ask the community and the DigixGlobal team to explain developments in jargon-free understandable English, which is then done (3:35, 8:60).

When terminology is not clear, discussion starts to take away this ambiguity. For instance, ‘demurrage’ was sometimes seen as a confusing term for depicting the costs for the storage of physical gold in vaults (3:232). By proposing to alternate this term to ‘storage fees’, ambiguity resistant vocabulary is created. Also, when innovations happen, new terminology is necessary. For instance, during the development process of Ethereum and Digix, innovations lead to new entities or products. These products, for example Spectrum, are clearly explained and terminology to address aspects of it is elaborated on (8:53). Sometimes, even similar entities are described with different names, based on the difference of one minor small characteristic (8:54).
A few issues could arise with the interdependency of primary activities of having DGDb and DGD holders being able to vote.

First, someone can do a hostile takeover by buying DGD from the market and vote in favor or against certain project proposals at the last minute of when the window for voting is open (9:45). In traditional organizations, a hostile takeover by buying up all shares could always happen. In order to circumvent manipulation of voting or a hostile takeover in DigixDAO, a ‘step down approach’ or a ‘blind voting window’ will be put in place. A step down approach means that each DGD has less influence as a vote, the longer the voting window is open (10:42). In this way, DGD holders are incentivized to vote at the start of the voting window, and last minute manipulation is less likely to happen because it is less effective (9:45). A blind voting means that DGD holders vote and only reveal their vote after the voting window closes. At present, it is not set in stone which option it is going to be. Chris Hitchcott thinks the blind voting is fairer, because in the step down approach all DGD holders might not be physically able to vote at the start of the voting window. For instance, because they live in the wrong time zone or are on a holiday.

Second, not all DGDb or DGD holders might be available for or aware of the quarterly voting window to vote on proposals. If not enough votes are being casted, then the primary activities would not receive funds. In order to coordinate all DGDb and DGD holders to be aware of the voting period, initially DigixGlobal will try to notify everyone through all available communication channels (9:36). However, when DigixDAO matures, this will be done by project teams themselves, as they are incentivized to make DGDb and DGD holders aware of when to vote for their proposal.

4.3.3 Control

4.3.3.3 Translation goals viable system to goals primary activities

The goal of DigixDAO is to grow the ecosystem of DGX. In other words, to decide on funding the projects that “could satisfy the aim of increasing usage of DGX” (3:279). The badge holders, the founders and DGD holders translate the goals for DigixDAO in goals for primary activities (9:28). When a badge holder submits a proposal, first all badge holders decide whether to approve it (1:27). The approval threshold is not definitive yet (9:24). This is because the level of participation of Badge holders in the voting process is not yet clear (9:25). Once a proposal is approved by badge holders, voting becomes open to all DGD holders who can then accept or reject the approval with an on-chain ballot (1:27). This means creating an unfalsifiable transaction effect on the Ethereum chain in Spectrum to prove that you own the DGD and indicate what you vote (9:27). “A simple mantra for every proposal should eventually boil down to: Are there clear benefits to DGD token holders if ETH was released to the said project? The more direct that relationship, the better” (8:37). In return for this ‘pledging’ effort, the DGD holders get profits from the quarterly revenue derived from the Digix platform.

The communication of the translation of the goals for the viable system to goals of the primary activities is done through different channels, such as the Slack Channel and the “friendly avenue to promote and pitch”-webinars (4:9). In order for projects to get funds, they must fully demonstrate how their plan could help with the adoption of DGX and how it would
reward the DGD holders as well (4:9), in congruence with the checklist for proposers (9:28). Also, the reward structure from the revenue of peripherals should be transparent (4:11).

There are three different development stages for tangible projects once they are primary activities of DigixDAO (4:18). First, the concept stage is where project is in its conceptual phase. Funding for this stage is capped to prevent an over expectation of the proposal. Second, the beta stage is when the proposal is worked out in an actual beta. This can be in a working application on testnet, so that DGD holders can actually test the project to provide a better understanding of what this project is. Third, the live stage is where the project or peripheral is in the growth stage with a working platform, customers and revenue numbers. Upward tiered funding is available for these phases. There is no maximum or minimum amount of funding. However, the project must justify the amount (4:28).

4.4.3.2 Systemic synoptic overview of primary activities
When the governance structure is in place, initially, the DigixGlobal team will have the systemic and synoptic overview of the primary activities because they are the default service provider (3:118, 11:15). They will orchestrate the process and make sure synergy between primary activities is reached (11:15). For the intangible projects, initially DigixGlobal has both the systemic and synoptic overview, since they have to allocate the funds when milestones are reached. The DGDb and DGD holders will have a more systemic overview of the intangible primary activities. For the tangible projects or peripherals, anyone that is actively looks at the open sourced code and transparent revenue streams on the Ethereum blockchain has the systemic overview of these primary activities (9:29, 10:26). When the DigixDAO is mature, the DGDb holders would be the ones to have the systemic and synoptic overview of the primary activities (9:30). Chris Hitchcott notes that “it will really come down to whichever party is the most incentivized to ensure things go smoothly”, meaning that the ones with the highest stake will have the overview. This creates a competitive community amongst the proposers (11:15).

4.3.4 Intelligence
4.3.4.1 Scanning for relevant developments in the environment
Accepted environment
First, a large part of the accepted environment consists the technology through which the DGX ecosystem works, which is the Ethereum blockchain. Developments happen in the Ethereum blockchain that are a given to the DGX ecosystem and therefore to the projects of the DAO (3:134). For instance, after the already mentioned ‘theDAO hack’ (not DigixDAO), it was announced that the Ethereum core developers would hard fork the blockchain (3:8). This effectively lead to a point in time where the blockchain was split in two, resulting in the dominant Ethereum blockchain and a new chain, which was named Ethereum Classic. These kinds of developments, with indeterminable consequences (3:284), happen, and the DGX ecosystem only identifies and responds to them by, in this case, choosing which blockchain it will be on. DigixGlobal’s reaction for DigixDAO, at the time, was that “Digix will be on the network that has the potential for the greatest user adoption, the greatest synergies amongst Dapps, the greatest chance of being with an ecosystem of amazing and yet unthought-of, mind blowing applications that are being built entirely for the new decentralized economy.” (8:46), which lead to Digix staying on the dominant Ethereum blockchain. In the future, these kinds of
events might happen more often (3:241), since Ethereum will switch to the more ‘experimental’ Proof of Stake algorithm (3:11). Besides developments, also problems with Ethereum, as mentioned in the relevant environment subparagraphs, lie in the accepted environment of DigixDAO. Security flaws come up in the technical environment of the DAO, since developers are constantly coding and have to pay attention to code patterns, potential bugs, refactor and review solidity code (3:128). Rules to avoid the security flaws are then formalized and implemented across the Ethereum ecosystem, which takes time (3:128). For instance, when Ethereum’s testnet ‘Ropsten’ went down (3:204, 3:205). Ethereum was sometimes even seen as Digix’s weakness (3:39) because of its vulnerabilities (3:42). DigixGlobal developer Chris Hitchcott illustrates: “It basically comes down to the combination of immature tools and rapid rate of change. And combining those two things together, you’re always making updates and there is no best practice” (11:27).

Second, software development is typically seen as having unpredictable estimated time of arrivals (ETAs). An illustrative quote for the accepted environment is: “Ethereum as a community gets plagued with questions on when mist / metropolis will launch, augur gets asked an ETA, we get asked an ETA, maker as well. Everyone in this space is in the same boat, and what everyone wants truly is a launch which we are all working towards. Even now we still have people calling Ethereum a scam, mist a vaporware regularly in anti-Ethereum forums, while Ethereum supporters themselves are getting antsy about the forks and delays that are occurring, whether rival chains will dominate etcetera.” (3:27). However, software development is a difficult and unpredictable process. Therefore, the accepted environment for the DAO is the DigixGlobal team who are building the governance model for the DAO. Without the software for this governance model, the DAO funds cannot be touched.

Third, the market movement of Ethers and other Ethereum based tokens reflects the nature of the Ethereum ecosystem and the Dapps as a whole. Impatient supporters leave, while others remain in the community (3:28). Additionally, others state that the market movement does not reflect the actual state of the technology, but only sentiment in the community (3:77). Market sentiment is a given for DigixDAO and scanning for developments in the market happens continuously.

Fourth, scanning for developments in legalities happens in the accepted environment of DigixDAO, including individual projects. Depending on where the projects are located, their initial legal environment, where they want to do business, secondary global legal environment, the influence of changes in legislation have an influence on DigixDAO (3:224). Legislation needs to be properly defined (3:81). AML and KYC are important aspects of the legalities in the DigixDAO and cryptocurrency ecosystem, to which DigixDAO has to comply (3:239, 3:242). Changes in legalities happen and DigixDAO looks for relevant developments. For instance when the Monetary Association of Singapore announced a new framework for the FinTech regulatory sandbox (8:39). DigixGlobal is located in Singapore and could only respond to this development by applying to be included in the sandbox. Depending on the outcome of the application, this could either “entail limiting the number of customers / capping the volume of gold sales per client on our marketplace until we move out of the sandbox. This could also mean submitting test proposals and pledges for DigixDAO for the duration of time.” (8:39). On
the other hand, a positive outcome of the application would provide more flexibility in following the current timeline (8:39).

Fifth, what happens with cryptocurrency exchanges lies in the accepted environment of DigixDAO. Exchanges sometimes are compromised or hacked, which might lead to a theft of digital assets such as DGD or DGX. So far, a hack has not affected DigixDAO as of yet (8:38).

Sixth, within the global gold industry DigixDAO is scanning for developments. In parts of the world, such as India, reports of tightening regulations concerning the ownership of physical gold are present (3:44, 3:66, 3:74). Also, reports of gold starting to be allowed for Islamic finance business use propose an opportunity for DigixDAO (3:76). DigixDAO can only react to these developments.

Sixth, rates of fees of competitors are in the accepted environment, because when competitors lower their fees, they might outprice Digix, and therefore lower the income for DGD holders and the projects. For instance when the demurrage fees of competitors becomes lower than the competitive prices Digix currently has (3:87).

