Blockchain business networks
Understanding the value proposal within centralized and decentralized governance structures

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PREFACE

This study represents the master thesis of Hampus Carlson and Isak Lejon, the final stage of our master’s program in Industrial Engineering and Management with specialization in Innovation and Strategic Business Development. Using our knowledge and experience gained through all courses taken at Luleå University of Technology we have provided practical and theoretical contributions through this study within decentralized blockchain business networks. This had not been possible without the support from our two supervisors.

Firstly, Jeaneth Johansson whose valuable advice within research methodology and feedback during our study has been critical for the completion of this study. Secondly, Johan Toll whose expertise within blockchain and engagement in our project has been truly unprecedented and an invaluable addition to our study. Thank you for educating, challenging and supporting us during our master thesis. We are also very grateful for the generosity of our client company who has hosted us and introduced us to a new world within the financial industry. The welcoming culture helped us finding the right expertise and quickly made us feel a like part of the organization. Finally, we want to thank all the respondent attending our interviews and workshop whose input was the building blocks for this study.

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ABSTRACT

Purpose – increasing the understanding of what distinguish a decentralized from a centralized blockchain business network and identify its value creating mechanisms. To fulfill this research purpose, three research questions have been derived, RQ1: What distinguishes a decentralized from a centralized blockchain business network?, RQ2: How are the blockchain business network values affected by a decentralized vs centralized network model? and RQ3: Which value creating mechanisms exists within decentralized blockchain networks?

Method – This study was conducted as an abductive explorative study with interviews of actors that works with their own blockchain or is an expert in the subject, respondents from 9 different industries were participating. In total 25 interviews were held in two phases and they were together with a workshop analyzed through a thematic analysis.

Findings – The findings from the study resulted in a framework including four separate areas, namely, Governance models, Blockchain values, Business network values and Value creating mechanisms. There were three governance modes, Lead organization, Network administrative organization and Participant owned organization. Furthermore, this study has resulted in 12 blockchain values, 11 network values and 9 value creating mechanisms.

Theoretical and practical implications – This study gives an answer to the question what distinguish the decentralized and centralized nature of a blockchain business network, stating that the most value critical factor is the choice of network governance model. Furthermore, additional examples of blockchain and network values have been presented and those values have been analyzed through three different governance models. Also, the 9 value creating mechanisms have been described and analyzed from a decentralized blockchain network perspective. The practical implications give managers insight of which value creating mechanisms that exists for a decentralized blockchain business network, an understanding that could help them decide on if blockchain fits their business needs or not. Lastly, by providing an overview of which the strengths and weaknesses are of different governance models for a blockchain business network, managers could better align their network governance.

Limitations and future research – Due to the explorative nature of this study these frameworks and relationships are built from our research and will need future validation from similar study to test its applicability in a larger extent. Hence, future studies with these frameworks and matrices as reference point would be interesting.

Keywords: Blockchain Business Networks; Centralized; Decentralized; Blockchain value proposal; Governance models
Table of Contents

1. INTRODUCTION .............................................................................................................1
   1.1 Digital transformation introduced to blockchain .......................................................1
   1.2 Problems with legacy businesses implementing blockchain ..................................3
      1.2.1 Issues arising when blockchain is entering businesses .................................3
      1.2.2 Enthusiasts lead the development leaving academics and corporations behind. 5
      1.2.3 A knowledge gap surrounded of well-established topics ...............................6
   1.3 Research purpose and research questions ..............................................................6

2. LITTERATURE REVIEW .................................................................................................9
   2.1 The hard and soft configurations of a blockchain business network .....................9
      2.1.1 The search for a distinction between blockchain structures .............................9
      2.1.2 Distinguishing blockchains as public, private, permissioned and permissioned-less ........................................................................................................10
   2.2 New value proposals with business networks and platforms ...............................11
      2.2.1 Value creating through platform business modeling .......................................12
   2.3 Increasing the value proposal by decentralizing ......................................................13
      2.3.1 Distinguishing networks as open or closed ....................................................13
   2.4 Trust in the blockchain offer ..................................................................................14
      2.4.1 Types of trust ...................................................................................................14
      2.4.2 Reasons for why an actor trusts another actor ...............................................15
      2.4.3 Concluding remarks on trust .........................................................................15
   2.5 Governance ...............................................................................................................16
      2.5.1 Organizational versus network governance .....................................................16
      2.5.2 Business network governance .......................................................................16
      2.5.3 Concluding remarks on governance ..............................................................18

3. METHOD .........................................................................................................................19
   3.1 Choosing an explorative abductive approach ..........................................................19
   3.2 Research process divided in three phases .............................................................19
   3.3 Collection of data through interviews, workshop and internal documents .............21
      3.3.1 Interviews, the primary source of data ............................................................21
      3.3.2 Validating concept through a blockchain expert workshop ............................22
      3.3.3 Other forms of complimenting primary data ..................................................23
3.4 Data analysis .................................................................................................................. 23
  3.4.1 Building the foundation of the concept with thematic analysis ............. 24
3.5 Quality improvement measures .................................................................................... 26
4. RESULTS AND ANALYSIS ..................................................................................... 29
  4.1 Network structure ...................................................................................................... 30
    4.1.1 Mapping the roles on to a centralized to decentralized scale .......... 31
    4.1.2 Spread of our interviews, blockchain structure ................................. 32
    4.1.3 Closing remark on network structure and distinguishing factors .... 32
  4.2 Blockchain and business network values ............................................................... 34
    4.2.1 Business network values ............................................................................... 34
    4.2.2 Blockchain values .......................................................................................... 36
    4.2.3 Concluding remarks on blockchain business model values .......... 37
  4.3 Value creating mechanisms ..................................................................................... 38
5. DISCUSSION & CONCLUSIONS ........................................................................... 40
  5.1 Conclusion - the critical choice of decentralized governance models and its effects. ......................................................................................................................... 40
  5.2 Theoretical implications ......................................................................................... 41
  5.3 Managerial implications ......................................................................................... 42
  5.4 Limitations and future research ............................................................................. 43
6. REFERENCES ............................................................................................................. 44

Appendix A: Initial interview guide ................................................................. 5 Pages
Appendix B: In-depth interview guide ................................................................. 8 Pages
Appendix C: List of respondents ............................................................................. 2 Pages
Appendix D: Workshop notes ................................................................................. 8 Pages
Appendix E: Blockchain, now and in the future ..................................................... 4 Pages
Appendix F: Definitions of trust ............................................................................... 2 Pages
Appendix G: Blockchain, business network and VCM representative quotes ..... 3 Pages
Appendix H: Blockchain & business network values vs VCMs plotting .......... 2 Pages
1. INTRODUCTION

This following chapter will provide context around blockchain business networks and its theoretical and practical problems. It will highlight the research gap and why it is important to increase the understanding around value creating in decentralized blockchain business networks. To fulfil this purpose and answer the theoretical and practical problems three research questions will also be coined in this chapter.

“The Last ten years of IT have been about changing the way people work. The next ten years of IT will be about transforming your business.” - Aron Levie, CEO of Box

1.1 Digital transformation introduced to blockchain

In a fast paced environment, continuous and agile transformation of one’s business is the key to ensure long term success. With the implementation of new technologies into one’s business, a transformation of parts or the whole business is not far away (Brynjolfsson & Hitt, 2000). Orlikowski and Barley (2001) argued that understanding economic transformation is best done by focusing on both the organizational and technological change together. Creating structural change in a business is not an easy task but can be very profitable. This change is today mainly driven by different digital transformations (Fichman, Dos Santos, & Zheng, 2014). In an article by McKinsey & Company (2019) the authors stated that much of the economic potential that is linked to digital transformation, also known as digitization, i.e. changing from analog to digital (Gartner, 2019a), is yet to be captured. Furthermore, digitalization, e.g. using digital technologies to change a business model to provide new value-capturing opportunities of the whole business, could help disrupting old industries and creating new ones (Gartner, 2019b).

As the digitalization of industries continues, the importance of communication, competition and collaboration within a business network has increased (Parker, Van Alstyne, & Choudary, 2017). A business network is often a complex network of
companies, working together to accomplish certain objectives (Ford, Gadde, Häkansson, & Snehota, 2002). One technology that could enable more of these business networks is called blockchain. The blockchain technology work as a decentralized, shared database called a ledger that can hold information about transactions that are verified and stored on a network without a governing centralized authority (Iansiti & Lakhani, 2017). This technology has the potential to become a game changer in many industries with Ginni Rometty, the CEO of IBM stating that “What the internet did for communications, blockchain will do for trusted transactions” (Business Insider, 2017).

The proclaimed value in the blockchain technology is its ability to create secure decentralized networks with strong trust across the network’s participants without any central entity (IBM, 2019; Iansiti & Lakhani, 2017). Even though the technology was designed for a decentralized network, as of writing this report, there are no blockchain solutions outside cryptocurrencies that have successfully implemented the blockchain technology on a decentralized network. With most of the current blockchain projects having a central governing entity in the network, many practitioners risk losing the core value proposal that a decentralized blockchain business network can provide. To succeed and gain value from this technology it is beneficial to consider and understand the aspect of a decentralized and centralized blockchain business network. As a decentralized business network could be discussed in both distributed; shared data without a central entity in a network, or decentralized; shared governance in a network without a central entity, we have decided to include both definitions and let our findings define that for us.

This study shows that there is always a tradeoff between value that the blockchain technology provides and the values that a business network provides when creating a blockchain business network. The choice of network governance model has shown to be a key design element in a blockchain business network and have a critical effect on the value proposal provided by the network. Embarking on the journey to create a blockchain business network will both require and incentivize a network wide digital
transformation, a journey which in itself can provide value to the network before the blockchain has even been implemented.

1.2 Problems with legacy businesses implementing blockchain

When implementing the blockchain technology designed for a decentralized network into the centralized and hierarchy governed real world, problems with capturing the value have arisen. Legacy systems, complex legal issues and selfish motivations have created barriers and an uncertain future for blockchain.

1.2.1 Issues arising when blockchain is entering businesses

Blockchain was in 2017 according to Forrester (2017) a promising emerging technology. However, two years later the technology has not yet seen the revolution that many predicted (Orcutt, 2019). One of the key values that blockchain technology may provide is its practically tamper free shared and distributed ledger, an immutable and fraud-resistant registry or database (Locher, Obermeier, & Pignolet, 2018). However, for the ledger to be fully tamper free the blockchain business network needs to be decentralized (Olleros & Zhegu, 2016).

As mentioned before there are very few blockchain business networks that have succeeded, of these successful networks arguably no one have yet successfully managed to create a decentralized blockchain business network outside the cryptocurrency industry (Laird, 2018). As the cryptocurrencies were created with and because of the decentralized nature of the blockchain technology, other industries with a centralized legacy have lacked behind. As illustrated in Figure 1 there is a clear industry gap where cryptocurrencies are the only industry who has implemented a fully decentralized structure both regarding governance and data sharing. As Laird (2018) discuss there are some industries that already have some, however small, decentralized aspects such as education, data storage and insurance while other like banking and voting are still very centralized.
Looking at the blockchain space today there are big corporations such as IBM and Amazon that are providing blockchain solutions which are owned and fully governed in a centralized way (IBM, 2019; AWS Amazon, 2019). These centralized solutions do not leverage the intended value that the blockchain was initially meant to deliver. There are however a very limited group of proof-of-concepts that are trying to create more decentralized governance models where they are working with multiple partners with decentralized decision-making, control and power.

“We.trade” for example is an attempt to create a decentralized blockchain business network that connects sellers, intermediaries and buyers to reduce cost and increase trust for all its network participants (We.trade, 2019). While these types of concepts are claiming a decentralized governance, they are more semi-centralized, mostly consortiums, i.e. two or more companies that work together toward achieving a chosen objective. These types of small consortium networks could at most be considered semi-centralized.

Arguably, the only platform that is close to fully utilizing the fully decentralizing aspect of the blockchain technology is the cryptocurrency Bitcoin. Bitcoin is a peer-to-peer electronic cash system that works like a digital currency (Satoshi, 2008). Bitcoin does not have any central authority meaning that no single person or organization is overseeing the network. The network’s power is fully distributed, in the case of Bitcoin the ones that provide the most computer power to the network has the most voting
power and thereby control. Since released in 2008 it has been run by its users, free from a central point of decision-making and control.

Since blockchain’s release it has faced several challenges many regarding its undefined and informal governance (see Appendix E). These challenges have forced newly launched cryptocurrencies to try more formal governance in their networks mitigate these issues. This change does however change the original value proposal of a truly decentralized cryptocurrency. Meanwhile, other industries are still motivated to continue pursue these decentralized blockchain networks to try to gain some of these values that can give them an edge towards competitors.

What practitioners are looking for is an increased understanding of how far towards a decentralized approach they can go to maximize the amount of value but still not lose too much power over the network.

1.2.2 Enthusiasts lead the development leaving academics and corporations behind.

The definition on blockchain as proposed by Research Institutes of Sweden (RISE) is “An umbrella term for a wide range of (old) technologies focused on one main task, to ensure agreement around a data state in an adversarial environment without centralized actors and by acting on local information” (Altmann, 2019). Even though this is far from a universally accepted definition it highlights the blockchain value as a decentralized technology as well as its lack of consensus regarding the definition around blockchain. The first adopters of this technology were programming enthusiasts often with a philosophy that blockchain is the technology made for circumventing big corporations. These are mainly the enthusiasts that since then have pushed the development of the technology using forums, blogs and websites as their knowledge sharing tool. This has caused both big corporations and academics to be lagged in the development and knowledge about blockchain networks.

The focus for these corporations has instead been on the strategy to become a marketplace rather than a being a direct producer of a product (Parker, Van Alstyne, &
This has been a successful business strategy and it has affected the business network, marketplace, and platform literature to become a common part of the management journals today. As blockchain is a tool to enable and enhance marketplaces, networks and platforms in the right environment it is easy to think that it would been more affected by the success of these topics since its release in 2008 (Iansiti & Lakhani, 2017). However, as practitioners have had problems with providing any true value from the technology there have been little interest in the topic from the academic world. Other topics such as business networks, have however seen an increased interest with over 10 000 new scientific articles in 2018. Comparing to blockchain which have less than 2000 new scientific the same year, although rapidly increasing in the last 3 years.

The literature regarding blockchain business networks are just taking off with only 164 published articles to date on Scopus. Furthermore, when searching for similar terms such as blockchain platforms there is still a lack of literature discussing the decentralized and centralized aspects of a blockchain network from a business perspective. Also, several researchers have requested further studies regarding the business aspect of the blockchain technology (Guo & Liang, 2016; Mendling, o.a., 2018; Zhao, Fan, & Yan, 2016). All and all, there is a clear lack of scientific knowledge regarding the practitioner’s problems to create this utopian decentralized blockchain enabled platform.

1.2.3 A knowledge gap surrounded of well-established topics

With the lack of both practical and theoretical understanding, the decentralized and centralized blockchain business networks seems to be an important topic to investigate. However, due to the novelty of this research topic there are no clear way of distinguishing a decentralized from a centralized blockchain network, with scholars discussing it in many different terms (Buterin, 2015; Gopinath, 2016; Wall & Malm, 2016).

1.3 Research purpose and research questions
There is a clear lack of consolidated knowledge by both academics and practitioners of what distinguishes a decentralized from a centralized blockchain business network. Similarly, there is a lack of understanding how the value proposal of a blockchain business network changes when going from a centralized to a decentralized business network. To address these two problems the following purpose of this report has been coined: *To increase the understanding of what distinguishes a decentralized blockchain business network from a centralized blockchain business network and identify its value creating mechanisms.* This purpose addresses the literature scarcity within this research area as well as gaining some clarity for practitioners when choosing a blockchain business network model. The knowledge gained will then be conceptualized into several frameworks with the purpose to also increase the understanding for practitioners.

This study’s focus is to understand what characterizes a decentralized blockchain business network and identify its value creating mechanisms [VCM]. With VCMs we focus on the underlying factors that would enable a value, i.e. the mechanisms for that value. Although the focus is the decentralized aspect, due to the lack of knowledge in this area a broader focus, both centralized and decentralized, will aid the understanding in this knowledge scarce area. A mapping of the whole centralized to decentralized spectrum will therefore aid the understanding of decentralized business network. The first step to satisfy this study’s purpose is to start by understanding what distinguishes a decentralized from a centralized blockchain business network. This question aims to both increase the understanding but also to find a way to separate the data gathered in this study on to a centralized and decentralized scale. Therefore, the following question was coined:

**RQ1: What distinguishes a decentralized blockchain business network from a centralized blockchain business network?**

In order to find the VCMs in a decentralized blockchain business network a clear understanding of what values are enhanced and suppressed in different decentralized and centralized networks will first be investigated. Using the findings in RQ1 the second research question is coined as:
**RQ2: How are the blockchain business network values affected by a decentralized vs centralized business network model?**

Both mentioned research questions will aid the understanding and identification of the VCMs in decentralized and centralized networks. Using this information, we tried to find the underlying mechanisms that help enable those values, i.e. the VCMs. Thereby, the last research question can be answered, which was coined as:

**RQ3: What value creating mechanisms exists within decentralized blockchain business networks?**

The three research questions now map out the whole picture of what distinguishes a decentralized and centralized blockchain network and what its value creating mechanisms are. These findings can be used to find how the VCMs effectiveness changes when a network decentralize and how that affect its value proposal. This can not only be used to fulfill the purpose of the study but also aid organizations in their design choices of a blockchain business network.
2. LITERATURE REVIEW

This section aims to give the reader an understanding of central aspects and will act as a foundation for analysis and discussion of our results, thereby helping this study to fulfill its purpose and research questions. As this study collects literature in two different waves the first three topics 2.1, 2.2 and 2.3 was retrieved before the initial interviews while the last two topics 2.4 and 2.5 was retrieved after the initial result was finalized.

2.1 The hard and soft configurations of a blockchain business network

Blockchain is a wide undefined definition for several old technologies that have been packaged in a new way when it was first launched with Bitcoin in 2008 (Altmann, 2019). This group of technologies together called blockchain can be adjusted in many ways to bring a wide range of different value proposals that suits different needs. Tuned in the right configuration the blockchain technology can provide businesses several benefits such as greater transparency, enhanced security, improved traceability, increased efficiency and reduced costs (Hooper, 2018). These “hard” technical aspects are however not the focus of this study as they are relatively well documented. A more in-depth technical explanation of the blockchain technology with a brief history of blockchain is presented in Appendix E.

The focus of this study is rather within the different “soft” aspects of a blockchain business network, meaning the social, organizational and administrative aspects of the network. These soft aspects have according to Altmann (2019) an equally as important effect on the value proposal as the technical aspects despite it is less documented. This problem has been identified by many researchers (Mendling, o.a., 2018; Guo & Liang, 2016; Zhao, Fan, & Yan, 2016) and is one of the main reason for this exploratory study.

2.1.1 The search for a distinction between blockchain structures

As many other aspects in blockchain there is no agreement on the how to group or distinguish different blockchain solutions from each other (Wall & Malm, 2016). Common definitions such as permissioned, private, permissioned-less and public
networks are often used interchangeably even though they are, according to Wall and Malm (2016), considered to explain different aspects of a network. In most cases the two types of distinguishing factors between a decentralized and centralized blockchain network is either a private & public definition or a permissioned & permissioned-less definition explained further in 2.1.2 and 2.1.3. Although these are slightly different definitions they are discussed as way to distinguish blockchain networks by some scientific studies (Buterin, 2015; Gopinath, 2016; Pilkington, 2015). These definitions are notably a more technical definition that does not account for the soft, non-technical components of a blockchain business network. However, to find a distinguishing factor for a blockchain business network these definitions does help to understand what underlying factors should be considered in the search for a more accurate scale that account for the soft components.

2.1.2 Distinguishing blockchains as public, private, permissioned and permissioned-less

The term public and private blockchains is an attribute that broadly explains who can read and contribute to a blockchain (Wall & Malm, 2016). This means to either read the data, change data, or write data to the database, in this case, into the blockchain. In a public blockchain there are little or no restrictions on accessing and reading the blockchain or contribute with new data. A private blockchain however is a network where access to writing or reading the data is limited to a defined list of participants (Wall & Malm, 2016). In this definition a public blockchain could be considered a more decentralized structure rather than a private that would be considered a more centralized structure.

The definition permissioned & permissioned-less describe a similar scale to public & private blockchain networks as they are considered more centralized when permissioned and more centralized if they are permissioned-less. The word “permissioned” refers to a network’s identification process where in some networks a participant needs to always disclose their identity. This is done to be able to assign different permissions on to an actor or to only let a certain list of participants to access
the blockchain. A permissioned-less network is similar to a public network as it is often an undefined number of participants and have unknown identities (Gopinath, 2016).

As participants right to access or contribute to the blockchain can be customized to different roles, it becomes difficult to draw a clear distinction between public & private and permissioned & permissioned-less (Gopinath, 2016). It is rather a continuum between two extremes where it is a transition from a fully decentralized to fully centralized blockchain. This is something that Pilkington (2015) highlights, and further argue that there are blockchains that are in middle of this scale called a semi-centralized or consortium blockchains (Pilkington, 2015). These are blockchains that made up of a defined list of participants where all have relatively equal rights within the closed private network. This study will use these indications of a centralized, semi-centralized and decentralized blockchain network to identify where on this continuum the different blockchain solutions are.

2.2 New value proposals with business networks and platforms

In relation to blockchain, literature regarding business networks has had a long history. The first literature described how organizations can create value in new ways through strategic relationships such as joint ventures (Harrigan, 1985). This type of literature has since then evolved into depicting strategic supplier networks, learning alliances (Jarillo, 1988; Dyer, 1996) and resource sharing networks (Gulati, Nohria, & Zaheer, 2000). Gulati et al. (2000) further explains that these kinds of strategic networks can provide an organization and a whole network with access to information, resources, markets and technologies that earlier was out of reach. Business networks that also can provide advantages such as allowing co-creation and setting up shared strategic objectives. These shared objectives can in turn reduce costs by using the positive effects from economies of scale and sharing risks (Gulati, Nohria, & Zaheer, 2000). It is these kinds of networks that blockchain claims to enable in new untrusted environments. This is why the network literature is interesting in a blockchain value perspective. However, the network literature has not been updated in recent years as similar network topics has such as the platform literature. In order to better understand the context on to which
blockchain can be used in, we also investigate the more updated platform literature in the next section.

2.2.1 Value creating through platform business modeling

As mentioned, the business network literature has a relatively long history in the academic world. However, recently with the rise of companies like Google, Facebook and Amazon practitioners and academics have focused on how to provide value as a platform (Parker, Van Alstyne, & Choudary, 2017). The definition of the word platform varies depending on context, and may characterize dimensions such as supply chains, markets, industry constellations, products and product systems according to Gann, Autio and Thomas (2014). Spulberg (2019) defines the platform as an economic institution consisting of (1) intermediaries, (2) “sides” e.g. buyers/sellers, (3) “location” either virtual or locational, (4) transaction technologies, and (5) “coordinating mechanisms” that creates incentives and structures.

The new generation of platforms, called multisided platforms, are enabling interaction between two or more customer or stakeholder groups (Hagiu, 2013). There are plenty of successful examples of multisided platforms, such as: eBay, Airbnb, American Express, PayPal and Facebook. Many of the modern multisided platforms creates value for consumers by reducing search or transaction costs, at an increased rate as the participators on each side of the platform increases (Hagiu, 2013).

The value of a platform often comes from the architectural design, shared assets, standards and coordination and governance of the participating platform users (Gann, Autio & Thomas, 2014). A key factor regarding platforms are network effects i.e. that the creation of value increases with the number of users (Van Alstyne, Parker, & Choudary, 2016). Platforms are not only a facilitator of business between users but are also an important foundation where the participants can innovate new products, technologies and services (Gawer, 2019). For example, the App Store, a digital distribution platform developed by Apple, has since its launched millions of innovative applications developed by organizations and people all around the world. Blockchain can act in similar ways, where its infrastructure and data can be utilized by many in
order to innovate and develop new services and technologies, in similar fashion as a platform.

2.3 Increasing the value proposal by decentralizing

Businesses have understood that a successful company must not only focus on its own capabilities but also care about its organizational relationships. This has caused many practitioners to focus more on managing business relationships and networks (Cantwell, 2013; Ritter, Wilkinson, & Johnston, 2003). Today it is generally considered that a company that acts and innovates all by its own will risk falling behind competitors (Pisano & Verganti, 2009). This need has introduced new, more decentralized approaches such as crowdsourcing, crowdfunding and open source projects that is disrupting the past ways of interaction (Pisano & Verganti, 2009). The new approaches on how to interact with participants in a more decentralized network is introducing new challenges of how to govern these networks (ibid).

2.3.1 Distinguishing networks as open or closed

When considering creation of a business network the question of how open or closed the network should be must eventually be addressed. Pisano and Verganti (2009) argued that when creating or joining a closed network you essentially need to commit to two implicit bets, firstly, that you have identified the knowledge domain from which the solution to your problem will be found and secondly, that you have the ability to choose the best collaborators within that domain. As closed business networks get bigger more time is needed to verify the entry requirement against the new applicants, which in turn will take a lot of resources. This sets a limitation on closed networks due to the increased governance cost as the network take in more participants. A cost that is greatly reduced in open business networks (Pisano & Verganti, 2009). Pisano and Verganti (2009) further elaborates that the advantages of an open network is its ability to establish many collaborators without the need to identify and constrain to the most suitable groups of participants. In a closed network defining the requirement for entry can be hard as the quality of a participant in a network can be complex and change
over time. When working within these networks with other actors, trust inevitably becomes a factor to consider.

2.4 Trust in the blockchain offer

Trust have existed for as long as human interaction has existed, Mill (1891) claimed that the advancement of mankind could partly be attributed to our ability to trust each other. Although trust has been a known critical factor of effective business interactions (Accenture Technology, 2016) there are considerable diversity and complexity surrounding the term trust (Nissenbaum, 2001; Sako & Helper, 1996; Wang & Emurian, 2004; Zaheer & Venkatraman, 1995). Furthermore, as the lack of trust in central banks and other intermediaries was one of the main reasons for the creation of blockchain (Satoshi, 2008). Building trust is also something that is critical when it comes to blockchain business networks. In the following sections we will present some of the ways one could approach trust in order to find an suitable approach to trust that will be used in this study.

2.4.1 Types of trust

When we were trying to define the term “trust” for this study there are plenty of ways to define and approach it. One can look into different litterateur disciplines such as psychology, sociology, marketing and management (Wang & Emurian, 2004). One can look at different type of trust related issues such as trustworthiness and opportunism (Berney & Hansen, 1994) or cooperation, confidence and predictability (Mayer, Davis, & Schoorman, 1995). One can study trust from a interorganizational or interpersonal perspective (Zaheer & Venkatraman, 1995; Abdul-Rahman, 1997), from an agency theory vs stewardship theory perspective (Schoorman, Mayer, & Davis, 2007) and several other perspectives (see Appendix F for an overview).

Furthermore, when discussing blockchain business network, cryptographic peer to peer trust such as the Byzantine general problem (Lamport, Shostak, & Pease, 1982), Pretty good privacy trust model (Abdul-Rahman, 1997) and Decentralized trust management (Blaze, Feigenbaum, & Lacy, 1996) becomes relevant. However, as we are looking into
the business aspect of blockchain our approach to trust will have more in common with studies of organizational (Mayer, Davis, & Schoorman, 1995), interorganizational (Sako & Helper, 1996; Wang & Emurian, 2004) and managerial (Wang & Emurian, 2004) trust.