**Problematic environment**

Scanning for opportunities and developments in the problematic environment of DigixDAO happens continuously, as the goal of DigixDAO overlaps with its problematic environment: to grow the DGX ecosystem.

First, opportunities lie within the Ethereum ecosystem. DGX is created/set in the Ethereum EIP20 format, which means that future Ethereum contracts can seamlessly use DGX for any potential application (1:20). This means that there are many possible future projects around DGX that grow the DGX ecosystem. For instance, being on several platforms such as Plutus or OpenBazaar, decentralized exchanges, decentralized prediction markets and ICO funding (3:61). Additionally, by using gold as the value basis, DGX could be used for salaries, futures and loans (1:36). DGX “can also be used as a basis for other tokens and financial instruments that have yet to be imagined.” (1:20). Through the presence of DGX in the Ethereum ecosystem, it is expected that not only the value of DigixDAO will be affected by the DGX release, but even the value of Ether itself (3:50). This means that DigixDAO is obliged to add value to the Ethereum ecosystem.

Second, within DigixDAO’s community there is continuous talk about shaping the future of DigixDAO. Firstly, opportunities for Digix to diversify in creating digital tokens for other precious metals such as silver or platinum are discussed. The DAO would then gain new revenue streams and also would be obliged to grow these other precious metals backed digital token ecosystems (3:71, 3:88). Secondly, the community looks for opportunities to create a more sustainable revenue stream for the DigixDAO (3:296). Thirdly, a lot of communication in the Slack channel is about releasing funds of the DAO for a project that is in charge of marketing the DGX platform (3:18, 3:84, 3:177, 3:179). Fourthly, the community should help other Dapps with integrating or using DGX (such as Plutus (3:147) or mkr.market (3:148)). This will increases demand for DGX and will increase profit for DGD holders of the DAO (3:147).

Third, opportunities in the gold industry are scanned for. For instance, the tightening of regulations for people in India to own physical gold. Digix could be one of the few ways for...
Indians to own gold offshore (3:66), which can be considered a future that DigixDAO is obliged to shape.

Fourth, scanning for possible partnerships in the problematic environment is present. For instance with Status, a mobile Ethereum client Dapp and messenger which would enable people to ‘text’ real physical gold to one another (3:57). Also, with making DGX and RippleSG (Ripple is another cryptocurrency) digital gold interoperable and partnering with SilverBullion to have the same custodian (3:278).

Fifth, DigixDAO is looking for developments for redundancy to be less dependent on the development of the Ethereum blockchain, illustrated in the first point of the accepted environment. Chris Hitchcott notes that ultimately, DigixDAO is going to have a high level of redundancy, because the DigixDAO smart contracts can always be redeployed on whatever viable blockchain is left (11:28): “Obviously, just because the chain goes down, the gold doesn’t disappear.”

4.3.4.2 Initiating plans for innovation
In the white paper several future use cases of DGX are mentioned. In this sense, the DigixGlobal team initiated several plans for innovation to the DigixDAO. Five use cases are mentioned here. First, a ‘Dead man’s switch’ can be built to allow for wealth being passed on in the form of other crypto assets to the Ethereum address under the Digix system (2:30). A ‘dead man’s switch’ is a smart contract that automatically transfers the balance of assets from one address to another, when that address has not been used for a set period of time (11:29, 10:44). It is meant to be an inheritance contract, hence ‘dead man’s’ (10:44). Second, DGX tokens could be used, like Bitcoin, in legal jurisdictions to facilitate game currency or gaming tokens (2:31). Third, DGX can be used as better and less volatile escrow services on the blockchain (2:32). Fourth, a Dapp can fill the niche of hosting crowdfunding without the price volatility of cryptocurrencies (2:33). Fifth, other cryptocurrencies can stake portions of their value with DGX and Gold Assets (2:34).

As mentioned, DigixGlobal is the driving force of Digix and also a large holder of DGD. Besides what was in the whitepaper, they continuously propose plans for innovation. For instance, their Digix 2.0 proposal about what kind of fees are gained from the Digix platform, which flow to the DAO (3:223, 3:234, 3:238), an EtherEx integration with the Digix platform (4:30), submitting the auditing and vaulting expenses as a proposal to the DigixDAO in return for a larger share of the revenue (4:31) and creating other asset classes or even other precious metals (4:32). The DigixGlobal team also present a list of Dapp developments that are lined up through the medium blog posts. These Dapps, that would benefit the DGX ecosystem, would be: a p2p lending platform, a decentralized exchange, smart contracts as a service and virtual nations (8:17). The badge holders who want to propose their peripheral to DigixDAO are also initiating plans for innovation. For instance, the mentioned Innocoin and Attores peripherals (8:31).

The community members of DigixDAO are helpful and are continuously initiating plans for innovation. For instance, by proposing to make the difference between DGX and DGD more clear (3:220), by doing translations (3:64, 3:65) and by proposing a plugin architecture for reporting DGX transactions for partner markets (3:244). Other examples are when a community
member initiated a plan to let the DAO buy back DGD from the market, similar to a traditional share buy back in securities (3:291), or when a community member suggested to sell the ETC and put it in an ICO of another cryptocurrency, making the DAO owner of other cryptocurrencies that might increase in value through which DGD holders or the DAO can gather more revenue (3:297). Within the DigixDAO, proposals for improving the internal system are also being done. For instance, proposing ways to test the governance system of DigixDAO, enabling a withdrawal option of the ETC, rethinking the transaction fees on DGX or letting the DAO pay for the demurrage fees in the first year(s) to boost demand for DGX (3:196, 8:44).

4.3.5 Policy
4.3.5.1 Imbalance
First, the current situation of the balance between conservatism and innovatism is discussed. Thereafter, the balance is discussed for when the DigixDAO governance structure is in place.

From the perspective of the DAO and the DigixGlobal developers, a cautious or conservatism approach is taken while preparing for finishing Digix 2.0 and the governance structure for DigixDAO (3:221). In this period, a lot of questions are being asked about ETAs of the technology or proposals (3:17, 3:119, 3:129, 3:130), weekly updates (3:21) or progress in general (3:180). These questions are countered by a more conservative approach to let the developers do their job. It is stated that these things take time because its cutting edge or bleeding edge new technology (3:15, 3:38, 3:131, 3:140), and everything needs to work flawlessly (3:32, 3:88) before (re)launching the platform and the governance model for DigixDAO. The DigixGlobal team is developing Digix and the DigixDAO governance structure with money out of their own pocket (3:36, 3:55). It is noted that a fine line exists between moving too fast and breaking things, and only releasing once everything is perfect (3:150). Some are stating that maybe more money should go to hire additional developers to speed up development (3:15), but others are skeptical about this idea and whether it would accelerate the release: “nine women cannot make a baby in one month” (3:182). The DigixGlobal team responds to these to these remarks and requests from the DigixDAO’s community and requests by keeping progress transparent and stating that they are doing everything they can to complete Digix 2.0 and DigixDAO (3:24, 3:184), since their attitude is: “these hard questions come and have to be explained and answered as honest and straightforward as possible” (3:136). Giving ETAs has negative effects, according to Anthony Eufemio, since they are getting blamed when the target is not hit (3:16). Also, the DigixGlobal team states that they take “a very conservative approach to building our DAO. We are making everything modular with the ability to change and upgrade the code safely.” (3:304). However, it can be stated that currently conservatism is present in DigixDAO, since it risks missing out on opportunities for innovation. An example of a missed opportunity is Innocoin, who are assumed to no longer be in existence.

When the governance smart contracts are in place, conservatism will no longer be the case, since many proposals for innovation will be done. Only when more innovations are done than the voting period or the available funds can handle, would innovatism be the case. When the DigixDAO governance structure is in place, there will be a quarterly period wherein proposals are voted on. From all the available project proposals, the DGDb holders whitelist

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the ones that they deem in line with DigixDAO’s goals, so that innovatism will not happen (9:32). Then, the DGD holders can allocate their DGD (their votes) to the project proposals that they think should be funded by DigixDAO. After this time frame, a, yet to be determined, number of projects that received the most votes get funding. The next voting period is three months later. This process is standardized to run every quarter. In this way, a balance between innovatism and conservatism is acquired. This system has some remarkable features. First, the only innovation limitation DigixDAO has, is when the internal funds run out. However, the value of the internal funds is more than 100 million U.S. dollars. Hence, it is possible to fund many projects at the same time. Second, the community of DigixDAO consists of many individuals around the world. Each of them might have an idea to add value to grow the DGX ecosystem and all he system is open. This means that DigixDAO can harness the full innovative power of the DigixDAO community.

4.3.5.2 Connectivity problem
Lacking of assessment of proposals for innovation
In DigixDAO, the proposals need to be fully assessed before voting happens, because once approved, the funds are automatically released from DigixDAO. Hence, everything has to be very clear beforehand. Initially, the proposal with the milestones and funding requirements and other points of the checklist is provided and discussed in webinars (9:13, 10:27). Then, discussing is opens directly with the project proposers (9:13). In the voting period, there will be a discussion window for vetting by DGDb and DGD holders where “you are subjected to be asked why do you need this much funding and stuff like that” (9:46). After the voting window, the voting will reflect the outcome of the assessment (9:46). Since all proposals go through an extensive period of discussion, where project proposers collude with DGDb and DGD holders, no lack of assessment of proposals is found (9:46).

Unused potential for change
In addition to the results in 4.4.5.1, currently there is unused potential for change, since DigixDAO’s funds have not been touched (3:178, 3:180). No proposals can be formally proposed to the DAO until the appropriate infrastructure for the governance interface for DigixDAO is ready (4:26, 10:12). However, in the webinar it was noted that third parties or DGD holders can already start working on the documentation, whitepaper or proof of concept that is needed for submitting a proposal (4:26). This means that although the internal system is not ready, possible innovations are conceptually ready. When the governance structure is ready, all projects that are deemed suitable can be funded (10:12). Proposals will be sufficiently assessed with regard to the potential of the organization to change. Shaun Djie states: “you [project proposer] have to collude with the badge holders, you have to collude with people who will be asking questions” (9:46). Projects can use the open sourced API to the Digix platform to create projects and can ask DigixDAO to fund their proposal, so the potential for change can be fully harnessed.