2.4.2 Reasons for why an actor trusts another actor

Why an actor trusts another actor could be split into either “soft” or “hard” reasons. “Soft” reason could be labeled as goodwill (Sako & Helper, 1996) personal (Williamson, 1993), honesty (Tapscott & Tapscott, 2016), personal characteristics (Zucker, 1986), cognitive (Zaheer & Venkatraman, 1995) or strong form of trust (Berney & Hansen, 1994). The common denominator for these “soft” forms of trust is the illogical, social or fussy characteristics, this type trust is very hard to motivate in facts or calculated in numbers but is built through reputation, personal relationships or, simply put, trust. The “hard” reasons to trust another actor have, among others, been labeled as calculative (Zaheer & Venkatraman, 1995; Williamson, 1993), accountability (Tapscott & Tapscott, 2016), contractual (Sako & Helper, 1996), semi-strong form of trust (Berney & Hansen, 1994), process/institutional (Zucker, 1986). These “hard” type of trust is related to laws, regulation, proven records and an ability to calculate and measure the risk or cost related to trusting that actor. How these two interact is what determines the type of trust an actor have in another actor and why that trust exists.

2.4.3 Concluding remarks on trust

Scoping down the term trust for this study, we will mainly focus on the interorganizational aspect of the subject trust. Within the interorganizational aspect we will be trying to understand the soft and hard aspects when actors interacting within a system with other actors as well as that system itself. These two focus areas, interorganizational and hard vs soft trust, will be the basis on which we build our questionnaire for the in-depth interviews. Another area closely related to trust is governance which can be seen as a way of increasing trust in an untrusted network using rules, contracts, organizational structures and processes.
2.5 Governance

This section will discuss the governance literature and present relevant governance models for a blockchain business network. Traditionally governance has been focused on the role of board of directors in a very centralized way as it was described by Mizruchi (1983). Since then the phenomenon has changed to include governance in more decentralized forms with informal social systems rather than by bureaucratic structures, such as firms and governmental organizations (Candace, Hesterly, & Borgatti, 1997; Provan & Kenis, 2007).

2.5.1 Organizational versus network governance

Governance can be enforced in different ways and depends a lot on what is being governed, how many is being governed and what type of social structure is governed. Therefore, it is important to distinguish different types of governance. Organizational governance is the first studied type of governance and it has its origins in how business firms and its board of directors represent and protect the interests of the shareholders (Fama & Jensen, 1983). A similar type of governance is corporate governance which refers to the set of mechanisms that influence the decisions made by managers when there is a separation between ownership and control (Larcker, Richardson, & Tuna, 2007).

However, this study is focusing primary on business networks, marketplaces and platforms where participants may both collaborate and compete. Business networks where the participants both have an individual goal and a collective goal (O'Toole Jr, 1997). This is an area where organizational governance does not apply and that is why we will only cover the network governance literature from now on.

2.5.2 Business network governance

Candace, Hesterly and Borgatti (1997) consolidated the term network governance as “a select persistent, and structured set of autonomous firms engaged in creating products or services based on implicit and open-ended contracts to adapt to environmental contingencies and to coordinate and safeguard ex-changes. These contracts are socially,
not legally, binding”. Provan and Kenis (2007) presented in their study three different types of network governance, all with their own strengths and weaknesses. These can be divided in three different types; Participant governed networks, Network administrative organization and Lead organization governed networks which are described below.

Participant governed networks are governance constructed and enforced by the network participants without a separate governance entity. Often all or most of the network has an equal responsibility and commitment in the governance process. Provan and Kenis (2007) explains that this kind of governance is most suitable for small, noncomplex networks with highly committed network participants that have a stake in the network’s success. If such a network adapts a participant governance model; a higher level of stability can be reached compared to the other governance models (Morgan & Cook, 2014). If such a network adapts a participant governance model; higher level of stability can be reached compared to the other governance models (Morgan & Cook, 2014). Also, this kind of shared self-governance is often preferred by the network participants as they remain in full control of the network’s future direction. Yet this kind of governance is the least agile and scalable governance as the network participants will either ignore critical network decisions or spend increasingly large amount of time coordinating decisions between all the participants (Faerman, McCaffrey, & Van Slyke, 2001).

The Network administrative organization (NAO) is a group of people or organizations that is created specifically for coordinating and governing a network. The NAO governed network is a semi-centralized governance model even though the network could be structured in a decentralized way. The NAO is often comprised of a subset of the network participants in a board structure using a formal organization such as a co-owned company. These formal organizations are often used to enhance the network legitimacy while also be able to manage complex network-level problems and conflicts. An example of a NAO could be Get Swish AB, the company that own the Swedish transaction service Swish.
Lead organization governed networks, in contrast to participant governed networks, is according to Provan and Kenis (2007) a centralized and high hierarchy governance model. This governance is preferred in networks where the inefficiencies and longer response times of a shared governed network are not acceptable. In a lead organization governed network, all the key decisions on a network level is made by a single network participant e.g. Amazon which operate and govern a network of suppliers and buyers.

### 2.5.3 Concluding remarks on governance

The blockchain technology has enabled a more decentralized approach to business networks. These networks also require a new approach to governing the network, governance models that are not as refined and tested as the more conventional centralized governance models. Practitioners have understood that a very critical success factor in building these decentralized business networks is a stable, well defined network governance model. Despite this increasing interest in these decentralized governance models, many of them have proven to be very difficult to implement and often unsuccessful in practice (Jew & Samman, 2016). The definition of network governance by Candace, Hesterly and Borgatti (1997) and the governance models from Provan and Kenis (2007) was our basis that derived the governance related questions for the in-depth interview.
3. METHOD

This following chapter will describe the research approach for this project. A detailed description of research process, data collection and analysis aim to increase transparency of the underlying processes of how the result were developed as the project proceeded. Finally, it will also describe the quality improvement measures that were taken to improve the quality of the result.

3.1 Choosing an explorative abductive approach

As the literature within decentralized blockchain platforms is an emerging research topic it still lacks well cited articles relevant to this study. Therefore, this research relies on an explorative abductive approach which allow the research process to be an iterative process between theory and empirical observations (Dubois & Gadde, 2002). The abductive research approach allowed for a more progressive understanding of both theory and empirical implication. The explorative nature of this research also allowed the gathering of information from many sources. Furthermore, the explorative nature allowed us to rely on grounded theory unlike traditional approaches that would be to strongly rooted in what we already know (Murphy, Klotz, & Kreiner, 2016; Gioia, Corley, & Hamilton, 2012).

3.2 Research process divided in three phases

The research was carried out through three different phases, exploratory, in-depth and validation phase, see Figure 2. Although this research process was conducted in an iterative manner, the key stages in the research process can be explained through our visualization in Figure 2. There was a total of four instances of data collection in all three phases, more on the different data collection methods is presented in 3.3. Furthermore, as can also be seen in Figure 2, there were two instances of thematic analysis and a continuous concept creation though out the whole study. More about the data analysis can be read in 3.4.
As this research follows a qualitative, explorative and abductive approach the first explorative phase aimed to gather an initial understanding from practitioner’s through a series of semi-structured interviews. Although the initial literature research was conducted before the initial interviews (see Figure 2) that literature research had the sole purpose of giving us a basic understanding of key concepts, such as blockchain and networks. Thereby, the initial interviews were carried out before gathering any significant amount of scientific literature. This helped us to not form any significant biases that might affect the explorative nature of the research process (Dubois & Gadde, 2002; Murphy, Klotz, & Kreiner, 2016).

The findings from the initial interviews acted as a guide for new aspects and areas into which an initial literature research was carried out. The findings from the first phase allowed for a more structured interview approach in the in-depth phase. Here we used themes from the explorative phase together with our literature review to prepare question for the in-depth interview. As the in-depth phase were initiated, we started to build the concepts and they were refined as insights from literature and interviews were collected. This second phase provided us with the main dataset used for the result, analysis and discussion. The last phase of the research was carried out as a validation phase where the result and the frameworks were validated by presenting and discussing them in a workshop together with blockchain experts from within and outside our client company. The feedback gathered from these discussions were then consolidated and used to improve the final concepts of this study.

Figure 2: Research process
3.3 **Collection of data through interviews, workshop and internal documents**

In this study both primary and secondary data were used to answer the research questions. The primary data were mainly collected from interviews, other sources of primary data included informal conversations, meetings and workshops. The secondary data was comprised of presentations, external workshops, public white papers and industry specific news articles.

3.3.1 **Interviews, the primary source of data**

Due to the exploratory nature of this study, we decided to conduct interviews in what Turner (2010) described as standardized open-ended interviews. This way of structuring the interviews are similar to the semi-structured interview method. The questions were constructed so that even though the same questions were asked to all participants it resulted in different answers and perspectives from each interview. Furthermore, this structure on the questions opened up for more probing questions relevant to the answer of every unique participant (Turner, 2010). As can be seen in Figure 2, we conducted three sets of interviews named pilot, initial and in-depth. The purpose of the pilot interviews was solely to prepare and try questions before the initial interview, thereby they were not transcribed or used any further in this report. This study conducted 25 interviews with respondents from a total of 17 companies in 9 different industries, see Appendix C.

**Outlining the research area with initial interviews**

Through our supervisor at the client company, Alpha, we were able to quickly secure interviews with experts and front-runners within our field. In the initial round of interviews all but one of the participants were from the client company. This was deemed acceptable due to their broad knowledge and expertise in our research area. The goal of the initial interviews was to gain a general understanding of our research area and key concepts for the literature review. All ten interviews were recoded and within a short timeframe transcribed. For an overview of the respondents see Appendix C.
Our initial interview segment was in line with the grounded theory approach (Murphy, Klotz, & Kreiner, 2016), i.e. initially free from academic perspective. Therefore, we mainly based the questions for the initial interviews on the practical knowledge we gained of the subject when participating in meetings, conducting informal conversations and taking part in internal documents. See the initial interview guide in Appendix A.

Creating a deeper understanding through in-depth interviews

The findings from the initial interview and literature review were the foundation on which we created the in-depth interview guide, see Appendix B. The in-depth interviews main purpose was to gain deeper understanding of the areas around our research questions, namely blockchain business network values, VCMs and the distinguishing factors between decentralized and centralized. The respondents were chosen from a diverse set of companies (see Appendix C) and a total of 15 in-depth respondents. These respondents were selected by recommendation from our client company supervisor, through contacts gained from blockchain conferences and by using snowball sampling. The snowball sampling was conducted by asking respondents to refer some acquaintances that could know more and contribute to this study. As our goal was to gain a general, non-industry specific, understanding of the subject, these three ways helped us diversify our industries outside of finance and into, among others, logistics, consulting, trade, gambling and government.

3.3.2 Validating concept through a blockchain expert workshop

When the in-depth interviews were transcribed and analyzed, we started to accumulate our learnings and insights into a framework, see Figure 3. This concept creation process was, as several other aspects of our method, conducted iteratively, where continuous refinement, changes and additions was done throughout the framework’s creation. In line with the grounded theory (Murphy, Klotz, & Kreiner, 2016) the in-depth interviews were ceased when the results were comprehensive in both depth and scope. At this stage the frameworks were going through there last iterations and were ready for validation through a workshop.
The validation was held as a semi structured workshop with experts from the client company (Alpha) and a global management consulting firm Romeo that had previous knowledge in blockchain implementation project. The purpose of the workshop was to consolidate Alpha and Romeo’s knowledge and experiences to gain a deeper understanding of what value creating mechanisms there are in a decentralized blockchain business network was realized with this three-hour long workshop. It consisted of presentations from both companies sharing insights from earlier experiences and a presentation of this study’s initial results. This created the basis on to which a brainstorm session was conducted. Due to a confidentiality agreement between the companies, the workshop was not recorded. However, notes were written down by two participants and later consolidated. The notes were then reviewed and accepted for publishing by the participating organizations, see Appendix D. These workshop notes were analyzed and used for final refinement of framework.

3.3.3 Other forms of complimenting primary data

As this study was conducted in the same department as many experts and experienced individuals in the blockchain and financial industry, participating in meetings and informal discussions was an important source of informal knowledge, broadening our perspective on the topic. A significant amount of knowledge was gathered through means of both internal and external meetings, informal discussions, blockchain conferences and internal reports related to our subject. This information was mainly used to guide us in our research but also used in the analysis of data and refinement of our result.

3.4 Data analysis

The data analysis was conducted in line with our three phases explorative, in-depth and validation phase, see Figure 2. There were two main types of analysis conducted in these three phases where thematic analysis and concept creation. The thematic analysis was mainly used to aggregate the values and VCMs to help answer RQ2 and RQ3 whereas the concept creation built the understanding that helped us answer RQ1. The goal of the analysis was to get a rich description of the data set to ensure that the
predominant and important aspects could be captured (Braun & Clarke, 2006). This goal is something that goes well with our grounded theory approach, making sure the emerging categories are saturated (Murphy, Klotz, & Kreiner, 2016)

3.4.1 Building the foundation of the concept with thematic analysis

As this study had two rounds of interviews generating two data sets, we conducted two rounds separate rounds of thematic analysis. The first set of analysis were mainly focused on finding themes related to our RQs which could help guide the literature research in specifying what topics we would focus on. The three goals of the second analysis was to find a list of VCMs to help answer RQ3, find values for blockchain business networks to help answer RQ2 and lastly to accumulate relevant insights for the concept creation.

The analysis process, thematic analysis, is a method for identifying, analyzing and reporting patterns (themes) within the data (Braun & Clarke, 2006). The thematic analysis approach allowed for a flexible analysis and was suitable for our explorative, abductive, research method. For the analysis, an inductive and data-driven approach was carried out where the themes that was strongly linked to the data themselves (Patton, 1990) was chosen. This allowed for our research questions to stay broad and evolve as the coding proceeded (Braun & Clarke, 2006). As a guide for our analysis, we used the first five of the 6-step process Braun and Clarke (2006) have created, presented below.