Since only on a quarterly basis proposals can be done to DigixDAO, there will be unused potential for change in two ways. First, short term projects such as marketing projects cannot be funded by DigixDAO when each time a proposal has to be made. Second, when already
funded proposals want to change their proposal, they have to wait until the next quarterly voting period. This might lead to unused potential in the meantime. For instance, when technological developments for Attores need more resources than expected, and a new proposal to ask for the extra funding needs to be done.

4.3.5.3 Lacking complexity

**Contribution of experts**

As stated, DigixDAO can harness the full innovative potential of its community, since all DGDb holders can propose innovations to DigixDAO. In assessing proposals, the DGDb are likely to be seen as the experts who initiate projects, who judge whether proposals for innovation are adequate and who ask the tough questions (9:34). This expert role of DGDb holders is illustrated by Shaun Djie: “let’s say if someone is an expert of doing swap contracts, he comes forward as ‘hey Attores I think you are asking a bit too much, probably the real costs of a project is 100,000 dollars’. It is really up to the founders of a project to alter their budget. If they stick to one million dollar budget it is unlikely to be passed.” (9:37). The idea for badge holders was set up with the idea of the more you are invested into DigixDAO, the more objective you are in assessing proposals (9:34). The badge holders can prevent ill-considered or shallow plans to be proposed to DigixDAO by not whitelisting them (10:30, 11:20). Also, future, similar project proposers will have to “battle it out” for getting funds by DigixDAO (11:19). Therefore, they are therefore incentivized to point out flaws in other project proposals, which creates a competitive environment (11:19).

Kai Cheng believes the DigixDAO can attract teams that want to have their project funded by DigixDAO (10:12). However, since the badge holders are semi-anonymous, it is difficult to see which badge holders are the real experts (10:28). To make this more transparent, the subject of reputation is broached. This means having DGDb and DGD holders rate each other on how they make decisions for DigixDAO (10:28). When this matures, DGDb and DGD holders who are not or less active or know less about the proposed innovations could let the DGDb or DGD holders with high reputation vote for them (10:28).

Experts such as Vitalik Buterin, co-creator of the Ethereum blockchain, and Rune from MakerDAO actively contribute as experts in the field to the creation of the governance contracts of DigixDAO (8:41, 8:47, 9:35). The DigixGlobal team also are connected to researchers based at the National University of Singapore to discuss technical subjects (3:229). Moreover, the DigixGlobal team’s office is located together with all promising ‘Deep Tech’ startups (3:184). On individual primary activity level, experts are taken on as advisors or consultants (6:21).

**Quality of innovation plans**

The innovation plans of peripherals or projects are excessively discussed through various channels. The discussion takes place in the form of detailed questions during the webinars (5:11), discussion in various slack channels and reiterating the project proposal by the creators based on feedback (5:11). Moreover, the badge holders make sure quality of innovation plans is assured (9:34).
4.3.6 Realization group
4.3.6.1 Control – Primary Activities

Direct commands
Direct commands are given to the projects proposals before they are funded by DigixDAO. When DigixDAO does not agree with a proposal, it can command to the peripheral that it should change the proposal before funds are dispersed or a project is engaged (6:34, 10:29). The DigixDAO community repeatedly and profoundly negotiated about the levels of revenue stream that would go to the DAO (5:4, 7:5, 7:6). Sometimes, the DGD holders directly set goals for primary activities by giving direct commands. For instance, when the DGD holders decided what kind of products Attores actually should build (6:16).

Reports
Projects or peripherals that are approved by DigixDAO would have to keep DigixDAO up to date by reports of their progress: “A milestone of this should be given on a monthly basis just to provide a checkpoint guide as to where the peripheral has been progressing.” (4:21). However, for tangible primary process, reports are not essential, since their work can be transparently viewed on the Ethereum blockchain trough open sourced smart contracts as law (10:26). They only have the informal obligation to periodically update DigixDAO on the general progress of their project (9:38). The reports from intangible primary activities are necessary to prove that they have reached certain milestones and should receive the allocated funds for the milestones (10:14). Reports with updates are also asked from the DigixGlobal team on development of the Digix platform and the DigixDAO governance structure (3:10).

Resource bargaining
Primary activities and the Control Functions bargain about resources. This goes both ways. First, the primary activity bargains about the funds needed (5:8). Second, the stakeholders of the DAO bargain about how high the allocation of revenue to the DAO is with the primary activity and even discuss the margin percentage that the primary activity sets (5:4, 6:28). The project proposals contain how much funds the peripheral or project needs. This is where the stakeholders can directly influence the projects (9:37). These discussions are done upon approval of the proposal, and only when unexpected things happen can a renegotiation of resources happen. Then, a new proposal has to be proposed to the DAO. This happened with Attores, when they had to change certain parts of the proposal or specify certain aspects (6:34, 7:5) and do a revised webinar pitch (7:1).

Audits of the primary activities
Here, the distinction between the mentioned tangible and intangible projects is important. The tangible projects can be audited by whomever, whenever, since activities and revenue streams are directly encoded onto the Ethereum blockchain, as Kai Cheng illustrates: “I would say that having smart contracts as law, as a form of regulation, would limit anyone’s need to do spot checks on the codependent entity.” (10:26, 10:19). The GitHub of Digix and the projects provide clear insight in progress made in coding. GitHub is an open, online repository where
written code is documented. DigixGlobal, for instance, has its own GitHub\textsuperscript{24} (3:29). For intangible projects, for instance a marketing project, auditing cannot be done on the blockchain. At present, there are no right metrics to audit these projects (10:21). Kai Cheng notes: I think the only way to do it is to say that this budget gets you this amount of paid ads on Facebook and Twitter. This amount of budget gets you this amount of hits on this specific website” (10:21). In this sense, the marketing proposals would have to be specific enough to allow for open auditing by anyone. For instance, when a proposal is done to make DigixDAO a sponsor of a congress for branding purposes, anyone can audit whether this executed (10:21).

Internally, the smart contracts of the governance model of DigixDAO need to be audited extensively. ‘TheDAO’ also had their smart contracts audited, but failed (3:303). The DigixDAO smart contracts are simpler, since it has no split function (3:303). Auditing of smart contracts happens regularly. For instance, auditing the contracts for the ETC withdrawal is done by different parties and can take up to 45 days (8:81, 8:83).

4.3.6.2 Control – Coordination
To counter the oscillations caused by the interdependency of DGD holders being unexperienced or unable to use their DGD, suggestions about making a ‘play DAO’ or test a governance tool to practice voting/pledging and submitting proposals were done (3:196, 3:297). In this way, goals were set for coordination.

4.3.6.3 Coordination – Primary Activities
See paragraph 4.4.2 for the relation between Coordination and Primary Activities.

4.3.7 Adaptation group
4.3.7.1 Intelligence – Control
Generating finalized proposals for innovation
In the final stages of finalizing project proposals, all parts of the proposal have been thoroughly discussed, for example, through the webinars and different slack channels. The finalization of proposals for innovation happens in different iterations. For instance, the project proposal of Attores was revised after the first webinar pitch and discussions with the DigixDAO community members into a finalized proposal (7:3). Also, the ETC withdrawal proposal was open for feedback for a period of three weeks and then updated in accordance with received feedback (8:83). The milestones in the project proposals provide the goals for the peripherals to be reached. When these are reached, the accompanied funds from DigixDAO are allocated to the project (6:30, 9:38).

Proposals for innovation have to be finalized before they become primary activities of DigixDAO. This means that the moment the voting period starts, the proposals are formally finalized (9:38). Iterative steps are limited after the projects become primary processes, because a whole new proposal has to be proposed to DigixDAO to finalize the changed proposal. This

\textsuperscript{24} See https://github.com/digixglobal

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can be a long process, since only on a quarterly basis proposals to DigixDAO can be done. In this sense, the internal variety created from peripherals’ activities cannot be covered by the peripheral itself.

4.3.7.2 Policy- Intelligence & Control
Facilitating communication between Intelligence and Control

There are different ways through which communication is facilitated. First, a list of questions for pledgers exists to facilitate a guideline in possible points of discussion (4:3, 8:35). This guideline for DGD holders exist to enable DGD holders to ask questions about, for example, the demand for what is proposed, the fairness of the requested funds and the main aim of the project make, so that the DGD holders can make informed decisions (4:6, 4:17, 10:36). Second, the DigixGlobal team provides a platform framework for discussion and will lead out with simple ideas to help the discussion moving forward for both the DigixDAO and token holders (4:6). Third, the project teams and peripherals can setup a channel within Digix’s slack channel under their own name (6:33). The slack channel facilitates the discussion between different members of the DigixDAO community in order to “boost the entire speed and expedite every process of the peripheral” (4:20). Fourth, to discuss the proposal, the peripheral shares the project proposal through the live webinar (5:9). DigixGlobal hosts the webinars and facilitate peripherals to pitch in a webinar and make room for a question and answer session (8:16, 8:33). Fifth, a private pledgers group exists in the slack channel, where DGD holders reside and projects can present their plans (3:218, 5:9). Sixth, other mediums exist where people who are looking for developments in the environment and people who are looking at the possibilities for change inside of DigixDAO can communicate, such as Reddit, Bitcointalk and others (11:19).

Consolidating proposals for innovation

The process of consolidating the finalized proposals for innovation is summarized in figure 4.4. Founders and proposers (owning a badge), are allowed to submit proposals for ‘vetting’ by the other badge holders (8:23). A minimum number of badges need to be met in order for the project proposal to be valid, also known as ‘whitelisting’ the proposals (8:23, 11:21). The exact number is not yet set (9:26, 10:22). When a proposal does not make the cut within the set time frame, it will not be subjected to a vote by DGD holders. If approved, the ‘vetted proposals’ go to all the DGD holders for ‘pledging’ (8:24). If the minimum amount, also not yet set (9:26), of DGD holders vote for approval of the proposal, the funds required by the proposers is released to an address controlled by the default service provider (8:27, 9:38). This process is automated by using the governance smart contracts. For more in depth results on the governance aspect of this process, see subparagraph 4.5.3.
4.3.8 Others

4.3.8.1 Resonation

Each primary activity of DigixDAO is a project that conducts its own operations. Once funded by the DAO, the project receives funding to be fully able to deal with its own complexity. It might happen that a primary activity runs into unforeseen consequences, with which it cannot deal. For instance, if Attores cannot overcome certain technical challenges of one of their milestones and they need more funding to hire talented developers. Then, the project needs to update the members of DigixDAO and discuss plans for overcoming this issue. In this way, leftover complexity of primary activities is being attenuated at metasystemic Functions of DigixDAO.

According to Kai Cheng, the ideal way for peripherals, the tangible projects, would be that only parts of their operations should be funded by DigixDAO (10:31). More in particular, only the parts that directly grow the DGX ecosystem. For instance, MyEtherWallet\textsuperscript{25}, a tool for easily and securely interacting with the Ethereum blockchain, could be funded by DigixDAO to add DGX to their operations (10:31). “Projects like that, we are not fully funding, we fund parts of it or funds things that are working already.” (10:31). In this sense, MyEtherWallet would deal with most complexity itself.

\textsuperscript{25} \url{https://www.myetherwallet.com}
4.3.8.2 Algedonic mechanism
At present, all the funds of DigixDAO are located in an address controlled by DigixGlobal to enable adequate action when something devastating happens with DigixDAO or in its environment: “A security mechanism was built in to the original crowdfund contract for unforeseen situations such as a hard fork, which allows DigixGlobal to withdraw the crowdfund in the case of emergency.” (8:67, 10:33). The funds are in cold storage and DigixGlobal holds the private keys for this address (8:76). In the near future, this mechanism could be used for when something devastating happens with for instance the Ethereum blockchain or the development process of Digix or DigixDAO (8:74).

In the future, the funds are moved to a smart contract in DigixDAO’s governance system (10:33). Then, an algedonic mechanism is put in place where DigixDAO will be able to dissolve itself. This means it returns all the funds of DigixDAO proportionally to all DGD holders. The threshold for this mechanism to be activated will be around 80-85% of DGD holders voting in favor for this mechanism (9:12). This mechanism can be, for example, set in motion when two types of attacks happen. First, when an exploit of a bug in the code of the governance contracts of DigixDAO allow for a drainage of funds (11:19). Second, when a social attack is done. This means that malicious project proposers fool a majority of DGD holders into voting in favor for their project (11:19). DigixDAO can thereafter always be redeployed by hosting another crowdsale.

Whenever there is a catastrophic failure with one of the peripherals itself, DigixDAO’s smart contracts would not be directly affected (10:33). This is because peripherals are basically just sending DGX to the DigixDAO smart contract, and they would have to redeploy the contracts if something catastrophic happens on their end (10:33).

4.4 Infrastructure
Most descriptions of the infrastructural aspects of DigixDAO which in practice realize what the system is supposed to do, are already integrated on descriptions on the Functions in paragraph 4.2 and 4.3. However, several noteworthy aspects of the infrastructure of DigixDAO cannot directly be encompassed in the description of a Function. Therefore, these aspects are mentioned in this paragraph.

4.4.1 Human resources
As stated, the human resources part of DigixDAO is not the focus of this master thesis. No results are therefore presented in this subparagraph. In the discussion chapter, a suggestion for future research about the human resource aspect of the infrastructure is made.

4.4.2 Division of work
In DigixDAO, there are several tasks and responsibilities identifiable: proposing proposals, vetting proposals, whitelisting proposals, pledging to proposals, being the default service provider and managing project proposals. In this order, these tasks and responsibilities, the accompanied capacities required, and the allocation of the tasks to the capable personnel are hereafter discussed.
First, DigixDAO is an organization that allocates parts of a large pile of money to projects that grow the DGX ecosystem. Hence, the first task within DigixDAO is to propose proposals to DigixDAO. The proposers need to convince the DigixDAO that they are worthy to be funded (11:34). As discussed in subparagraph 4.3.2, these projects can be intangible or tangible and vary from peripherals such as Attores and Innocoin, to marketing and branding project proposals. The capacities required is an understanding of where DGX is necessary, useful or demanded in the cryptocurrency spheres. Additionally, knowledge about marketing, branding and all other possibilities to grow the DGX ecosystem is necessary. Then, access to and understanding of DigixDAO’s proposal system is required. These tasks are allocated to badge holders and founders of DigixDAO (10:39). Only they can officially propose proposals to DigixDAO and therefore need to have the mentioned capacities to do that. However, DGD holders or external parties might have adequate proposals as well that they want to propose to DigixDAO (10:40). Therefore, another nested responsibility for badge holders is to help these parties with shaping and proposing their proposals to DigixDAO (10:40).

Second, these project proposals need to be vetted to see whether these projects are in line with the goal of DigixDAO, have reasonable demands, are well thought-out and have realistic milestones. In a sense, the task is to ‘curate’ and give professional advice to project proposals (9:40, 10:37). The capacities necessary for doing this are having a sense for business, understanding financial budgets, having an involved attitude, knowing if a project is demanded and being critical. Vetting is allocated to badge holders (10:37, 11:20). However, not all badge holders might actively participate in the vetting process, as Shaun Djie illustrates: I’m thinking there will be a certain group of badge holders that will not be using their badges at all. That is simply too much work to do in that sense. And the reward that comes back to them is not a direct effect, it is not like immediately I pass a project I get paid for it. But in the sense that I pass a project, it creates a certain network effect, this creates volume or transaction fee that comes back to me eventually.” (9:42).

Third, the projects deemed suitable for being proposed to DigixDAO need to be whitelisted (11:20). This means that a vote is necessary to separate the wheat from the chaff. Projects that do not make the cut are canceled and good projects whitelisted. The capacity necessary for this is having a badge and knowing how to technically use it. Therefore, this task is allocated to badge holders. However, the DigixGlobal team has the privilege of proposing proposals without having them whitelisted first.

Fourth, once project proposals are whitelisted, all ins and outs of proposals have to be discussed. A checklist exist with aspects on which proposal are judged. Only when this is thoroughly done, can pledging be done. The required capacities are a sense of business and budgeting, being actively involved in discussions, asking questions, giving feedback and, most importantly, being able to vote rationally (9:40, 9:41, 12:426, 12:8) with the main tenant being to increase DGX adoption (10:35). Rational voting means to vote in ways to incentivize yourself and encourage responsible spending of DigixDAO’s funds (9:40). Furthermore, voting

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26 Source number 12 is the interview with Christopher Franco, who was interviewed as an expert on DAOs. This is a result in a general sense about DAOs, not in specifically about the case study that concerns DigixDAO and should be interpreted as such.
is done with DGDs, so a technical understanding of how to use Spectrum to vote is required (10:38, 11:23). These tasks are allocated to all DGD holders (10:35), badge holders (9:40) and founders. However, DGD holders might not be actively involved or available, as pledging can be considered real work (9:13, 10:30). Reasons for this vary from language barriers of investors, because knowing how to speak English is a necessary capacity, to even DGD holders being on vacation at the time of voting (9:13, 10:36). To incentivize DGD holders to pledge, the quarterly claim of revenue from the Digix platform will be directly tied into the pledging process (8:42). This means that only when DGD holders pledge, they receive the revenue in return for their work (8:42, 9:39): “why would you get a share of the reward if you’re not doing anything to make the DAO a better place or a better thing for the ecosystem?” (10:30). This resets every quarter (10:30).

Fifth, when a proposals is sufficiently pledged to, the respective amount of funds is automatically withdrawn from the DigixDAO smart contract to an external address. The automation itself cannot allocate the funds to the project proposers or judge when milestones are achieved. A service provider has to exist that takes on these tasks. Moreover, the service provider is tasked with preventing malicious attacks, fraud and misappropriation of funds (9:40, 10:9) and making sure that side issues are in order. Side issues are the non-essential tasks that exist in DigixDAO, such as hosting webinars, creating slack channels and writing up updates on progress at DigixGlobal and DigixDAO (8:34). At present, the default service provider is also tasked with keeping the funds of DigixDAO safe, building the governance smart contracts and, when ready, locking the funds away in these smart contracts (9:40). However, in terms of allocating funds to proposals when milestones are reached, the right metrics still have to be found (10:14). Negative ramifications might occur when the service provider decides that an intangible milestone is reached, but the DigixDAO disagrees (10:41). This means that it is not clear yet if the service provider will also serve as an Oracle (10:14). The default service provider is the DigixGlobal team, as explained in paragraph 4.3.3. DigixGlobal understands the systemic risks of individuals, and keep each other updated on their work, so that they can always take over another team member’s tasks (11:26).

Sixth, project proposals need to be managed, which is allocated to the parties mentioned in the specific project proposals. They need to be able to use the user interface to propose, if necessary, adjusted proposals after being already funded and keep communicating with DigixDAO about progress and reached milestones (9:44, 11:23).

The allocation of tasks and responsibilities to token holders (DGD holders), proposers (badge holders) and founders is summarized in figure 4.5. In the future, badge holders might have some perks over DGD holders (11:20). This is because the incentives between badge holders and DGD holders are not necessarily the same. As Chris Hitchcott states: “those that are holding a lot of badges, they might prefer to increase the utility of the badge, and therefore increase the value of the badge, whilst the DGD holders might want to increase the value of the DGD. But both of them together will mean that the badge holders can’t go full out of whack and the DGD holders can’t go full out of whack. So, whenever there’s not a complete alignment that will make friction that helps the overall system.” (11:21).
As stated, the thresholds for the amount of badges and the amount of pledged DGD necessary are not yet set in stone, as the right metrics still have to be found (10:16, 10:22). There are many variables that weigh in this issue, as it is also a matter of game theory. To find the right metrics, a learning by doing approach, in the form of starting with small projects, is taken on (10:7). Additionally, the user interface Spectrum is made modular to allow for experimenting (3:304). One metric, and possible hurdle, which arises with the pledging process is that DGD holders do not have to have any qualifications to own DGD, and therefore can also be considered ‘the man on the street’ (9:41). This means that not all DGD holders would have a business sense, understanding of organizational cost structures, knowing what kind of projects are necessary to grow the DGX ecosystem or even understanding the voting process (9:41). For instance, within the Slack channel many times DGD holders ask technical question about how to use their DGD or report that they lost their DGD due to technical inabilities (3:78, 3:155, 3:305). Sometimes even reports of DGD being stolen or lost are apparent in the Slack channels (3:309, 3:310). If they are not skilled enough to do this, they might not participate in voting (9:41). However, Chris Hitchcott does not see this as a potential hurdle, because he sees DGD as a sophisticated crypto investment product for which a high degree of participation and knowledge of the cryptocurrency ecosystem was necessary to invest in (11:23). This resulted in a very “tech savvy DGD holder base” (11:23).