1. **Familiarizing with the data**, when the data was collected, participants anonymized, and interviews transcribed we began familiarizing ourselves with the whole set of the data. This was done through repeated, active readthrough by both researchers as well as listening to the interviews a second time to get a feel for how emphasizes, pauses or tone of voice could alter the meaning of the transcription. Furthermore, we took individual notes when reading through, commenting on any meaning, patterns or future codes that could be interesting in the following steps. The process for both the initial and in-depth interviews were the same when familiarizing with the data.

2. **Generating initial codes**, during the second step of the analysis we created the initial codes. The coding was conducted by having our research questions in mind while
identifying interesting aspects or repetitive patterns across the data set. In the second set of thematic analysis some inspiration was taken from the first, due to some similarities in codes. However, this earlier knowledge also helped us look beyond these codes to see if there were any new codes that could be found in the material from the in-depth interviews.

(3) **Searching for themes**, the third step involved sorting the different codes into themes, trying to consider how different codes may combine to form a subject or theme. Any pattern or potential themes were also evaluated in relation to the codes themselves, other themes and different levels of themes. Discussions around what should be main or sub-themes and thematic mapping helped guide the structuring and pooling of codes into designated themes.

(4) **Reviewing the categories and themes**, the fourth step included the merging of the resulting themes from the initial and in-depth interviews as well as refining and revising the new pool of themes and their relationship to one-another. The reviewing and refining were conducted on three levels, consolidating the themes, reviewing the themes in relation to the codes, and reviewing the themes according to the whole data set.

(5) **Defining categories and themes**, the fifth and final step included defining and refining the themes as well as testing the themes in accordance to additional insights we gained from the discussion with our supervisor.
Our first set of interviews, Initial interviews, resulted in a pool of themes which can be seen in Table 1. As we were focusing on the business factors of a decentralized blockchain network we selected the themes Governance, Trust and Value proposal as potential answers to both RQ2 and RQ3. These themes did then become a focus for the literature study. Blockchain and network characteristics were used as a reference point for the concept creations of Network roles, Figure 5, and Network values, Table 5.

### Table 1: Themes derived from thematic analysis of the initial interview data set

<table>
<thead>
<tr>
<th><strong>Themes from initial interviews</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NETWORK CHARACTERISTICS</strong></td>
</tr>
<tr>
<td>Transparency</td>
</tr>
<tr>
<td>Openness</td>
</tr>
</tbody>
</table>

#### 3.5 Quality improvement measures

To ensure that a qualitative study have a high quality, a study should be evaluated according to four measurements, namely: credibility, transferability, dependability and conformability (Lincoln & Guba, 1985). We took several measures to ensure high credibility, i.e. internal validity (Shenton, 2004). To familiarize ourselves with the topic we attended relevant meetings and conferences and got introduced actors working with blockchain. Another credibility increasing measure were the pilot interviews that assisted with the refinement of the questionnaire (Turner, 2010) and gave us, some experience and feeling of how the interview would proceed. We conducted the pilot interviews with a person with similar knowledge as our participants in the initial interviews to ensure that the feedback was aligned with our future interviews (Turner, 2010). Furthermore, we used three different methods for selecting participants during the in-depth phase, both letting our participants, client supervisor and conference contacts to select the sources of information, mitigating the chance of our own sampling bias. Lastly,
we made it clear for the participants that their contributions and thoughts would be anonymized in writing.

To improve the transferability of the study, i.e. if the work can be applied to a wider population or other situations (Shenton, 2004), we attempted to reach as many industries as possible outside the financial industry. Although a significant part of our participants worked within the financial industry, we managed to interview people within 9 industries. This helped diversify our data set having less than 48% of participants from one industry. A description of our respondents and their context is presented in Appendix C.

The confirmability, i.e. that the findings are a result of the data from the participants and not the subjective preferences of the researchers (Shenton, 2004). The study was improved by having the interviews transcribed and then coded according to the participants own wordings and not our interpretation of their ideas and experiences. Finally, due to having the result of the initial interviews guide our literature review and thereby our in-depth interviews, the research bias regarding the questions could be minimized.

Lastly, ensuring high dependability, i.e. that similar a study could be repeated without difficulties and that the result should be similar (Shenton, 2004). This was reached with a detailed method, interview approach and analysis. Furthermore, visualization of the different processes and methods, such as Figure 2, helps the reader see the steps we took when acquiring and analyzing our data.

The literature gathering for this study have been done through a wide range of sources with both high ranked academical and managerial journals as well as company papers, white papers and community websites. With the highly ranked journals such as MIS quarterly, Journal of Business Research and Strategic Management Journal, together with managerial journals such as MIT Sloan and Harvard Business Review the foundational literature in this study is based on high-quality sources. However, due to the novelty of this topic, some literature and concepts have been collected from company articles such as IBM or Accenture as well as blockchain white papers and
relevant forums such as CoinDesk and Bitcoin.org. All these sources helped us mix new ideas with established theories enabling us to build an understanding for this project.
4. RESULTS AND ANALYSIS

This chapter will present the results in relation to its respective research questions. Initially there will be an overview provided were the different results will be put into relation to each other. Then the individual results will be presented and analyzed together with the literature insights and how they relate to different levels of decentralization and centralization.

There are four main results from this study, which are visualized together with their relationships in Figure 3. The results are Governance models as a decentralization scale for blockchain business networks, Value creating mechanisms for blockchain business networks, Blockchain values, and Business network values. As can be seen in Figure 3, the four results are directly linked to the three research questions. The individual results are presented in more detail in their respective section in this chapter.

As the result have been consolidated, Figure 3 were constructed to give the reader an overview of the results. The two type of arrows in the relationship figure, light and dark gray, shows the different type of impact the different results has on each other. The dark gray “Enhancing” arrow visualizes how the governance model is enhancing the values and VCMs, i.e. neutral or strengthens the existing values or VCMs.

![Figure 3: An overview of the results](image-url)
The other “Enabling” arrow, shown in light gray, visualizes how the VCMs are enabling some of the blockchain & business network values. In other words, the difference between the arrows is that the light gray is showing a creation of some values, whereas the dark gray arrows is showing that governance is increasing or decreasing the significance of already existing values.

4.1 Network structure

From the initial interviews we understood that when it comes to decentralized blockchain networks there are many instances that can be decentralized. As our definition of a blockchain is broad, some clarification for us and the respondents was needed. To clarify what can be decentralized and help align the respondent’s definition of “decentralized” we decided to create a framework mapping up the network structure. This framework was a first step in helping us answer RQ1. First a framework was created including the four roles Orchestrator, Verifier, Writer and Reader, see Figure 4. To create this framework, we used insights from the initial interviews together with the literature review section 2.1. and 2.3.

![Figure 4: Blockchain network roles](image)

We define an Orchestrator as the participant or group of participants that have the responsibility and right to decide any network-level decisions. This entity is the one that maintains and control all other roles in the network as well as deciding on what
updates is implemented in the system. A Consensus provider is as an internal or external participant that have the responsibility and right to provide agreement in the network. This can be done by a consensus model with several other consensus provider or by a single entity deciding what should be added to the blockchain. A Writer is an internal or external participant that has allowance to issue a new asset or request a transaction to the consensus provider. Lastly, we define a Reader as an internal or external participant that have access to read and monitor the blockchain and its content.

### 4.1.1 Mapping the roles on to a centralized to decentralized scale

Next, after clarifying the four roles of the blockchain networks we added the decentralization layer split into four sections, fully centralized, semi-centralized, semi decentralized and fully centralized. These four categorizations from fully centralized to fully decentralized were loosely based on interviews and prior literature review and acted more as a starting point on to which categorizations could be added or removed further as the study progressed. This categorization was made to capture the centralized and decentralized structures of the respective interview related blockchain. For the full layout and explanation for each type, see Table 2.

<table>
<thead>
<tr>
<th>Orchestrate</th>
<th>Fully centralized</th>
<th>Semi-centralized</th>
<th>Semi-decentralized</th>
<th>Fully decentralized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central node updates and change rules on own will</td>
<td>Few participants updates and change rules on own will (majority)</td>
<td>All network members vote on changes and updates with (majority)</td>
<td>Anyone allowed to submit changes and vote on (majority)</td>
</tr>
<tr>
<td>Consensus provider</td>
<td>Central node verify all transactions</td>
<td>Few participants/nodes allowed to verify transactions</td>
<td>All in network allowed to verify</td>
<td>Anyone allowed to verify transactions</td>
</tr>
<tr>
<td>Write</td>
<td>Central node writes all transactions</td>
<td>Few participants allowed to submit transactions</td>
<td>All in network allowed to write</td>
<td>Anyone allowed to submit transactions</td>
</tr>
<tr>
<td>Read</td>
<td>Central node are only actor allowed to read the blockchain</td>
<td>Few participants allowed to read some/all of the blockchain</td>
<td>All in network allowed to read all of the blockchain</td>
<td>Anyone allowed to read</td>
</tr>
</tbody>
</table>

This matrix was then used to plot every blockchain that some of our respondents in the in-depth interviews were working on. This gave us a way to plot every interview to identify similarities between the different types of blockchains. The result of our
blockchain network plotting can be seen in Table 3. The framework proved itself usable to the respondents as more than 90% of the respondents found it applicable to their blockchain projects.

4.1.2 Spread of our interviews, blockchain structure

When mapping the interviews related to a specific blockchain network into Table 2, the results showed a diversity in the first two roles but as seen in Table 3 the writer and reader has low diversity. This lower diversity can be explained by the blockchain’s decentralized nature regarding the infrastructure, reading and writing, of the network. This observation is aligned with many of the respondents who indicated that even though the roles presented in Figure 4 are relevant to their blockchain solution the Consensus provider, Writer and Reader can be viewed as permissions provided by the Orchestrator. Thereby it seems that the Orchestrator is the only role that is the most permanent and makes a significant, lasting impact on the blockchain business network.

<table>
<thead>
<tr>
<th>Table 3: Respondents blockchain network structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Orchestrator</strong></td>
</tr>
<tr>
<td>12I, 19I, 20I, 23I</td>
</tr>
<tr>
<td>11I, 22I, 24I</td>
</tr>
<tr>
<td>17I</td>
</tr>
<tr>
<td><strong>Consensus provider</strong></td>
</tr>
<tr>
<td>20I</td>
</tr>
<tr>
<td>11I, 22I, 24I</td>
</tr>
<tr>
<td>12I, 19I, 23I</td>
</tr>
<tr>
<td>17I</td>
</tr>
<tr>
<td><strong>Writer</strong></td>
</tr>
<tr>
<td>11I, 12I, 19I, 20I, 22I, 23I, 24I</td>
</tr>
<tr>
<td>17I</td>
</tr>
<tr>
<td><strong>Reader</strong></td>
</tr>
<tr>
<td>11I, 12I, 19I, 20I, 22I, 23I, 24I</td>
</tr>
<tr>
<td>17I</td>
</tr>
</tbody>
</table>

4.1.3 Closing remark on network structure and distinguishing factors

Analysis of the in-depth data set show that although all roles and their decentralized or centralized characteristics have some effect on the value proposal, two of them, Reader and Writer had almost no spread among the blockchains. This result seems logical.
though all solutions using blockchain have somewhat decentralized reader and writer permissions. The Consensus provider could be fully centralized or decentralized in some solutions. Respondents argued that the Consensus provider, if different from the Orchestrator, only has executing power provided by the Orchestrator. As the Consensus provider permissions could be changed and removed by the Orchestrator in all cases, respondents believed that this role did not affect the value proposal in a major way. Orchestrators however was believed to have a major effect on the value proposal and can stall projects due to a badly designed orchestrator role in a network.

Looking closer into the top role the main responsibility for an Orchestrator is to govern its network. The initial data and the in-depth data indicated that a blockchain network’s governance model is a critical part of a blockchain network aside from its technical aspects. Using the network governance literature, a scale from centralized to decentralized can be used, in the form of Participant shared governance (decentralized), Network administrative organization governance (semi-centralized) and Lead organization governance (centralized) presented by (Provan & Kenis, 2007). A plotting following the orchestrators choice of network governance was accordingly to our interviews the most value critical design choice of a blockchain business network. The models presented by Provans and Kenis (2007) provided this study with a three-step categorization rather than our initial four-step categorization. This was not seen as a problem due to the continuum, lack of defined steps, in the decentralized to centralized scale identified earlier. Plotting the interviewees blockchain solutions according to these governance models provide the following results, see Figure 5. The figure presents how the data of blockchain business networks is distributed over a centralized to decentralized scale. This representation closely resembles the landscape presented in Figure 1 adapted from (Laird, 2018), providing additional confirmation that most blockchain projects today are mainly centralized.
The three governance models that were deemed applicable as “distinguishing factors” were Participant shared governance, Network administrative organization governance, and Lead organization governance. These three models will be used to analyze the values and VCMs in the following sections.

4.2 Blockchain and business network values

To answer our RQ2 a consolidation of the values retrieved from both the initial and in-depth data set was consolidated into two types. The two types of values, (1) blockchain and (2) business network, have been given their own section, 4.2.1. for business network values and 4.2.2 for blockchain values. In these two sections the values will also be analyzed against the tree types of governance models that were established in 4.1.

4.2.1 Business network values

The in-depth data set provided through thematic analysis a list of 11 business network values. The values together with a representative quote can be seen in Appendix G. These values that could be realized in a business network but are highly dependent on, among other things, the technical and governing structure of the network. That is why the business values have been plotted against our three governance models from 4.1.
The plotting was done on a scale with strong positive effect, shown as “++”, down to “--” representing a strong negative effect. In this table the business network values were also pooled together further to distinguish overlaying themes among the values, see Table 4.

The results show no clear advantage of any governance model and that there is always a compromise of different business network values in every choice of network governance model. Looking at the table, the values in the theme Governance i.e. the values N1, N2, N3, are strongly positively enhanced in business networks with a Lead organization (more centralized) governance model. This seems reasonable as its related values are focused on speed and efficiency, something that increase if there is only one actor deciding and controlling the network (Provan & Kenis, 2007). On the contrary, the theme Network relationship (values N8 and N9) in Table 4, shows that it has a positive effect in a decentralized environment such as a participant shared governance.

Table 4: How the business network values are affected by different governance models

<table>
<thead>
<tr>
<th>ID</th>
<th>Theme</th>
<th>Business network values</th>
<th>Lead organization governance</th>
<th>Network administration organization governance</th>
<th>Participant shared governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Governance</td>
<td>High decision and implementation rate</td>
<td>++</td>
<td>-</td>
<td>--</td>
</tr>
<tr>
<td>N2</td>
<td>Governance</td>
<td>Strong strategic consistency</td>
<td>++</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td>N3</td>
<td>Governance</td>
<td>Inexpensive governance</td>
<td>++</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td>N4</td>
<td>Network growth</td>
<td>Higher growth potential</td>
<td>++</td>
<td>+</td>
<td>--</td>
</tr>
<tr>
<td>N5</td>
<td>Network growth</td>
<td>Ease of attracting users</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>N6</td>
<td>Trust &amp; Security</td>
<td>Increased resilience to internal exploitation</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>N7</td>
<td>Trust &amp; Security</td>
<td>Higher data redundancy</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>N8</td>
<td>Network relationships</td>
<td>Ease of collaboration and resource sharing</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>N9</td>
<td>Network relationships</td>
<td>Higher consumer centric network</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>N10</td>
<td>Participant dedication</td>
<td>Increased tolerance for participants goal diversity</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>N11</td>
<td>Participant dedication</td>
<td>Low participant engagement required</td>
<td>--</td>
<td>-</td>
<td>++</td>
</tr>
</tbody>
</table>

This supports what Pisano and Verganti (2009) discussed about crowdsourcing and collaboration, that opening up and giving away authority helps create a collaborative environment. The Network growth theme, including values N4 and N5, was interesting as there were both negative and positive effects from both centralized (Lead organization) and more decentralized (Participant shared) governance models. This contradictory result is interesting as it points to the inherent difficulty with scaling
blockchain business networks. This contractionary result could be due to that the Lead organization have a structure that is more scalable with lower complexity, faster processes and higher efficiencies (Provan & Kenis, 2007), but on the other hand the participants are not as attracted to such a network, thereby slowing scaling. The lack of attractiveness for the participants could be due to the potential “lock-in effect” or as respondent 221 stated “…with more decentralized networks the lock-in-effect is not as apparent and new actors will feel more comfortable to invest in it”.

4.2.2 Blockchain values

The blockchain values were collected and analyzed the same way as the business network values in 4.2.1. The final 12 values for blockchain with representative quotes are presented in Appendix G. The blockchain values were then also plotted against the three governance models from 4.1, in the same way as business network values, which can be seen in Table 5. Overall, the blockchain values clearly indicate that the decentralized, or participant shared governance, is strengthening all the blockchain values. As blockchain is designed for these kinds of environments that lack a central entity (Hooper, 2018; Iansiti & Lakhani, 2017), this is an expected result.

Table 5: How the blockchain values are affected by different governance models

<table>
<thead>
<tr>
<th>ID</th>
<th>Theme</th>
<th>Blockchain values</th>
<th>Lead organization governance</th>
<th>Network administrative organization governance</th>
<th>Participant shared governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Data trust</td>
<td>Improved record keeping and accountability</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>B2</td>
<td></td>
<td>Improved risk assessment</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>B3</td>
<td>Network efficiencies</td>
<td>Increased efficiency in data processes</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>B4</td>
<td></td>
<td>Decreased administrative cost</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>B5</td>
<td></td>
<td>More efficient regulatory processes</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>B6</td>
<td>Data security</td>
<td>Improved data security and redundancy</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>B7</td>
<td></td>
<td>Increased reliability of the data</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>B8</td>
<td>Reach and collaboration</td>
<td>Increased collaboration</td>
<td>--</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>B9</td>
<td></td>
<td>Closer contact to end consumer</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>B10</td>
<td></td>
<td>Increased reach and globalization</td>
<td>+</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>B11</td>
<td>Network trust</td>
<td>Improved peer-to-peer trust</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>B12</td>
<td></td>
<td>Improved trust in the network infrastructure</td>
<td>--</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
From this result several themes confirm findings in earlier studies discussed in the literature review. The results from the theme Reach and collaboration is confirming with what Gann, Autio and Thomas (2014) said was one of the more important drivers of a platform. Also, Van Alstyne, Parker, & Choudary (2016) states that the value of a platform increases with the number of users, something that tied in well with the value Increased collaboration (B8). There were also some typical blockchain related values such as Increased efficiency in data processes (B3), Decreased administrative cost (B4), and different forms of trust (B1, B11 and B12), all being central to the core value offering of the blockchain technology (Iansiti & Lakhani, 2017). However, the table shows that only the theme Network trust was depending on the governance model, as the theme Data trust were strong independently of the governance model.

4.2.3 Concluding remarks on blockchain business model values

As networks gets more decentralized the easier it becomes to attract members to join the network, especially in early stages as the distribution of power is increased and there is less risk of exploitation of the network from any single member. Decentralized networks do also increase collaboration as the ability and willingness to share resources and information with each other increase as risk of exploitation decrease. This collaboration and resource sharing can increase data redundancy as information can be duplicated on to several nodes or members. As less intermediaries are involved in a more decentralized network the connection between producer and consumer can be much closer, increasing customer relationship from a producer perspective.

These positive effects come with a price as decentralized networks are much harder to scale. This is due to the increased decision and implementation time that is needed to get consensus in the network on any changes. Members taking part in every decision in a true decentralized form require a higher engagement from its members and voting systems that increase governance costs for the network. Due to this cost, a higher network consensus and alignment of goals and strategy will directly have an impact in lowering costs for the network. Lastly the closer a truly decentralized network you get the more problems will appear in a regulated market. As most legal jurisdictions require
that there is a single legal entity for all organizations a fully decentralized network without any leader or owner is hard to implement in this kind of jurisdictions. Even though there are changes being made, as of writing this report, to some countries jurisdictions the heavy regulated industries will likely always require a legal responsible if any problems occur in the network.

4.3 Value creating mechanisms

To answer RQ3 the VCMs derived from the interviews were consolidated and put into a table, see Appendix G. Although the questions in the in-depth interview guide (see Appendix B) were focused towards VCMs, the respondents often discussed values and VCMs interchangeably. An effort was made to go through the values and VCMs one additional time to make sure they were not mixed together. The VCMs were then separated from the blockchain and business network values on the sole premise that the VMCs were seen as enabling the other values in 4.2. The relationships between VCMs and its blockchain and business network values is presented in Appendix H.

<table>
<thead>
<tr>
<th>ID</th>
<th>Theme</th>
<th>Value creating mechanisms</th>
<th>Lead organization governance</th>
<th>Network administrative organization governance</th>
<th>Participant shared governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Sharing digital standards</td>
<td>Digitalizing processes</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>M2</td>
<td>Sharing infrastructure</td>
<td></td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>M3</td>
<td>Standalisation of protocols</td>
<td></td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>M4</td>
<td>Trusted transaction</td>
<td>Immutability of ledger</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>M5</td>
<td>Making data traceable</td>
<td></td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>M6</td>
<td>Increasing transparency</td>
<td></td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>M7</td>
<td>Ecosystem efficiencies</td>
<td>Distribution of power in the network</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>M8</td>
<td>Reducing network intermediaries</td>
<td></td>
<td>--</td>
<td>--</td>
<td>++</td>
</tr>
<tr>
<td>M9</td>
<td>Sharing participants data</td>
<td></td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
</tbody>
</table>

Table 6: How the value creating mechanisms are affected by different governance models

The resulting VCMs were closely linked to the literature as the Immutability of ledger (M4) and Making data traceable (M5) are at the core of the blockchain offering (Piscini, Guastella, Rozman, & Nassim, 2016; Iansiti & Lakhani, 2017). Furthermore, both Sharing infrastructure (M2) and Sharing participant data (M9) have been discussed as a value in the network (Pisano & Verganti, 2009) and blockchain (Iansiti & Lakhani, 2017) literature. Also, the Distribution of power (M7) and Reducing network intermediaries (M8) are similar values to the ones that Satoshi (2008) claimed was his
reason why he created Bitcoin. The VCMs that is a new addition to the literature is the Digitalizing processes (M1) and Standardization of protocols (M3). However, these VCMs are a side effect of the blockchain implementation instead of a direct effect of the blockchain itself. The fact that organizations need to digitalize their processes and created standardized protocols is a shift that is needed for the blockchain to work however, the digitalization shift have a huge value potential.

As with the values the VCMs were plotted against the governance models in 4.1 which can be seen in Table 6. What is clear in this matrix is that all the VCMs identified was positively affected by a participant shared governance, i.e. decentralized governance. This is to be expected when the questioner and the purpose is focused towards understanding the VCMs for decentralized blockchain networks. However, as with the blockchain values some VCMs (M1, M2, M3 and M5) were effective no matter what governance model they had. All but one of those VCMs were in the theme Sharing digital standards which indicate that creating those VCMs are not necessarily about how they are governed. This ties in with a discussion in our workshop (see “Brainstorming session” in Appendix D):

It seems like one of the key VCMs that the blockchain business network brings is neither about blockchain nor network but more about creating a common standard to gain efficiencies when interacting with each other on a network. As Gann, Autio and Thomas (2014) stated that one of the key leverages of a platform is the coordination and standards that follows, it seems like the decentralized blockchain works similarly.

“... the focus on blockchain may be wrong, why gather people to the table using blockchain, ... promise digitalization! Then after the standardization and digitalization has been completed then the network would be ready to discuss the question about centralization or decentralization.” – Workshop participant from company Alpha

It is clear that the full potential of blockchain business networks are more likely to be in a decentralized environment. However, in a centralized environment it can still provide some niche value in specific cases, for example in resource sharing networks of sensitive information.
5. DISCUSSION & CONCLUSIONS

This section presents the discussions and conclusions around our research questions and the result. Also, the section discusses the impact of the result in both theoretical and managerial environments. Finally, limitation and future studies are presented.

5.1 Conclusion – the critical choice of decentralized governance models and its effects

Our result and analysis have given us three insights. Firstly, we have concluded that a distinguishing factor between a decentralized and centralized blockchain business network could be its governance model. The three network governance models used was Lead organization representing a centralized governance, Network administrative organization representing a semi-centralized governance and Participant shared organization as a decentralized governance model derived from Provan and Kenis (2007). Choosing the right level of decentralization in a blockchain business network is found important for the network’s success. We also saw that a fully decentralized blockchain business network might never be feasible due to difficulties related to legal issues, scaling problems and difficult to draw revenue from these networks which confirms Jew and Samman (2016) statement regarding the difficulties of decentralization. The most value efficient decentralized blockchain business network may therefore be a hybrid leaning close to a decentralized solution, yet not fully decentralized.

Secondly, as presented in 4.2 a total of 11 business network values and 12 blockchain values were derived from the interviews (see Appendix G). Furthermore, these values were then plotted against the three governance models to see the positive and negative effects the scale of centralization has on these values (see Table 4 and Table 5). This study found that some of the values and VCMs for the business network were very dependent on the level of centralization of the business network while a few were not affected at all.
Finally, we have derived nine VCMs for a decentralized blockchain business network, (see Table 6). When analyzing the data from these nine VCMs they were found to influence the value proposal of a blockchain business network (see Appendix G).

As mentioned from our results, several VCMs and values were not necessary blockchain related but more about modernizing a business process. This ties in with the discussion about digitization, digitalization and business transformation. As with digitalization requiring digitization, blockchain is requiring digitalization thereby forcing digitization of one’s business. The key VCMs of the blockchain business network could be that businesses are forced to digitize their business, collaborating with suppliers and competitors, establishing standards, etc. Brynjolfsson and Hitt (2000) also discussed similar ideas with how new technologies fundamentally alters businesses and not just the technology on its own. Instead of using blockchain as a way to change the whole business, companies should consider a step-by step method climbing the digital value chain and to not set up too big of a goal initially. Ensuring that the business have time to adapt to the new technology is supported by Orlikowski and Barley (2001) stating that organizational transformation and technologic transformation should be done in relation to each other. When all that is established the effects of a blockchain can come to life, bringing their own niche benefits. However, for a vast number of companies it is likely that most of the efficiencies are already realized when digitizing or digitalizing their networks.

5.2 Theoretical implications

Even though the literature within the blockchain technology is a popular and fast emerging topic, it could still be considered scarce and unconsolidated (Altmann, 2019; Wall & Malm, 2016). Because of this every new dataset helps increase the understanding of the blockchain in all its dimensions. Although blockchain network values are somewhat established in the literature (Iansiti & Lakhani, 2017), this study gives another input to the discussion. In 4.2.1 and 4.2.2 we present the set of blockchain and network values we collected from our interviews. Analyzing the values together with the governance models and VCMs puts the values in a new context.
helping to add a centralized and decentralized aspect of the blockchain and business network values.

The results also present how a distinction between a decentralized and a centralized blockchain can be made clear from a value perspective. By connecting Provan and Kenis (2007) governance models to the orchestrator roll of a blockchain network, we increase the understanding of the governance role within a blockchain network. Furthermore, with these models being validated against our data set we can also support Provan and Kenis (2007) claim that no model is superior to another. All our models had their inherent weaknesses and strengths, not one governance model strengthens all values or VCMs.

### 5.3 Managerial implications

The managerial implications form these studies are twofold. For businesses overall and managers specifically, the insight presented in 5.1, that several blockchain VCMs are realized without the need for blockchain, could help them reevaluate their business needs and what changes they want to implement. This more nuanced understanding of the blockchain offering could help managers avoid costly and complex blockchain initiatives by focusing on proven initiatives such as digitizing or digitalizing processes.
Secondly, understanding some of the values that exist as well as the how the choice of governance model impacts the value proposal of a network could be useful for managers if they want to initiate their own blockchain network. To help facilitate that understanding a figure have been derived (see Figure 6) from the matrixes in our findings, showing the main strengths and weaknesses together with success factors for each governance model. In Figure 6, the focus is not on the values or VCMs of that respective governance model, but a more general list of the concluding managerial insights gained from this study.