4.4.3 Technologies
4.4.3.1 Technologies for realizing operations
The tangible projects will use open source smart contracts that weave parts of the revenue to DigixDAO’s governance contracts (11:25) and therefore to the DGD holders. For example, the revenue in the form of transaction fees on the Digix platform, are entirely settled on the Ethereum blockchain (4:10). This means that the fees do not first pass through a private database and therefore it doesn’t require anyone, neither the project team nor DigixGlobal, to manually delegate certain proportions of the gained revenue back to the DGD holders. This allocation of revenue all happens autonomously on the blockchain (4:10). In addition to using the Ethereum blockchain, tangible projects will use their own technologies for realizing operations. For instance, Attores uses binary options smart contracts to realize operations.
4.4.3.2 Technologies for regulating operations

Projects of DigixDAO will be regulated through a quarterly voting period. Before this period, badge holders whitelist and cancel proposals. There will be a queuing system from where badge holders whitelist the best, for instance ten, proposals (11:5). When the badge holders have whitelisted a set of proposals, a voting period for DGD holders starts. Even though it is not set in stone, this voting period will, most likely, contain three subsequent ‘windows’ (11:4). First, there will be a window where DGD holders can use their DGDs to rank the projects. This means that this voting window will contain several projects, for example ten, and the DGD holders need to order or ‘upvote’ their favored projects, similar to Reddit (11:4, 11:5). Chris Hitchcott illustrates that the DGD holders: “will be simply ranking the available proposals against each other and they can essentially spend their DGD on various different proposals within that window.” (11:4). This window will likely be open for a week (11:13). Second, there will be a period where the DGDs are locked, so that no one can change their votes. Third, there will be a reveal period, where the results of the voting are revealed. This window will also likely be open for one week, making the voting period a two week period in total (9:26, 11:13). The top three project proposals, for example, will then receive funding (11:5).

In the first window, at least one proposals that says ‘do nothing’ is included, to enable DGD holders who do not think that the window contains enough suitable projects to fund, to upvote the ‘do nothing’-proposals (11:4). The allocation of DGDs to the preferred projects will be done by an on-chain ballot. This means that in this voting window of, for instance, ten different proposals, DGD holders would need to say “I like this one 30% and this one 20% and then 10%, 10%, 5%, 0%, so you would allocate your voting ballot to a particular proposal and then once everyone’s done that, at the end they reveal and then you tally up the votes and whichever is in the top 3 will win.” (11:9). As stated in section 4.4.2.2 under ‘others’, it is not decided whether this period will be done ‘blind’ or with a ‘step down approach’ (11:11).

A key difference here with traditional shareholders, is that DGD holders digitally have to allocate their DGD to specific proposals (10:47). This process is, due to the transparent and immutable characteristics of blockchain technology, fraud resistant and openly auditable on the Ethereum blockchain. DGDs have attributes that are different from traditional shares, stocks or securities (10:47). DGDs are not just passive dividend tokens, as Kai Cheng illustrates: “It’s nothing you can define with what’s out there right now. (10:47). DGDs can be used to stake, vote and claim rewards (10:47). Moreover, you can trade DGDs in the same way you can trade Bitcoin, giving DGDs all the benefits that Bitcoin has.

Only when DGD holders participate in this voting system, will they be able to claim the rewards in the reveal window (11:4, 11:13). In this way, the voting system and the reward claiming system are linked together as the same system (11:4). The ‘do nothing’-proposal enables DGD holders to claim rewards by casting a ‘null vote’ (11:4).

The technology used for ‘vetting’ is sending the badges to a specific proxy address to indicate whether the badge holder approves or rejects the project (8:22). The sent badges are locked up for the duration of the ‘vetting period’-process, before they are returned (8:22). The
technological process of pledging for DGD holder is the same as for the badges; DGDs are sent to a proxy server to approve or reject the proposal for the period of time, before being returned to the sender (8:25). The DGD’s are locked for the time that the proposal is open, to avoid double spending (8:25).

In the future, Chris Hitchcott sees the adoption of ‘derivative contracts’. These are smart contracts where DGD holders can put their DGD in, and someone else claims the rewards during the voting period for them. In exchange, the creator of the derivative contract takes a small fee for doing this (11:4). This, again, makes it clear that the eventual technologies for regulating operations is not yet set in stone, as Chris Hitchcott puts it: “It really comes to when we actually implement the system. It’s going to be fairly long process of lots of like boarding. So, turning these generic ideas and crystalizing them into code can present limitations that maybe don’t soot the particular idea. Until that happens it’s difficult to confirm that it exists” (11:14).
5. Conclusion

A DAO is a new kind of organizational beast that has not been thoroughly described from an organizational point of view. This master thesis aims to bring the subject of DAOs into mainstream organizational literature and looks to answer the fundamental question one could ask about a new type of organization:

Can a Decentralized Autonomous Organization be a viable organization?

This exploratory, single case study uses the Viable System Model (VSM), which provides the organizational norms for being a viable organization, and combines these with an infrastructural aspect that realizes these norms. According to the norms set by the VSM, an organization should have primary activities if it is to be viable. At present, it can be concluded that DigixDAO cannot be considered a viable organization, because it has no primary activities. This is because the Digix platform is not yet ready and DigixDAO’s governance smart contracts are not yet in place. Therefore, DigixDAO is not able to fund projects that aim to grow the DGX ecosystem.

However, DigixDAO already exists for more than a year, so multiple possible project proposals are already lined up and waiting for the Digix platform to be finished. Within these proposals, a distinction can be made between tangible projects, which are primary activities that have their revenue streams directly encoded on the Ethereum blockchain and intangible projects, which revenues are more subjective. For example, a marketing project requires funds from DigixDAO, but its gains are not encoded in the blockchain. Subjective metrics need to be in place to judge whether the project executes what it promised, and the projects are therefore considered to be intangible. These project proposals, once approved and funded by DigixDAO, will be its primary activities. Taking these possible projects as primary activities in the description of its future viability amounted to results on all aspects of the VSM and descriptions of the infrastructure. From this perspective, five particularly interesting results were found.

First, the VSM states that primary activities have interdependencies that need to be coordinated. Coordination activities are necessary to prevent the interdependencies from causing disturbances. In DigixDAO, individuals or teams from all over the world propose project proposals to DigixDAO. The most logical way to coordinate these is through automated code. Project proposals have to stand alone in order to acquire funding by DigixDAO. Therefore, for the tangible projects in DigixDAO, the main interdependency would be a protocol level interdependency on the Ethereum blockchain. This means that projects are coordinated through automated smart contracts on the Ethereum blockchain, via the DigixDAO user interface called Spectrum. Revenue streams from the project are hard coded using smart contracts which can be checked at all times. In this way, projects cannot underbook profits or misrepresent the actual status of their project. This way of coordinating primary activities prevents fraud, because the code is law. In conclusion, the results showed that the interdependencies between the possible tangible primary activities of DigixDAO will be coordinated.

Second, the VSM states that an organization should audit the primary activities, because the information from the management of primary activities might not represent the actual status
of the primary activity. Traditionally, this is done by directly looking at what is going on at the ‘shop floor’. In DigixDAO, auditing primary activities can be done by anybody, because tangible projects will have their revenue streams and products directly encoded on the Ethereum blockchain. In this sense, the ‘shop floor’ is the Ethereum blockchain. The regular reports, which the management of a primary activity should provide, are continuously added to the blockchain. The open sourced code and revenue flows on the Ethereum blockchain simultaneously represent the reports and audits of a primary activity. In this way, reports from and audits of tangible primary activities of DigixDAO happen continuously and in a trustless manner. In conclusion, the results showed that regular reports from and auditing of tangible primary activities will happen in DigixDAO.

Third, according to the VSM, direct commands and resource bargaining between Control and the primary activities should happen in low detail and at regular intervals. In DigixDAO, project proposals have to be thoroughly described and vetted upon approval. This means that the majority of direct commands and resource bargaining happen, in high detail, before a project proposal becomes a primary activity. If something unforeseen happens, with a project, commands and renegotiation of resources happens before another proposal is submitted. In conclusion, the results showed that direct commands and resource bargaining happens in high detail before a proposal is formally submitted to DigixDAO.

Fourth, according to the VSM, an organization should look in its environment for developments and initiate plans for innovation. DigixDAO’s community, at present, consists out of several thousands of individuals around the globe. The DAO structure, eminently harnesses the ability of these individuals to look for relevant developments in the environment and enables them to initiate proposals for innovation. The stakeholders, badge and DGD holders, can directly and indirectly propose project proposals to DigixDAO. This creates a situation where the status quo of DigixDAO will be a continuously innovating system. Here, the limitation that DigixDAO has, is the amount of funds it contains. In its crowdsale, 5.5 million U.S. dollars were raised in Ethers. Due to the value increase of Ether, the internal value of DigixDAO, lies around 100 million U.S. dollars at present. This amount is not likely to be all spent in the near future. In conclusion, the results showed that the DAO structure can harness the full innovative power of its community.