5.4 Limitations and future research

The novelty of the subject made defining aspects for respondents, such as “decentralized blockchain networks” and “orchestrator role” as well as explaining differences between “value creating mechanisms” and “value” difficult. A future study, looking further in the differences and similarities between VCMs and values of a blockchain would help fill that gap. Furthermore, building on the three governance models suggested in this study, a study problematizing and elaborating on how blockchains can be governed would be interesting from both a practitioners and academics point of view. Finally, with the realization that several of the VCMs of a blockchain are mostly related to realizing digitization or digitalization, a study evaluating that relationship would be interesting. Evaluating the blockchain potential from the perspective of both digitization VCMs, digitalization VCMs and finally blockchain VCMs would help practitioners decide upon if it is blockchain they really need, or digitization or digitalization of their business. Also, this would further help academics understand the blockchain phenomenon and its intrinsic value offer.
6. REFERENCES


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APPENDIX A: Initial interview guide

Background

We are two master thesis students that are employed here at Nasdaq during the spring 2019, our goal is to understand what driving aspects there are in a business model for decentralized blockchain platforms. We have scheduled this interview with you to understand more about you and your line of work here at Nasdaq as well as ask you about a few questions within blockchain networks, centralized and decentralized, platforms and financial ecosystems.

Interview process

This interview will take about 40 minutes and consists of two 20-minute sections. The first part is dedicated for us to learn more about you, your position at Nasdaq and what current projects you are working at right now. During the last remaining 20 minutes we will ask you about the topic that we are researching in a few open-ended questions.

Confidentiality

To be clear, we both have signed a full non-disclosure agreement with Nasdaq and the final report based on this interview will be clear of any sensitive information. Your name will also be anonymous in the transcribed interviews and in the final report. The last part of the interview will be recorded for us to be able to transcribe your answers correctly, the recordings and your contact details will be deleted when the anonymized transcriptions are completed.

Get in touch

If you want to get in touch with us you can contact us on email, you can find our contact information in the interview invitation email.

Any questions before we start the interview?
Background questions

Question 1.1:

Tell us a bit about yourself, what are your current employment here at [Company]?

Question 1.2:

Could you tell us a bit about your background before you got your current position?

Question 1.3:

Could you describe some of the general areas of work in your position?

Question 1.4:

What is/are the current project(s) you are working on?

Question 1.5:

Would you consider your general expertise to be technical or business focused?

Question 1.6:

Is there anything that you would like to add to your background that we have not yet covered?

Question 1.7:

This is the end of the first part of this interview we will now turn on our recording device and continue to our research questions, are you ok with that?

Explorative research questions

Question 2.1:

Within your position at [company] do you ever encounter work related to the blockchain technology?
- Can you give an example?
- In what way?
- How does that work?

Example: Blockchain is a technology for secure and transparent data storage, one example of a successful use of blockchain is Bitcoin. There are also other initiatives in finance, health care, real estate, logistics and more where a blockchain technology seems to be a viable solution for making transactions more effective and efficient.

With that in mind, what do you believe are some key aspects to get blockchain to function in a business perspective?

- Can you give an example of that?
- How do they do that?
- Can you explain that further?
- Can you give an example of a company or a product that does this?

Question 2.2:

Within your position at [company] do you ever encounter work related to digital platforms?

- Can you give an example?
- In what way?
- How does that work?

Example: Digital platforms is a site that allow multiple actors (producers, distributors, regulators, etc.) to connect to it and interact with each other to create or exchange value. Facebook, Apple, Amazon and Google are some examples of successful digital platforms.

With that in mind, what do you believe are some key aspects to get platforms to function in a business perspective?

- Can you give an example of that?
- How do they do that?
- Can you explain that further?
- Can you give an example of a company or a product that does this?

Question 2.3:

Within your position at [company] do you ever encounter work related to centralized or decentralized networks?

- Can you give an example?
- In what way?
- How does that work?

**Example:** A centralized network is a network where all users connect to a central server which act as an intermediary for all transactions and communications within the network. Facebook could be seen as a centralized network were if Facebooks servers is down the network will no longer function.

A decentralized network has no central node or server that act as an intermediary, the actors in the network can make transactions and communicate directly with each other and does not depend on a central authority. The internet is an example of a completely decentralized network where a large part of the network can be down and still function, another example is Bitcoin.

**Could you give an example of a completely decentralized network?**

**What are some key aspects to get and decentralized networks to function in a business perspective?**

- Can you give an example of that?
- How do they do that?
- Can you explain that further?
- Can you give an example of a company or a product that does this?

**Question 2.4:**

**Within your position at [company] do you ever encounter work related to decentralized blockchain platforms?**

**Example:** There is many pilot blockchain projects that have a centralized node such as Nasdaqs Nordic Fund Ledger, Maersk LENS, IBM Hyperledger. If the central node or company responsible for the blockchain fails, then the whole blockchain network seize to exist. A decentralized blockchain platform similar to Bitcoin will not fail if larger part of the network is down.

**During the interview you have talked about these [See interview notes] aspects, with these in mind what do you believe are some key aspects to get a decentralized blockchain platform to function in a business perspective?**

- What of the earlier aspect that you have told us are relevant or irrelevant?
- Do you think of any other aspect or driving force that can be relevant?
- Can you give an example of any company or product that utilize that aspect?
- How do they do that?
- Can you explain that further?

**Question 2.4:**

*Is there anything that you would like to add that we have not yet covered that may be relevant to this study?*

**Wrap-up questions**

**Question 3.1:**

*Can we contact you again if we need more information or for some follow up questions?*

**Question 3.2:**

*Do you know anyone else that we can contact that would be interesting for this research?*

**Question 3.3:**

*Would you consider your understanding of the blockchain to be non, basic, intermediate or advanced?*

*Would you consider your understanding of a platform to be non, basic, intermediate or advanced?*

*Would you consider your understanding of a decentralized to be non, basic, intermediate or advanced?*
APPENDIX B: In-depth interview guide

Background

We are two master thesis students that are employed at Nasdaq during the spring of 2019, our goal is to understand what value creating mechanisms are there in a business model for decentralized blockchain platforms. This study has moved into its second phase where will study three previously identified value areas deeper. These are (1) Governance, (2) Trust, and (3) Blockchain value proposal. These three has been identified during our initial study into this subject. However, feel free to add, remove and go outside these areas at any time if you think that we have missed any critical mechanisms. We have scheduled this interview with you to understand more about you and your current projects as well as ask you about a few questions within blockchain from a business perspective related to our research topic.

Interview process

This interview will take maximum 60 minutes and consist of three sections. The first 5 minutes is dedicated for us to learn more about you, your position at [company] and what current projects you are working at right now. The second section (15 minutes) of this study is aimed to map and identify the characteristics of your blockchain solution. After these first steps the remaining 40 minutes we will ask you about the topic that we are researching in a few open-ended questions. Due to the importance that we cover all research topics in this interview within our limited time frame we might stop you during the interview to continue to the next question.

Confidentiality

The final report based on this interview will be clear of any sensitive information. Your name, company and any personal affiliation will be anonymous in the final report. This interview will be recorded for us to be able to transcribe your answers correctly, the recording and your contact details will be deleted when the anonymized transcription are completed.
Get in touch

If you want to get in touch with us you can contact us on email, you can find our contact information in the interview invitation email.

Any questions about the interview before we start?

Background questions

We will now start our recording device

Question 1.1:

Tell us a bit about yourself, what are your current employment at [Company]?

Question 1.2:

Tell us a little about [Company], what industry are you operating in and what products and solutions do [Company] offer?

Value proposal

Question 2.1:

Can you describe what value you think that blockchain can provide to your company’s industry?

Question 2.2:

Can you describe what value your blockchain solution that [Company] provide?

- What value do you provide with this solution that is unique to other non-blockchain solutions?

What value do you provide with this solution that is unique to other blockchain solutions?
Blockchain network structure

In order for us to evaluate your answers in greater detail we want to map up your blockchain solution and its network roles. This section will present the roles we have found in prior cases and literature and use these to map your blockchain network characteristics.

Question 3.1:

In our study we have identified four roles in a blockchain network: (1) Reader, (2) Writer, (3) Consensus provider and (4) Orchestrator. We define them as:

(1) A participant that can read and monitor the blockchain and its content.
(2) A participant that can issue a new asset or request a transaction to the consensus provider.
(3) A participant that have the responsibility and right to provide consensus in the network. This can be provided by a consensus model with several other consensus provider or by a single entity.
(4) The participant or group of participants that have the responsibility and right to decide any network-level decisions. This includes network updates, network entrance requirements, rules standards, etc.

Would you like to add or remove to this list?

Question 3.2:

Looking at your blockchain solution, what rights and obligations does a READER have?

We define a reader as a participant that can read and monitor the blockchain and its content.

- Who can read?
- What can they read (parts or all the information)?

Looking at your blockchain product, what are the requirements to become a READER?

Question 3.3:

Looking at your blockchain product, what rights and obligations does a WRITER have?

We define a writer as a participant that can issue a new asset or request a transaction to the consensus provider.

- Who can write?
- Can you issue a new “asset” on the blockchain? If yes, who can do that?
- What can they write (parts or all the information)?

**Looking at your blockchain product, what are the requirements to become a WRITER?**

**Question 3.4:**

**Looking at your blockchain product, what rights and obligations does a CONSENSUS PROVIDER have?**

We define a consensus provider as a participant that have the responsibility and right to provide consensus in the network. This can be provided by a consensus model with several other consensus provider or by a single entity.

- Who can provide consensus to the network?
- How many nodes can provide consensus to the network?
- What are the requirements to become a consensus provider?

**Looking at your blockchain product, what are the requirements to become a CONSENSUS PROVIDER?**

**Question 3.5:**

**Looking at your blockchain product, what rights and obligations does an ORCHESTRATOR have?**

We define an orchestrator as the participant or group of participants that have the responsibility and right to decide any network-level decisions. This includes network updates, network entrance requirements, rules standards, etc.

- Who is the orchestrator?
- How many can become an orchestrator?
- What are the requirements to become an orchestrator?

**Looking at your blockchain product, what are the requirements to become an ORCHESTRATOR?**
Trust

In our initial study we have seen that a critical value creating mechanism is to ensure trust towards different entities in the network. We have identified three areas of trust that we have seen as critical for a successful network. In this section want to identify what trust you have identified and how you have created trust in these areas.

Question 4.1:

In our study we have identified three areas of trust when creating a blockchain enabled network: (1) Peer-to-peer trust, (2) Network trust and (3) Orchestrator trust. We define them as:

- Trust between participant and participant (companies or individuals).
- Trust between the participants and the network, governance, protocols, systems and infrastructure.
- Trust between the participant and the network owner and developer.

Would you like to add or remove to this list?

Question 4.2:

Considering the areas mentioned, which would you consider the most critical when creating a successful blockchain enabled network?

Question 4.3:

Looking at your current blockchain solution, how do you create trust in that network?

- Does the blockchain technology make it easier or harder to ensure trust in that network?
- How does it make it harder or easier?

Governance structures

In our initial study we have seen a strong connection between choosing the right governance models and its networks success. In this section want to identify what governance you have and what positive and negative effects these governance models have on a network.
Question 5.1:

In our study we identified three types of network governance structures that is relevant to blockchain enabled networks: (1) Participant shared governance, (2) Network administrative organization governance and (3) Lead organization governance. We define them as:

1. Refers to a governance that is decentralized in its nature were the networks participants is the ones that decide on the network-level decisions by voting or similar methods. Example: Bitcoin.
2. A semi-centralized network governance where an external organization is the governing entity. This entity is often a non-profit organization comprised of elected network participants. Example: Ethereum.
3. A few selected entities or a single entity that have full control and responsibility of the network. All network-level decisions are made by the Lead organization. Example: Stellar, Concordia.

Would you like to add or remove any to this list of network governance structures?

Question 5.3:

Looking at your current blockchain solution, what kind of network governance do you have?

Question 5.4:

What positive and negative effects do you see in a shared participant governance model?

We define participant governance model as a governance that is decentralized in its nature were the networks participants is the ones that decide on the network-level decisions by voting or similar methods (Bitcoin).

- Would you consider this a scalable model?
- Would you consider this model be suitable for more complex or simple network transactions?
- Do you consider this model to be more suitable for fast or slow transactions?

Question 5.5:

What positive and negative effects do you see in a Network administrative organization governance structure?
We define a Network administrative organization as a semi-centralized network governance where an external organization is the governing entity. This entity is often a non-profit organization comprised by elected network participants (Ethereum)

- Would you consider this a scalable model?
- Would you consider this model be suitable for more complex or simple network transactions?
- Do you consider this model to be more suitable for fast or slow transactions?

Question 5.6:

What positive and negative effects do you see in a Lead organization governance model?

We define a Lead organization governance model as a few selected entities or a single entity that have full control and responsibility of the network. All network-level decisions are made by the Lead organization (Stellar, Concordia)

- Would you consider this a scalable model?
- Would you consider this model be suitable for complex or simple network transactions?
- Do you consider this model to be more suitable for fast or slow transactions?
Wrap-up questions

Question 6.1:

This study aims to understand what value creating mechanisms there are for a decentralized blockchain platform. What would you see as a value creating mechanism if you would decentralize your blockchain solution?

Question 6.2:

Considering our research topic, is there any question that we have not yet covered that could be discussed in future interviews?

Question 6.3:

Could we contact you for follow-up questions if we find that necessary?
### Appendix C: List of respondents

<table>
<thead>
<tr>
<th>ID</th>
<th>Industry</th>
<th>Organization</th>
<th>Profession</th>
<th>Date</th>
<th>Duration</th>
<th>Type of interview</th>
<th>Round</th>
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<td>5E</td>
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<td>Strategic Business Development</td>
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<td>45 min</td>
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Appendix D: Workshop Notes

Workshop Blockchain and networks in the financial sector

Date: 2019-04-10
Time: 12:00 – 15:00 (GMT +2)
Setting: Stockholm video conference room Sweden and London via link.

Purpose

Consolidate knowledge and experiences between all participants to gain a deeper understanding of what value creating mechanisms there are in a decentralized blockchain network.

Confidentiality

The workshop was held under the Chatham House Rule which implies that participants are free to use the information received, but neither the identity nor the affiliation of the speakers, nor that of any other participant, may be revealed.

Agenda

• Introduction
• Financial services report
• Decentralized blockchain perspective
• Industry utility initiatives
• Whiteboarding
• Conclusions

Financial services

During the workshop the participants highlights that fast time to market can significantly lower costs and is a secure way to win new customers, in contrast of this there is often a lot of legacy in the financial industry that make businesses take years to innovate. The participants further describe that there is an emerging approach that takes advantages of the existing firms’ capabilities to launch new offerings.
As of today, there are several banks that are already using the this fast paced grassroot business approach. This approach is a practical strategy that can accelerate change in the parent organization. The starting point of this strategy is often to identify an unmet customer need, identified from existing customer data or the potential for a radically lower cost approach. In the study presented by the participants the path to success is not to focus on what needs to be done but more on how to do it. Further it explains how to execute new innovative solutions and products even though the business’s cash cows are in twined in legacy systems and processes. The value is to create a new culture in a new company or project with a full, rapid and top down support all the way from the board members to the CEO and further down. To succeed, the strategy needs to start form the customer, put data and analytics at the core, have a distinct culture and governance, and be built to scale up and meet stringent risk and cyber requirements.

While there are examples of hybrids of this strategy the implications are often that the project takes more time and money than necessary. Therefore, it is a full commitment often the only way of succeeding in this industry. There is no way of doing this strategy in incremental steps, there must be a revelation in the business and in the industry. A clear barrier to this strategy is that the technology legacy needs to be ignored, this does especially tie into blockchain offerings. There is a dangerous pit fall with legacy systems influencing new products or companies that make new radical technologies that are too compatible with its legacy technology. The technology needs to be built from the bottom up otherwise it will never be implemented! You can't imitate the same system that you already have. The business embarking on to this strategy will both need the full support from both the business and its technology departments.

With new technologies it is crucial that the developers have early input with regulatory entities. This is a success factor that is especially applicable for business to business (B2B) companies. This is because the regulatory entities are often most interested in fostering consumer or client value in a market. A business to consumer company can have an easier time to present for the regulators its value for its clients and customers
then B2B companies have. Regulators are often questioning what value is created for the clients and have in history been easier on technologies that have a clear value proposal for its clients. The businesses that have a heavier focus on the technology solution before its client’s value proposal will often have problem getting regulators on to their side. Looking at blockchain, the problem is that the blockchain technology and its solutions often stretches over several regulatory systems either in different industries, different countries or both.

A concept called digital challengers is a small business that have a data-driven approach for creating new technologies. These companies can easily start up small and grow quickly, have a low time to market, low costs and often have a willingness to sacrifice near-term profitability for building a business that can scale rapidly.

These digital challengers are business that utilizes their small size and data-driven approach way of creating technology to get solutions out fast on to the market. They are often starting small and are good at focusing on the client values and getting the regulators on their side from the start. When implementing these radical solutions from these businesses the barriers of adoptions will be high. Reducing this cost is crucial the question is just how can we manage to decrease this cost? Another insight brought up by the participants is that big companies might be talking and interacting too much with their internal innovation departments. These are departments that often does not have power or the resources to make big changes outside their assigned task and strategies, locking them to a predefined path. These departments have smaller budgets and less support from business leaders, making it hard to implement new solution without this top down support from the start.

The point of doing this strategy is to leverage the agility of a digital challenger when you are stuck in legacy system. By creating an independent digital challenger for the next innovative solution will deliver business opportunities and create a transformational catalyst where you can do things fast in a safe way.

**Blockchain perspective thesis presentation and questioning**

[Presenting initial results from the thesis study]
When looking at the framework and more precisely on the centralized and
decentralized scale, is there actually a true difference in the characteristics of the
network or is the only variable the number of participants? Are the different stages in
the framework really tied to a different value model?

Looking at the decentralized part of the scale there are no true decentralized
blockchain network in the financial world right now. Arguably there are no example
of a true decentralized network, looking at the internet for example, the system might
behave as a decentralized network but looking at its origin even the internet was highly
centralized. Today it is still centralized as you have an entity that decide on what
standards should be used and there is a heavy dependency on the eight or so main root
servers. What made the internet possible and popular was the fact that it started out as
a noncommercial solution. When building these systems or networks you need a
promoter someone that take time and money to create this without a commercial
mindset.

Even looking at Bitcoin it could only be considered semi-decentralized. A true
decentralized network is not possible in the market we have today due to regulatory
difficulties. The world is built on the concept that there must be someone to blame if
something goes wrong.

Looking back at blockchain it may not be the final solution. However, the vision is
truly useful, a concept like “Inspired by blockchain” can absolutely be a successful
solution. Blockchain makes organizations sit down the same table and coordinate with
each other. Making standards in a network across the industry is a great way of making
a market more efficient but does not require a blockchain solution. Standardization
initiatives can be viewed as a way of doing the blockchain network idea without
implementing any blockchain technology. The problems with standardizations,
however, is that they are very hard to define accurately and often get outdated fast,
especially in the technology sector.

Blockchain is a distributed trust mechanism, not looking at the anarchist culture around
it, is there actually a case where decentralization will make it cheaper than a centralized
counterpart? In every instance the cost is higher. However, the claimed value of the platform or network can sometimes be higher. But still even though there is a theoretical business case the difficulties to change the regulatory system is a huge barrier. Who is the owner and who are responsible when something bad happens?

Decentralized networks won't work because people need to join the network and for that you need a salesperson that make sure that people join. Leaving it up to a decentralized platform might make it hard to enable growth. Some form of incentive or application on top of the platform that make sure that new members join might be needed.

**Industry utilities**

When defining a utility, it is not only a standardization tool, but it comes with several tangible values. Two clear examples of this is the service BankID and Swish. Both these are a product founded through a standardization of an inefficient market. However, it has a clear additional value on top of what's incorporated in the application. A utility approach often is a non-commercial project. Creating a benefit in markets by cutting costs and making the market more efficient without the focus of creating revenue streams from these benefits. There are however a few successful examples of projects where the creators have shared the equity or profit of the product to the users. Sadly, there has been a trend lately to organization owned projects and closed consortiums.

Having an open platform spirit is key for successful utilities in markets, for example in the post trade solutions there is a clear value that can be made for all parties, this is where a true utility could be created. There is still in an open spirit in this sector where the industry needs and want to share information and access a common environment. However, the problem is as always, the commercial problem, how do you capture the profits? Another pitfall for these kinds of common market utilities is that these can easily grow big very fast and become much bigger than it was initially planned. The problem that this often results in, is the utility expanding over on to other adjacent steps in the value chain. Suddenly cannibalizing on the market that created the utility
in the first place. The utility then loses its value for the market and then no one will continue to use it.

A critical success factors for utilities are like all network applications to reach its critical mass. However, a barrier in these market utilities is the lack of incentives for joining early, if I can join later why risk time and money now when I can join in this solution later? Looking back on to the blockchain technology an incentive token can be a way of creating incentive for the early adopters. Inspiration could even be borrowed from a pyramid scheme where the network participants are incentivized to recruit more to the existing network.

The value of the momentum that blockchain and everything around it still have is key to get people and organizations interested. It is a great tool for creating standards and to quickly get critical mass. We see a lot of movement in the blockchain space, but the question is how can we make a business from that in this space? Let’s drop that the blockchain is great and that its going to revolutionize the world and lets instead solve a problem! One last barrier to success is that this financial space has a lot of inertia in it. Especially if you want to take away a lot of costs, then you need a long process that can easily take several years to implement. It is crucial to create a well-defined interface with clear values. For example, a utility value could be lower costs, regulatory requirements (Know you customer), risk diversification, predictable service & quality, improved agility, efficiency through standardization and faster time-to-market.

Lastly regarding the thesis framework, you should cut write and read to focus on the aspects of orchestrating, who is making the decisions and consensus provider, who enforce the rule. You could also switch centralized and decentralized to formal and informal, i.e. is the decision for the blockchain made in a formal or informal setting.

**Brainstorming session**

Arguably your platform solution or blockchain consortium could be seen as an example of our study even though it has not formally been used. It could however be seen as a cannibalization on your company's main business, which is not the goal
accordingly to our study. Its true value is created when companies can use the existing capabilities to come up with new technologies in new markets.

Trust is that you can sue someone, so trust can be high at consumer to consumer or business to business. Lock-in effect can be separated to the trust. The barriers of exit, the cost of exit will always be higher than staying. There is always a lock-in effect.

An interesting turn of event in the financial markets is new ways of dealing with dept. Dept as a resource has been growing its being used as a tradable entity. A part of the financial system that is not currently on your company's radar. For example, cars as a service can now much easier be valued, insured, traded and audited as the gathering of data about the car’s heath is increasing and it can be securely with proven validity. Could this be a case for blockchain? The value is always in the interception between blockchain and the real world. Ever changing, real-time updating insurance and coverage on a car or for a farmer’s yield as a service is the true value not the information itself.

The problem is that blockchain is so tied to decentralized networks, this is creating all the problems which we have been coved earlier. The focus on blockchain may be wrong, why gather people to the table using blockchain, let people bring them self to the table with the promise of digitalization. Then after the standardization and digitalization has been completed then the network would be ready to discuss the question about centralization or decentralization.

It is always hard to present bad internal reports on blockchain because you always ask yourself will it truly die or did, we fail to see it? The thing about blockchain is it brings people to the table, gets people talking about their problem and inefficiencies. But for many, blockchain is not the solution, instead, digitalization of one's documents and processes are the right step for most. People need to understand that blockchain is just one of many ways to increase efficiencies through digital means. Also, blockchain is quite advanced, many companies are not ready for that technology and change to their organization and processes. If they still struggle with lack of efficiency through paper-based processes, going straight for the blockchain solution might be too large of a task.
However, if their processes are updated and their needs align well with what blockchain can offer with immutability, shard information etc. then yes, blockchain might be an alternative for your business.
Appendix E: Blockchain, now and in the future

The blockchain landscape has changed a lot in these two years. Since 2013 the investments and the interest from practitioners has seemingly followed the Gartner’s hype cycle seen in Figure 1. Gartner’s hype curve provides a graphic representation of the maturity and adaptation of technologies and applications (Gartner, 2019). As

![Gartner's hype curve (www.gartner.com)](image)

Bitcoin is often seen as the indicator for the interest of blockchain the price of a bitcoin could tell a lot about the interest of the blockchain technology. When comparing the hype cycle to the price of Bitcoin, one can see that they share similar trend indicating that the blockchain hype may already peaked. After the hype of the technology, the ones left engaging in the technology is now trying to find and realize the value proposal that blockchain once promised to provide. This change might indicate the “Through of Disillusionment” stage of Garner’s hype curve and this year can be the start of the slope of Enlightenment (Orcutt, In 2019, blockchains will start to become boring, 2019).

According to Iansiti and Lakhani (2017) a blockchain consists of five core principles, namely (1) distributed databases, (2) peer-to-peer transmission (3) transparency with pseudonymity, (4) irreversibility of records, and (5) computational logic. The author explains the distributed database as a ledger including all transaction history and its transaction contents. There is no central authority or intermediary ensuring that, no single operators can alter or control the current and former transactions. Instead, every party (i.e. node) in the network verify the records of its transaction partners. Peer-to-peer transmission refers to the lack of intermediary, instead, communication and interaction occurs directly between individual actors on the platform. Simplified, when
a transaction is requested it is bunched together with several other transactions and included in a new block. This block is then encrypted using the last block in the blockchain effectively adding the block to the chain. When a block has been added the new version of the blockchain (i.e. ledger) is broadcasted to all other nodes so that all nodes has the newest version of the ledger (Iansiti & Lakhani, 2017). *Transparency with pseudonymity* gives the user the choice to be anonymous using their public key (a 30-plus-character address). The fact that the transactions occurs between addresses instead of personal information enable the complete openness and visibility of all the transactions. However, due to the ledger being public, a user can see all the transactions that has been done using that key which can cause problems if a person’s identity is somehow linked to the public key (Satoshi, 2008; Iansiti & Lakhani, 2017).

The *irreversibility of records* gives the blockchain its falsification free abilities, that once a transaction is put into a block, updated and accepted by the other nodes, it is practically impossible to alter it, due to being linked and encrypted to all former transactions in a chain (Orcutt, How secure is blockchain really?, 2019). Lastly, the *computational logic* of the system creates the possibility of programing transactions and creating rules to automatically trigger interactions between nodes (Iansiti & Lakhani, 2017). An example of this computational logic is the mining of blocks, that is when computers are trying to solve a resource demanding cryptographic puzzle. This is called proof-of-work and provides the right to write a block. A significant amount of computer power is needed to solve a single proof-of-work and get the right to write a block. After a block is created then validated by other nodes in the network, false blocks or incorrect data are said to be practically impossible to write onto the blockchain (Piscini, Guastella, Rozman, & Nassim, 2016).

There is an incentive to increase the computing power due to its increased probability to solve the proof-of-work. Due to this puzzle solving contest between miners, the Proof-of-stake consensus model is a very energy demanding model that has gotten critic for being wasteful and environmental hostile. The “consensus” in a network is about coming to an agreement about a single truth, often referring to the ledger of the blockchain. An alternative consensus model is proof-of-stake which aims to provide
the same type of fair distribution of new blocks without the need of miners burning a large amount of energy. Proof-of-stake will distribute the right to write a block proportionally to their stake in the native token, i.e. cryptocurrency. A high stake in the native token proves the exposure to the network and implies that the miner will try to “do the right thing”.