Fifth, the VSM states that an organization should be able to finalize and consolidate proposals for innovation. In DigixDAO, two tiers exist: badge holders and DGD holders. The investors that invested over 15,000 U.S. dollars in the crowdsale received a badge. This badge allows them to propose proposals to DigixDAO and preselect which proposals are in line with the goal of DigixDAO. When the badge holders approve or ‘whitelist’ proposals, voting becomes open to all DGD holders. The mechanism of voting with DGD, called ‘pledging’, for project proposals happens on the Ethereum blockchain, making this a completely transparent and tamper proof system. Each DGD holder controls its own DGD in real time and together, they consolidate proposals for innovation. In this way, it can be stated that DigixDAO has more than a thousand bosses with a vote in the decision-making process. In conclusion, the results showed that consolidation of proposals for innovation is fraud resistant and happens transparently in DigixDAO.
The five mentioned conclusions concern positive or unique characteristics of DigixDAO. However, due to the fact that the DAO space is in unchartered water and since DigixDAO does not have primary activities at the moment, several possibilities for improvement are found.

5.1 Recommendations

5.1.1 Rebalance dependency on Ethereum
To absorb the variety created by Ethereum, it is recommended that DigixDAO rebalances the equation by reaching redundancy. As illustrated in the results, a large part of DigixDAO’s relevant environment is the Ethereum blockchain. At present, this blockchain is in rapid development which creates a lot of variety. DigixDAO can barely absorb this variety or deploy sufficient variety. The development of Ethereum and problems in its ecosystem, such as the ‘theDAO’-hack, have already led to a delay in the development of the governance structure of DigixDAO. One way to achieve redundancy is through Spectrum, the governance interface of DigixDAO. In the future, Spectrum can be used on Ethereum Virtual Machines of other blockchains if something happens to Ethereum. Another possible solution to acquire redundancy is to explore dual-blockchain technology, which allows cryptocurrencies to be dynamically interchangeable between blockchains (Sholom et al., 2017). If the variety caused by Ethereum is not dealt with, DigixDAO is not likely to pass for a viable organization.

5.1.2 Allow for change
In order to make the internal system of DigixDAO ready for change, the Digix platform and DigixDAO’s governance structure should be put in place. The delay of the Digix platform and the deployment of the DigixDAO governance smart contracts has led to a lot of unused potential for change. The internal funds of DigixDAO cannot be used to fund any project and many branding and marketing opportunities have passed. Moreover, peripherals such as the Attores and Innocoin projects have moved on to focus on other business ideas or are no longer in existence. To prevent this, peripherals and projects should only propose their proposals through webinars or other channels, when the governance structure-release date is clear.

When the governance structure is in place, it is likely that there will be unused potential for change as well. It is recommended that a mechanism should be thought of to allow projects to receive immediate funding when necessary. In the planned governance structure, project teams or individuals will only be able to propose their proposals to DigixDAO on a quarterly basis. This means that whenever opportunities for change arise in between these periods, DigixDAO will not be able to respond. Moreover, when project teams encounter problems or see additional possibilities, they can only ask for more funding on a quarterly basis. This will lead to situations where project teams can no longer deal with their own variety. A possible mechanism is that DigixDAO could group similar projects together, for instance marketing projects, and create a subDAO with the sole purpose to market. This subDAO would have to make a quarterly proposal to DigixDAO for the expected marketing funds, and all the stakeholders in that subDAO would be able to set a voting period with a higher interval. This creates a situation where DigixDAO would be able to allow for change by being able to quickly respond to problems and opportunities.
5.1.3 Coordinate intangible projects
It is recommended to find the right metrics to coordinate the intangible projects of DigixDAO. The default service provider of DigixDAO allocated funds to teams of intangible projects when certain milestones are achieved. However, when milestones are intangible, someone has to decide when a milestone is reached. This might cause problems when the default service provider allocates the funds, but DigixDAO does not think the milestones are reached. A possible solution is to only allow small intangible projects to be proposed to DigixDAO. These projects should have easy to identify results or milestones, so that there can be no uncertainty about whether the project should receive the proportionate funding.

5.1.4 Clarify relation DigixDAO - DigixGlobal
There occasionally seems to be a discrepancy between the perceived relation between DigixDAO and DigixGlobal. On the one hand, DigixGlobal states that they have a 1:1 relationship with DigixDAO. This means that DigixDAO will dissolve if the DAO decides that DigixGlobal is not capable as the default service provider. On the other hand, DigixDAO’s community members believe the default service provider can be replaced without DigixDAO having to dissolve. From the conducted interviews, it appears that the latter scenario is possible, but would involve unknown risk and problems with coordination efforts. Because, for instance, the private keys of the DigixGlobal team would have to be physically transferred to a new service provider. It is recommended to clarify the relation between DigixDAO and DigixGlobal and to concretize the process of transferring to another default service provider.

5.1.5 Find right metrics and create best practices
The DAO structure is a new way of harnessing the innovative power of a community, who together consolidate plans for innovation in a transparent and fraud resistant way. However, presently, it is unknown how many badge holders and DGD holders will actively be involved in vetting, whitelisting, and eventually voting proposals. How does one get all these badge and DGD holders, to actively vote on what projects should be funded and what projects are not? As previously shown, DGDs are not the same as traditional shares. Various reasons for DGD holders to not always or never participate in the voting process were found, amongst which: DGD holders lose access to their DGD, are not technically savvy enough to use them, have their DGD on exchanges for trading purposes, are not able or available to vote during the voting periods and only participated in the crowdsale of DigixDAO for investment purposes. Therefore, it is unknown what thresholds should be set for the amount of votes a proposal requires to get funding. The threshold should not be too high, because no project would ever be approved. It also should not be too low, because this would lead to an unsustainable drainage of funds. This is a matter of game theory, for which the right metrics have to be found. This is terra incognita and no best practices exist. In addition to the conservative approach of learning by doing, by starting with simple proposals and learn from the behavior of DigixDAO, it is recommended that DigixDAO seeks to learn from other DAOs as well. Together with other DAOs, by learning from trial and error, best practices might be acquired.
5.1.6 Communicate mission DigixDAO
Finally, a general recommendation to DigixDAO is to communicate the ideology and mission behind the DigixDAO more often. Only in one Medium blog post is this explained. This message should be repeated more often to strengthen the relationship of DigixDAO with its direct environment, creating more interest in the DAO and attract more likeminded individuals.

In conclusion, according to the norms set by the VSM, DigixDAO cannot be seen as a viable organization at present. It does have the potential of being a viable organization when the governance system is in place. However, many lessons have to be learned and many metrics have to be discovered in order for DigixDAO to live up to the potential that is ascribed to DAOs, as is described in the introduction of this master thesis. Then, DigixDAO might prove to be a revolutionary organizational beast, with unique characteristics made available by blockchain technology.
6. Discussion

This master thesis is, to the best of the knowledge of the researcher, the first empirical study on a specific DAO. Therefore, little to none best practices or rules of thumb exist in studying these new organizational beasts. In this chapter, strengths, limitations and implications of this master thesis are discussed. Additionally, since the novelty of this type of organization, many theoretical recommendations for future research are given. Reflections on both the literature and method used are provided. Finally, as the researcher plays a large role in qualitative research, reflexivity is discussed.

6.1 Strengths, limitations and practical implications

6.1.1 Strengths and practical implications

The major strength of this research is the scientific contribution of tying organizational science together with the blockchain ecosystem in the form of DAOs. This research provides an insight into an, up to now, unexplored technical ecosystem from an organizational point of view. Additionally, this master thesis can serve as the basis for future organizational scientists to explore the concept of DAOs.

The second strength is the high degree of practical relevance and implications of this master thesis for DigixDAO. Since the governance structure of DigixDAO is not yet in place, many metrics and issues have to be figured out. Not only does this research provide an overview of possible improvements to DigixDAO, it also sheds light on this phenomenon from a new perspective which provides new insights. DigixGlobal, the team that is building the governance structure, can use the recommendations to (re)design DigixDAO or start an actual diagnosis, which will benefit DigixDAO.

Third, the VSM is often described as difficult to use in practice, due to the large amount of complexities and subtleties (Espejo et al., 1999). For time constrained-practitioners, as was the case in this master thesis, this puts the use of the VSM as a disadvantage to more interpretative approaches (Preece, Shaw & Hayashi, 2013). This might lead to flaws or misinterpretations in the analysis of this thesis. The work of Espejo is seen as a more digestible interpretation of the VSM (Preece, Shaw & Hayashi, 2013). Therefore, the researcher of this master thesis tried to minimize these flaws by choosing the description of Achterbergh and Vriens (2010) of the VSM, who combined the works of Beer with the work of Espejo.

Fourth, the methodological aspect of selecting the right sources is a strength of this master thesis. The researcher purposefully invested in DigixDAO, and therefore has knowledge about its origin, the people involved, the channels of communication this ecosystem uses and the location of relevant documents. Consequently, the richest sources could be found, adding to the quality of this master thesis.

Fifth, in addition to the previous point, a strength of this research is the amount of data gathered and analyzed for this master thesis. Multiple sources from multiple perspectives are used, which led to a rich and detailed image of the phenomenon under study.
6.1.2 Limitations
This master thesis contains several limitations. First, the researcher of this master thesis is trained in understanding the theory of cybernetics and the VSM, but not an experienced practitioner. The VSM is in the hands of a skilled user a fast and precise tool for looking at organizations (Hoverstadt & Bowling, 2002). Due to the inexperience of the researcher, interpretations in this master thesis can be subject to flaws and results might lack depth from a cybernetical point of view. To prevent this as much as possible, the researcher divided the analysis into different phases. Therefore, lessons could be learned about how the VSM is put to practice and initial, erroneous interpretations could be altered. Moreover, the researcher consulted with experienced professors to enhance the understanding of the VSM.

Third, due to time restrictions and logistical difficulties, a limitation of this study is that the researcher did not physically go to Singapore to research the DigixDAO or its possible peripherals. This limits the choice and possibly the usability of the VSM in this master thesis, because Stafford Beer conducted research in practice to describe an organization with the VSM. However, this does not hold up since the DigixDAO is an entity that lives on the internet and therefore does not have a physical location. However, DigixGlobal and possible peripherals do have a physical office, which are described in the result section and the appendix 2 of this master thesis. Therefore, descriptions on the DigixGlobal team, who manage the Digix platform, and the peripherals are limited, since the researcher was unable to visit the physical locations where they operate.