The first decade of blockchain

The blockchain technology has already been celebrating its first decade in existence, during this time it have gone from an experimental digital currency to a revolutionary technology with disruptive potential on a scale that can be compared to e-commerce’s change on the world (Gupta, 2017). Blockchain as a technology have gone through many evolutions but most scholars and industry experts are on the same page that blockchain was in the beginning only a supportive technology for Bitcoin, the cryptocurrency that was created by the unknown person or group under the pseudonym Satoshi Nakamoto (Satoshi, 2008; Marr, 2018; Gupta, 2017; Srinivas, Fromhart, & Trujillo, 2017). After the release of Bitcoin in 2008 the blockchain technology has according to Gupta (2017) gone through five major evolutions with this release being the first. After the release, the understanding that blockchain itself could be a potential fit for other industries and usages become the second step in the evolution of blockchain (Gupta, 2017). Next, the innovation of smart contracts by incorporating self-executable code commands within the blockchain, created the ability for participants to utilize financial instruments like bonds or loans (Gupta, 2017; Klotz, 2018). Then, in the early 2010s the creation of an alternative work allocation method is created, allocating mining work through a proof-of-stake instead of proof-of-work, essentially shifting the block creation task from the one with the most computing power to the one with the larger amount of stake or ownership over current issued coins (Kiayias, Russel, David, & Roman, 2017; Gupta, 2017). This shift is claimed to make the blockchain more secure and energy efficient (Kiayias et al., 2017). Finally, the most recent mayor innovation is the blockchain scaling, where the
shared ledger is split into different nodes to improve performance (Gupta, 2017). This could according to (Zamani, Movahedi, & Raykova, 2018) help overcoming problems with performance and scalability by decreasing the need for communication, computation and storage.

*Future Trends and usage*

According to (Gupta, 2017) almost every major finance institution is today conducting some form of blockchain related research. This shows the potential the banks see in this new technology and some areas are already changing. Tapscott and Tapscott (2016) has discussed about the possibilities of blockchain changing the aspect of identity & reputation, how companies are moving & storing value, lending & borrowing, trading value in marketplaces and managing risk & tax. Tapscott and Tapscott (2016) pointed towards the blockchain company Cosmos that helps connect every blockchain in the world, earning them the title “internet of blockchains.”. Cosmos claim that they would solve the issue with scalability by shifting the way the protocols are constructed and by connecting multiple blockchain to one another. Furthermore, they claim that they could help connect different cryptocurrencies with one another this would making the coins created on your blockchain transferable to other currencies such as Bitcoin or Ether. Tapscott (2018) discussed further in an article in The New York Times that blockchain could help solve problem related to voter fraud, lack of trust in the voting process and voter participation.
### Appendix F: Definitions of trust

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</tr>
</thead>
</table>
| **Trust in business is the expectation that the other party will behave with integrity.** | Synonymous with business integrity:  
- Honesty  
- Consideration  
- Accountability  
- Transparency | (Tapscott & Tapscott, 2016)                                                     |
| **The presence of multiple definitions is likely due to two reasons:**  
Trust is abstract, often used interchangeably with related concepts such as credibility, reliability or confidence  
Trust is multi-faceted, incorporating cognitive, emotional and behavioral dimensions. | General overview of trust:  
- Philosophy  
- Psychology  
- Management  
- Marketing | (Wang & Emurian, 2004)                                                        |
| **Trust is an expectation held by an agent that its trading partner will behave in a mutually acceptable way.** | Characteristics of trust:  
- Trustor/Trustee  
- Vulnerability  
- Produced actions  
- Subjective matter | (Sako & Helper, 1996)                                                        |
| **Once gone, trust is incredibly hard to regain...** | Three types of trust  
- Contractual trust  
- Competence trust  
- Goodwill trust | (Accenture Technology, 2016)                                                   |
| **Trust is an extraordinary rich concept, covering a variety of relationships, conjoining a variety of objects.** | Digital trust: Digital ethics and Security | (Nissenbaum, 2001)                                                        |
| **The definition of trust ... is the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party.** | One can (among other things) trust/distrust:  
- Persons  
- Institutions  
- Governments  
- Information  
- Deities  
- Physical things  
- System | (Mayer, Davis, & Schoorman, 1995)                                               |
|                                                                                | Factors of perceived trustworthiness:  
- Ability  
- Benevolence  
- Integrity | (Schoorman, Mayer, & Davis, 2007)                                              |
|                                                                                | Several terms have been used synonyms to trust, among these are:  
- Cooperation  
- Confidence | (Mayer, Davis, & Schoorman, 1995)                                               |
… while trust is an attribute of a relationship between exchange partners, trustworthiness is an attribute of individual exchange partners.

Trust, trustworthiness and opportunism is closely related. (Berney & Hansen, 1994)

**Form of trust:**
- Weak form of trust
- Semi-strong form trust
- Strong form of trust

Thus, both the rational calculation and the “leap of faith” comprise trust. (Zaheer & Venkatraman, 1995)

**Dimension of trusts:**
- Cognitive
- Calculative
- Behavioral

Embedded social practices, ethnicity and past experiences are key forms of social trust. (Zucker, 1986)

**Three forms of trust creating mechanisms:**
- Characteristic based trust
- Process based trust
- Institutional based trust

According to this formulation, trust is warranted when the expected gain from placing oneself at risk to another is positive, but not otherwise. Indeed, the decision to accept such a risk is taken to imply trust. (Williamson, 1993)

**Different type of trust**
- Calculative
- Personal
- Institutional
**Appendix G: Blockchain, business network and VCM representative quotes**

*Business network values and representative quotes*

<table>
<thead>
<tr>
<th>ID</th>
<th>Value of business network</th>
<th>Representative quote</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>High decision and implementation rate</td>
<td>&quot;With a strong central entity, you can make decisions and drive change in a network&quot;</td>
<td>11I</td>
</tr>
<tr>
<td>N2</td>
<td>Strong strategic consistency</td>
<td>&quot;…. having a continuous plan helps get things done and keep moving things forward&quot;</td>
<td>13I</td>
</tr>
<tr>
<td>N3</td>
<td>Inexpensive governance</td>
<td>&quot;…. governance could easily become costly and difficult, the network needs to have the right governance but it should not be too expensive to use&quot;</td>
<td>16I</td>
</tr>
<tr>
<td>N4</td>
<td>Increased resilience to internal exploitation</td>
<td>&quot;… by distributing control and information it becomes much harder for a single entity to take advantage of their influence”</td>
<td>23I</td>
</tr>
<tr>
<td>N5</td>
<td>Higher data redundancy</td>
<td>&quot;… a good thing about more decentralized or distributed solutions is that you take away the single point of failure.”</td>
<td>18I</td>
</tr>
<tr>
<td>N6</td>
<td>Higher growth potential</td>
<td>&quot;With the right resources, trustworthiness and brand a network could scale fast&quot;</td>
<td>14I</td>
</tr>
<tr>
<td>N7</td>
<td>Ease of attracting users</td>
<td>&quot;… with more decentralized network the lock-in-effect is not as apparent and new actors might feel more comfortable with investing in it”</td>
<td>22I</td>
</tr>
<tr>
<td>N8</td>
<td>Ease of collaboration and resource sharing</td>
<td>&quot;With this type of network [semi-decentralized] collaboration becomes much easier…”</td>
<td>18I</td>
</tr>
<tr>
<td>N9</td>
<td>Higher consumer centric network</td>
<td>&quot;…. however, it is a fine balance, you also needs to ensure that you work towards customer needs, you need to find ways to get customer inputs…”</td>
<td>19I</td>
</tr>
<tr>
<td>N10</td>
<td>Increased tolerance for participants goal diversity</td>
<td>&quot;…making decisions with many different wills becomes easier in centralized entities”</td>
<td>19I</td>
</tr>
<tr>
<td>N11</td>
<td>Low participant engagement required</td>
<td>&quot;In that type of network [decentralized] there are a much higher need for active users who vote and are active, with one central leader, that is not needed …”</td>
<td>15I</td>
</tr>
<tr>
<td>ID</td>
<td>Value of blockchain</td>
<td>Representative quote</td>
<td>R</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>B1</td>
<td>Improved record keeping and accountability</td>
<td>“You get the opportunity to see that everything is done the way it is supposed to, and if it’s not, you can see who did it”</td>
<td>13</td>
</tr>
<tr>
<td>B2</td>
<td>Improved risk assessment</td>
<td>“… then risk-absorbing companies will use the block chain to determine which risk they are dealing with”</td>
<td>17</td>
</tr>
<tr>
<td>B3</td>
<td>Increased efficiency in data processes</td>
<td>“Blockchain can help systemize AML processes and bring more transparency to both regulators and to the operators”</td>
<td>21</td>
</tr>
<tr>
<td>B4</td>
<td>Decreased administrative cost</td>
<td>“In particular, it is about efficiency improvements and cost savings”</td>
<td>11</td>
</tr>
<tr>
<td>B5</td>
<td>More efficient regulatory processes</td>
<td>“I think that blockchain can systemize this process and bring more transparency both to regulators and to the operators”</td>
<td>21</td>
</tr>
<tr>
<td>B6</td>
<td>Improved data security and redundancy</td>
<td>“…use blockchain to build customer retention methods and mechanisms which today are done completely differently to what it would be done if you made a blockchain solution.”</td>
<td>21</td>
</tr>
<tr>
<td>B7</td>
<td>Increased reliability of the data</td>
<td>“It is when you have many links that it is good with blockchain. In those cases, it becomes easier for people to cheat, blockchain is then one that you cannot change”</td>
<td>23</td>
</tr>
<tr>
<td>B8</td>
<td>Increased collaboration</td>
<td>“Blockchain allows for a number of organizations to trust each other on a limited basis and exchange and share, it is really about sharing a level of effort and a level of work across a number of competing organizations.”</td>
<td>12</td>
</tr>
<tr>
<td>B9</td>
<td>Closer contact to end consumer</td>
<td>“The system vulnerability is decreased if the system is decentralized due to no single point of failure.”</td>
<td>11</td>
</tr>
<tr>
<td>B10</td>
<td>Increased reach and globalization</td>
<td>“maybe even faster get a greater reach, i.e. to reach out to… areas that have quite undeveloped pay and banking systems today”</td>
<td>14</td>
</tr>
<tr>
<td>B11</td>
<td>Improved peer-to-peer trust</td>
<td>“The larger ledgers and system are saying that they don’t need to trust in people because the code will speak for itself.”</td>
<td>21</td>
</tr>
<tr>
<td>B12</td>
<td>Improved trust in the network infrastructure</td>
<td>“Blockchain allows for a number of organizations to trust each other on a limited basis and exchange and share…”</td>
<td>12</td>
</tr>
<tr>
<td>ID</td>
<td>Value creating mechanism</td>
<td>Representative quote</td>
<td>R</td>
</tr>
<tr>
<td>----</td>
<td>------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>M1</td>
<td>Digitalizing processes</td>
<td>“Many processes that are more manual than you think, and blockchain can help fix that…”</td>
<td>22I</td>
</tr>
<tr>
<td>M2</td>
<td>Sharing infrastructure</td>
<td>“The blockchain can ensure that you can keep the customer relation without creating your own infrastructure”</td>
<td>22I</td>
</tr>
<tr>
<td>M3</td>
<td>Standardization of protocols</td>
<td>“but then I think instead that it is enough that they set standards and how the technology could help set those standards of how to work together but then the solution is with distributed”</td>
<td>11I</td>
</tr>
<tr>
<td>M4</td>
<td>Immutability of ledger</td>
<td>“In our case it create trust, its building that kind of trust that its, the kind of trust that the data cannot changed, refuted or denied.”</td>
<td>12I</td>
</tr>
<tr>
<td>M5</td>
<td>Making data traceable</td>
<td>“So blockchain and the fact that we can now start encrypting document flow, documents that were manual and where affected by fraud is a game changer.”</td>
<td>19I</td>
</tr>
<tr>
<td>M6</td>
<td>Increasing transparency</td>
<td>“…the distributed is after all more about transparency, that one can see, that one gets the opportunity to see that everything is right…”</td>
<td>13I</td>
</tr>
<tr>
<td>M7</td>
<td>Distribution of power</td>
<td>“There is a fear of platform risk and big intermediaries that a blockchain can prevent.”</td>
<td>22I</td>
</tr>
<tr>
<td>M8</td>
<td>Reducing network intermediaries</td>
<td>“…that you don’t need intermediary or middlemen, because you now have smart contracts and transactions that settles in atomic ways that is huge…”</td>
<td>18I</td>
</tr>
<tr>
<td>M9</td>
<td>Sng participants data</td>
<td>blockchain can remove unnecessary data updates and communication as everyone has the same real-time data.</td>
<td>22I</td>
</tr>
</tbody>
</table>
### Appendix H: Blockchain & business network values vs VCMs plotting

Matrix presenting which VCMs that enables which blockchain value

<table>
<thead>
<tr>
<th>BLOCKCHAIN VALUES</th>
<th>VALUE CREATING MECHANISMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>More efficient regulatory processes</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>Increased collaboration</td>
</tr>
<tr>
<td>B3</td>
<td>Improved risk assessment</td>
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<td>B4</td>
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<tr>
<td>B5</td>
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<td>B9</td>
<td>Closer contact to end consumer</td>
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<tr>
<td>B10</td>
<td>Improved data security and redundancy</td>
</tr>
<tr>
<td>B11</td>
<td>Improved peer-to-peer trust</td>
</tr>
<tr>
<td>B12</td>
<td>Improved trust in the network infrastructure</td>
</tr>
<tr>
<td>BUSINESS NETWORK VALUES</td>
<td>ENABLING</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>Digitalizing processes</td>
</tr>
<tr>
<td>N1</td>
<td>High decision and implementation rate</td>
</tr>
<tr>
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