Fourth, due to the development of the Digix 2.0 platform and DigixDAO not being finished, a hypothetical approach had to be taken to describe the primary activities of the DigixDAO. This means that the VSM was applied by describing possible primary activities instead of actual primary activities. The Digix 2.0 platform and the governance structure for the DAO were considered to be ready shortly after the crowdsale. Possible primary activities, in the form of project proposals and peripherals, are lined up since then. Fortunately, these possible primary activities could be used as primary activities so that a description on all Functions and their interdependencies could be acquired. However, this is a large limitation, as, for example, possible unknown interdependencies between primary activities could come up when the primary activities are operationally ready.

Following on the previous limitation, fifth, a possible weakness of this study is the uncertainty of the interviewees in describing what DigixDAO’s governance structure will look like. The governance contracts are not in place yet, and many metrics have to be figured out beforehand. This led to results being hypothetical, especially the infrastructural part. In using the results of this master thesis for further research, the researcher advices to double check the information with the actual status of DigixDAO at that time in the future.

A sixth limitation, even though also a strength of this master thesis, is that the researcher is a DGD holder himself. This means that the researcher has a monetary motivation or incentive to describe DigixDAO in an overly possible way. Additionally, due to time restrictions and because no other researcher with the same knowledge about the subject matter was available, only the researcher has coded the sources. This makes that no conclusions can be drawn regarding inter-coder reliability: there has been only one coder. The researcher reflects on this role in paragraph 6.5.
A seventh, and last, limitation is that the researcher is not a technically trained scientist. This might have led to an oversimplification of or inaccuracy in explaining the technical parts of DigixDAO. To prevent this from happening as much as possible, the researcher challenged his own understanding of technicalities with the DigixGlobal team, or whenever his personal expertise fell short, used the words of these team members to explain techniques. Additionally, the researcher acknowledges that it is uncertain whether the recommendations provided in the conclusion are all technically feasible.

6.2 Theoretical recommendations

A DAO is a new type of organization. The implications of the results and conclusions of this master thesis are yet to be discovered. There are many possibilities for future research on this new organizational beast, which are necessary to explore the characteristics and societal implications of the phenomenon of DAOs. In this paragraph, first, the author provides two theoretical recommendations for future research which directly follow from present research. Also, several stand-alone options for future research are provided. Finally, the author wants to add to the scientific discourse about what defines a DAO by comparing existing views.

Future research should study DigixDAO when its governance structure is in place and it has actual primary activities in the form of funded projects. Then, a new conclusion on whether DigixDAO can be a viable organization can be formed. Additionally, similar studies, as the current study, should be conducted on other DAOs, such as Dash, Wings, the Expanse DAO and others. These future case studies can learn from the reflection on the literature and method used in this master thesis, as explained in the following paragraphs. Eventually, a metastudy should compare and integrate the results of different case studies into one.

Additionally, the present study should be repeated on the level of recursion of the company DigixGlobal and the Digix trading platform. In particular, it is interesting to look at the coordination activities of the Digix platform, since these appear to be automated in code and once deployed, do not have to be altered. From there, it is worth looking into whether the current description of ‘coordination activities’ of the VSM, which are necessary for viability, still hold. Also, individual primary activities, either peripherals or other projects, of DigixDAO should be the focus of a similar study.

As stated in the introduction of this master thesis, a lot of potential is ascribed to blockchain technology and its applications such as DAOs. ‘Disruptive’ is a word that is often used to describe this phenomenon. More research is necessary on future applications of DAOs and where DAOs could benefit society at large. Also, more research is necessary to look at whether a DAO in particular, or other blockchain applications in general, contain the right features or have the right conditions to have a disruptive influence on the world. Therefore, in future research the works of ‘innovation guru Clayton Christensen could be used as a lens to look at the disruptive potential of DAOs and blockchain technology (Christensen, Horn & Johnson, 2008). Additionally, in order to look at the acceptance of DAO structures in society, future research should apply a technology acceptance model (Davis, 1986) on blockchain based governance systems in organizations. This should be done similar to the study of Folkinshteyn
and Lennon (2016) on the general acceptance of Bitcoin as a currency and Blockchain as a financial technology.

In the introduction of this master thesis, the following definition of a DAO was provided: “it is an entity that lives on the internet and exists autonomously, but also heavily relies on hiring individuals to perform certain tasks that the automation itself cannot do” (Buterin, 2014, p.7). This definition applies to DigixDAO in the sense that DigixDAO needs individuals or teams to manage projects, and because it needs a default service provider. The DigixGlobal team acts as the default service provider. Here, the infrastructural aspect of human resources becomes interesting, on which a closer look should be taken in future research. However, at present, DigixDAO does not exist autonomously. This is because DigixGlobal is taking a conservative and centralized approach to building the DigixDAO governance structure. DigixGlobal is making the code modular with the ability to change and upgrade the code safely. This is in sharp contrast with a statement from the introduction which said that after creation, a DAO does not necessarily need its creators to survive (Wright & De Filippi, 2015). Does this mean that DigixDAO, at present, is not a real DAO, since it needs the DigixGlobal team to finish its governance structure? Or are there unexplored paths to becoming a DAO? Further research is necessary to answer these questions. Moreover, future organizational research should try to classify DAOs in existing organizational configurations, for instance, based on the work of Mintzberg (1980) or Mowshowitz (1997). If DAOs appear to not fit in any known organizational type, a new class should be developed.

**Contribution to scientific discourse of what a DAO is**

More research is necessary on the difference between ‘Decentralized Autonomous Organizations’, ‘Distributed Autonomous Organizations’ and ‘Decentralized Autonomous Corporations (or Companies)’. As shown in the results of this master thesis, the first two terms are used interchangeably to depict DigixDAO. It seems that these names are referring to the same phenomenon and ‘Decentralized’ is simply the most used and accepted term. Furthermore, in scientific research there is the difference between the use of Organizations and Corporations, or in short DAOs and DACs. Glazer and Bezzenberger (2015) have created a taxonomy for looking at the new entities that the realm of cryptocurrency has brought. They state that the difference between a DAO and a DAC is that a DAO’s community is tiered, and a DAC’s community is centralized. However, Buterin (2014) states that the difference is that a DAC pays dividends and a DAO is non-profit. Buterin (2014) does state that people can make money in a DAO by participating in its ecosystem, but not by investing into the DAO itself. Glazer and Bezzenberger (2015) and Buterin (2014) seem to agree that DACs are a subclass of DAOs, but they differ in their argumentation.

Here, the author of this master thesis wants to add to this scientific discourse by providing a reasoning about the class that DigixDAO belongs to. This is done through a combination of the reasonings of Glazer and Bezzenberger (2015) and Buterin (2014).

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27 The term Corporations prevails in literature over the term Companies, hence only Corporations is used.
Based on the findings of this master thesis, DigixDAO can be depicted as having a tiered community. Everyone is able to join and participate in this community, but the channels are hosted by centralized parties such as DigixGlobal, which makes the community tiered. Additionally, there are different levels of shareholders with different levels of privileges; badge holders have more privileges and therefore more influence than DGD holders. In contrast, it can also be argued that DigixDAO’s community is centralized, based on the large and essential presence of DigixGlobal. However, due to the openness created by the DigixGlobal team, the community as a whole can be seen as tiered. In this sense, the single case study of this master thesis provides evidence for DigixDAO to fall under the DAO category of the taxonomy of Glazer and Bezzenberger (2015), regarding the community characteristic.

However, under Buterin’s (2014) description, DigixDAO would be classified as a DAC, since DigixDAO will pay dividends in the form of DGX to the DGD holders. Buterin (2014) notes that the difference between DAOs and DACs is a murky one. He reasons that DAOs will inevitably look like DACs, because the value of the internal capital of a DAO can go up if the DAO becomes more powerful or popular. DigixDAO’s internal capital has grown in value over time, and is currently not yet paying dividends. This means that, presently, evidence from this single case study shares DigixDAO under the DAO category, but DigixDAO is intended to be a DAC under the argumentation of Buterin.

In summary, at present, DigixDAO falls under the DAO category, but a new dimension that describes the profitability characteristics of the DAO/DAC could be added to the taxonomy of Glazer and Bezzenberger, since the reasoning of Buterin would categorize DigixDAO as being intended as a DAC. More research needs to be done to clearly separate DAOs from DACs, in order for this scientific discourse to mature.

6.3 Reflection on literature used
Two literature studies have been conducted for this master thesis. First, to explore the existing research on blockchain technology and Decentralized Autonomous Organizations. Second, to find a suitable model to describe the viability of this phenomenon and what it looks like on the level of its infrastructure. In this order, a reflection on the literature used is given.

In preparation for this master thesis, multiple sources were used to acquire an understanding of the concepts involved in the DAO space. These sources were mostly technical, albeit some were more general. The works of Swan (2015a) and Wright and De Filippi (2015) in particular, helped with acquiring an initial understanding of the concepts surrounding a DAO.

In the introduction of this thesis, the work of Jentzch (2016) has been cited. A critical view should be taken while interpreting his work, because he describes the failed ‘theDAO’, wherefrom the quality of his work can be questioned. However, this was, to the best of the knowledge of the author, the first worked out paper on what an actual DAO should look like. Therefore, his work is referenced in the introduction of this master thesis.

The author of this master thesis has repeatedly put that, to the best of his knowledge, little to no research exists on DAOs from an organizational point of view. The researcher acknowledges that time has passed since the start of this master thesis, and that the bulk of literature from this point of view has undoubtedly grown. Additionally, research which the
author was not aware of or had no access to might have already existed. Future research should reference to these claims with care, and practice due diligence.

This master thesis used the VSM as norms for organizational viability and combined it with an infrastructural aspect, because it is the infrastructure that expresses what the system does. The VSM was particularly useful, because it allowed for identifying different levels of recursion by looking at what the system in focus is. If this was not done in this master thesis, the descriptions in the results on the metasystemic Functions would have had overlap between recursions. Now, the three different levels of recursion (DigixDAO, Digix, and the relation between Digix, DigixGlobal and DigixDAO) could be distinguished. Descriptions on the level of recursion of the latter two are given in appendix 2. Using the VSM allowed for this distinction between levels of recursion to be found so precise and early.

One could ask the question whether a relatively old model such as the VSM can still be used for new types of organizations, such as DAOs. As shown in the second chapter of this master thesis, many authors have contributed to the development of the VSM over the years. At present, the theoretical claim of the VSM still holds, and all systems can be viewed through its rhetoric. However, the VSM proved challenging to use in some aspects of this master thesis. For instance, the problematic environment, which is the future that DigixDAO is obliged to shape, can be seen as the future primary activities of DigixDAO. Projects shape the future and directly stem from the problematic environment. Since DigixDAO does not do anything at present, the future primary activities and the problematic environment proved difficult to distinguish.

In light of the novelty of the phenomenon of DAOs, the, relatively old, VSM might not have been the best choice for describing DigixDAO. The development of DigixDAO is dynamic and infrastructural choices change rapidly. The expression of Functions might therefore also be dynamic, making it difficult to accurately describe the viability of DigixDAO through the VSM. Moreover, the VSM does set the norms for viability, but the recognizable Functions in DigixDAO seem to overlap, as shown above. Additionally, the VSM states that an organization should have primary activities. Peculiarly, DigixDAO can exist and grow without actually ever doing anything. DigixGlobal creates and manages the Digix 2.0 platform, from which the DAO reaps parts of its revenue through automated smart contracts on the blockchain. This can be considered as ‘free money’ or ‘passive income’ for the DGD holders. They could be incentivized to never accept a proposal. This is a trade-off, because funding projects might lead to more revenue for the DAO. In a sense, this DAO does not need to have primary activities to exist, does it mean it is then not a viable organization or entity? More research need to be done on the theoretical claims of the VSM in describing the new organizational form of DAOs.

6.4 Reflection on method used

6.4.1 Operationalization
The description of the VSM by Achterbergh and Vriens (2010a) was used to operationalize the VSM, because some form of standardization was necessary in analyzing the bulk of data. Following their narrative, the first, second and third order codes were created. In hindsight, this was not ideal for two reasons. First, the five Functions and the realization and adaption group
overlap. For instance, a part of the realization group consists of the interdependency between coordination and the primary activities. However, this interdependency differs little from the Coordination Function. This resulted in similar descriptions in the results section. Second, this also holds up for the Policy Function in relation to the adaptation group. To distinguish these from each other, the Policy Function was operationalized as the problems that could limit the organization’s viability. These overlaps between the realization and adaptation group and the individual Functions led to difficulties in allocating the right codes to the right parts of sources. In subsequent research, due diligence must be practiced into using the operationalization of the VSM of this master thesis. If this research is repeated, the researcher suggests to, for example, encompass all five Functions and their characteristics directly into the realization and adaptation group.

In the Coordination Function, many more possible interdependencies and coordination activities exist than have been included in the operationalization of this master thesis. For instance, in the research of Leonard (2009) a longer list is provided. To include all possibilities in the operationalization would be inefficient and demand too much of the analytical skills of the researcher. Therefore, a category ‘others’ was added in the operationalization. This made the analysis uncluttered.

6.4.2 Sources
In the cryptocurrency ecosystem many sources are present. However, there are no guidelines or rules of thumb for choosing the richest sources. Here, the author wants to provide a short reflection on the knowledge sources used in this master thesis, so that future researchers can more easily choose their dataset.

The researcher’s expectation of the content of the knowledge sources was somewhat different than the result. The researcher thought the richest data would be gathered from the Slack channel and the Medium blog posts. However, in hindsight, this was not the case for the Slack channel. The channels certainly provided valuable insights across the Functions and specifically into the communication of the community, but these were also the largest sources and therefore the most time consuming sources to analyze. In future research, a more prudent approach should be taken in using channels within a community’s Slack channel as knowledge sources. The Medium blog posts and the webinars proved to be the richest knowledge sources. The white paper, in this case, mostly contained information on the level of recursion of the Digix trading platform instead of on DigixDAO. Finally, the press releases repeated information that was already in the Medium blog posts and were written by third parties, so were minimally used in the analysis.

The data sources proved to be very useful. Selecting the DigixGlobal team was a good choice for detailed explanations of DigixDAO, because from the results it appeared that the DigixGlobal team are considered to be the ‘parents’ of DigixDAO. Interviewing community members, badge holders and DGD holders alike, could lead to having more rich sources from different angles as well.

Therefore, in future research, it is recommended to include the DigixGlobal team’s blog updates, the webinars, the white paper, the website, practice due diligence into including -parts of- the slack channel and interview the development team and initiators of the DAO.
6.4.3 Procedure
In hindsight, the researcher would suggest another order of analysis of the knowledge sources, since the website, whitepaper and slack channel provided richer information about DigixGlobal and Digix, but little about DigixDAO. The used order did allow for an identification of the system in focus, but when the webinars and medium blog posts would have been analyzed first, the process of identifying the exact system in focus would have been quicker.

Splitting the procedure in three phases proved to be adequate for the learning process of the researcher. In phase two, the researcher was able to code efficiently and less codes had to be altered after revaluation. Additionally, the amount of codes in phase two is significantly less than in phase one, showing the ability to code more effectively. After phase two, the codes from phase one were adjusted where necessary to receive more accurate results.

However, in future research, the researcher would start by conducting interviews. It can be said that the interviews would have provided more initial rich information to define the exact system in focus and how DigixDAO is related to Digix and DigixGlobal. The researcher spent, unfortunately, much time on this process that could have been avoided by interviewing first, notwithstanding that in the final phase interviews were necessary. If the agendas of the interviewees allow for it, conducting interviews both before and after the analysis of the knowledge sources would have been ideal.

6.5 Reflexivity
The term reflexivity encompasses a sense of deep awareness of the researcher’s role in conducting research and how this influenced the research process and results (Haynes, 2012).

Choosing the subject of DAOs for my master thesis stemmed from a passion for how decentralized systems could prove to be solutions for problems caused by excessive centralization, such as secrecy, corruption and fraud sensitivity. In Bitcoin, Ethereum and the accompanied blockchain technology I found a possible materialization of decentralized systems. I wanted to contribute to this space as well. However, I am not trained in the techniques that these systems use. Therefore, choosing DAOs as the subject of my master thesis is my way of contributing to this space. The passion for this subject and my underlying assumptions could have led to a presence of myself, as a researcher, in the research process and results.

First, subconsciously, I might have been tended to describe DigixDAO in a more favorable way than it actually is. This is because I would like to see that decentralized and autonomous organizations work, since I believe they might have a very positive influence on the world. In some way, this connection with the subject matter might have led to an overly positive description of DigixDAO. However, the researcher has been aware of this role from the very start and tried to minimize the influence this had on the research process and results.

Second, in addition to the previous point, I am a DGD holder and therefore have a monetary incentive and interest in DigixDAO being a viable organization. This also might have led to an overly positive description of DigixDAO. However, I think the cryptocurrency ecosystem is known for its critical stance on developments and its attitude of always looking for improvements. I like to think that I have this stance as well. The best thing this research could have brought forward was large problems or inabilities for DigixDAO to be considered
a viable organization. Because, by finding out flaws, we can improve it. Therefore, I think I was extra motivated to find flaws in DigixDAO following from the description of the VSM.

Third and last, I had a large influence in the interviews, due to unbalanced knowledge about the VSM and the infrastructure. During the first interview, I realized that I sometimes guided the interviewee too much in the direction of aspects of the VSM, which led to the interviewee not being able to speak freely. This may have caused the first interview to be of lesser quality than the others.
References


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Wilt, J. de (s4034627)
Glossary

In this glossary, terms and abbreviations of this master thesis that are newly introduced, uncommon or specialized are alphabetically listed and defined.

AML – anti money laundering
API – application programming interface
Blockchain – a distributed database for recording the transactions of an asset independently and chronologically in subsequent ‘blocks’
Bitcoin – the first decentralized, digital currency also known as a cryptocurrency
Crowdsale – a way to raise funds for a project in the cryptocurrency ecosystem, comparable to a traditional stock ‘initial public offering’
Cryptocurrency – a digital medium of exchange such as Bitcoin or Ether that uses cryptography to secure transactions and regulate the output of new units of the particular cryptocurrency
Cybernetics – the study of effective organization
DGDA – stake or ‘share’ in DigixDAO that investors received in return for investing
DGDb – a badge, provided to investors who invested 15,000 U.S. dollars or more into the crowdsale of DigixDAO, that allows for proposing proposals to DigixDAO and vetting other proposals
DGX – gold backed cryptocurrency
Digix (2.0) – trading platform for DGX
DigixDAO – DAO to grow the DGX ecosystem
DigixGlobal – private company that deals in gold bullion
ETA – estimated time of arrival
ETC – the denomination for Ether Classic, the cryptocurrency of the Ethereum Classic blockchain
ETH – the denomination for Ether, the cryptocurrency of the Ethereum blockchain
Ethereum – a blockchain with a built in programming language that allows for the creation of smart contracts
Ethers – cryptocurrency of the Ethereum blockchain
DAO – decentralized autonomous organization
Dapp – decentralized application made possible by smart contracts
GitHub – online repository of software
Initial token offering – see ‘crowdsale’
ICO – initial coin offering
KYC – know your customer
Lightwallet - provides a full spectrum of tools in a user interface to interact with a certain blockchain
Mist – Ethereum blockchain interface / wallet
Peripherals - project teams or startups that are not directly linked to the DigixGlobal team and have project proposals that have a direct incentive to DGD holders
Proof of stake – a consensus algorithm for validating transactions and creating new coins for a blockchain
Ropsten – Ethereum’s former testnet
Smart contracts – blockchain based, self-executable contracts
Solidity – internal programming language of Ethereum
Spectrum – user interface for the Digix platform and governance structure of DigixDAO
Testnet – a test environment parallel to a blockchain
VSM – Viable System Model
White paper – scientific documentation of a cryptocurrency