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Rebooting Healthcare: Deploying Collaborative Networks to Enhance Healthcare Effectiveness

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Abstract

The following Master Thesis investigates how Collaborative Networks may be sustained in healthcare, by investigating their value creation and value appropriation activities. Collaborative Networks have appeared, due to the knowledge creation benefits these yield. In contrast to traditional forms of formal inter-firm relations, community-based organizational designs rely on self-organizing actors, who jointly create value. To facilitate this collaborative value creation, the Collaborative Network organizations provide social- and technical infrastructures. Hence, for the value creation to be sustained, these organizations need to survive. Despite successful examples, little is still known about how Collaborative Networks can be sustainably arranged.

This thesis is conducted as a qualitative case study, with semi-structured interviews of several Collaborative Networks in healthcare, so-called Learning Networks, conducting research- and Quality Improvement initiatives. The interviews surfaced motivation and coordination as the core drivers of value creation in the Learning Networks, which presently are sustained by external funding sources. We find that the networks are not presently configured for financial value appropriation. A link between value appropriation and value creation is discovered, signaling that present value is sub-optimized. By increasing the financial value appropriated by the network organizer, we argue how the Learning Networks not only can ensure their sustainability, but even enhance their value creation activities. We argue that the Learning Networks should move away from their current scope of learning activities, to more permanent providers of care, so-called Learning Health Systems.

Keywords: *Business Model; Co-Creation; Co-Production; Collaborative Networks; Healthcare; Innovation; Learning Networks; Learning Health System; Organizational Design; Value Creation; Value Appropriation; Value Slippage.*

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Next, we would like to extend a warm thank you to the main contributors to this thesis: Our interviewees, the attendees at all of the three conferences, and staff at Dartmouth Hitchcock Medical Center and Cincinnati Children's Hospital Medical Center – too numerous to name here – for sharing their expert insights. Inspired by what we have observed, this thesis has taken on a greater meaning for us. We consider ourselves incredibly lucky to have been given this opportunity, and are forever grateful for all the wonderful people we have met along the way.

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Although we stand as authors of this thesis, it is the product of contributions from everyone mentioned above. Except for the errors, they remain our own.

Last, but not least, we would like to extend a thank you to our families and loved ones for all their encouragement and support. Kristian wants to thank Hedda for her endless patience and positivity during the days when this thesis took all of his focus. Patrik would like to thank Sunniva for her loving and continuous support, and also to the flexibility shown by his employer to pursue this degree.

Patrik Duraj *Kristian Werner Rizi*

Abbreviations

C3N	Collaborative Chronic Care Network
CCHMC	Cincinnati Children's Hospital Medical Center
CDM	Common Data Model
CDRN	Clinical Data Research Network
CN	Collaborative Network
EHR	Electronic Health Record
FFS	Fee For Service
HPRN	Health Plan Research Network
IBD	Inflammatory Bowel Disease
ICN	Improve Care Now-network
LHS	Learning Health System
LN	Learning Network
P/I-grid	Power versus Interest Grid
PCORI	Patient-Centered Outcomes Research Institute
PCORnet	National Patient-Centered Clinical Research Network
PEDSnet	National Pediatric Healthcare Network
PPACA	Patient Protection Affordable Care Act ('Obama-care')
PPRN	Patient Powered Research Network
QI	Quality Improvement

“Doctors have always recognized that every patient is unique, and doctors have always tried to tailor their treatments as best they can to individuals. You can match a blood transfusion to a blood type — that was an important discovery. What if matching a cancer cure to our genetic code was just as easy, just as standard? What if figuring out the right dose of medicine was as simple as taking our temperature?”

- President Obama, January 30, 2015

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1. Introduction

New communication- and information technologies have led to increasingly rapid cycles of innovation, challenging established industry logics and disrupting entire industries (Christensen, 1997). From guarding internal processes within their hierarchies, firms are gradually opening up, searching new organizational ways of mimicking complexity, and experimenting with new organizational designs (Miles, Snow, Fjeldstad, Miles & Lettl, 2010; Snow, Fjeldstad & Langer, 2017). One such organizational form is the *Collaborative Network* (CN), where actors come together to create value, through knowledge generation, -accumulation and -exchange (Fjeldstad, Snow, Miles & Lettl, 2012). This makes such schemes particularly powerful in knowledge-intensive industries, such as healthcare. Despite successful examples, little is still known about how CN organizations should be sustained,

This thesis aims to address how CNs can be sustained, by studying the most prevailing CNs within healthcare; the so-called *Learning Networks* (LNs). As LNs are best understood in a wider context, we will first give a brief background of their emergence, highlighting benefits and challenges – the source of our research question – before outlining the structure of this Master Thesis.

1.1 Background: The Healthcare System, a Sick Patient?

Western medicine represents one of the great social triumphs of modern society, with medical innovations in diagnosis and treatment driving a continuous fall in the global mortality rate over the last five decades (Global Burden of Disease, 2016). Despite advancements in medical science, the healthcare *system* is showing ill-foreboding symptoms: First of all, there is a gap in care quality across the system (Christensen, Grossman & Hwang, 2009). Second, the system is ineffective at facilitating learning; new research takes on average seventeen years to translate into medical practice (Morris, Wooding & Grant, 2011). Third, costs are spiraling, worldwide (Marino, Morgan, Lorenzoni & James, 2017). These issues are not strictly medical, but rooted in administrative concerns, indicating misalignments in the healthcare system. Despite being a USD 7.6 trillion global industry, healthcare is often not approached as a business; but instead referenced in an altruistic light (World Economic Forum, 2017). However, the healthcare system is not immune against economic forces – in fact the care one receives is at large defined by it.

Technology is often prescribed as the answer (Christensen et al., 2009). Yet, healthcare organizations are increasingly struggling to keep up with the present technological development. This is a problem, as the healthcare system's ability to absorb improvements is increasingly being determined by its ability to manage and deploy information (Institute of Medicine, 2007). A recent report by the World Economic Forum (2017, pp.17) highlights how technology "represent[s] only isolated patches of innovation", and call for more thorough changes in how the system is "organized, financed and regulated, and how financial and non-financial incentives are structured". The present dialogue on organizing has focused on *standardization* or *personalization* of health services – notably within the frame of today's system (Christensen et al., 2009). These two are from a traditional economic logic conflicting, due to an assumed trade-off between resource deployment, e.g. cost efficiency, and activity scope, e.g. differentiation in product or services (Porter, 1996). However, Christensen et al. (2009) argues how standardization and personalization could be combined, through innovations in healthcare organizing.

1.2 Collaborative Networks in Healthcare: Learning Networks

The CN represents such an organizational innovation. CNs may be formed both in intra- and inter-organizational ways, in order to improve and simplify coordination, enhance adaptability to environmental changes and facilitate joint value creation (Benkler, 2006; Fjeldstad et al., 2012). In healthcare, CNs have emerged in the form of LNs, based on a clinical need to advance treatments, and add value by being a more effective facilitator of research and Quality Improvement (QI).

Healthcare is an interesting laboratory for studying collaborative schemes, as medicine fundamentally is collaborative. The LNs bring together a rich set of stakeholders, across healthcare sites, such as patients, practitioners and researchers, to *co-create* (Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2004) knowledge – with the goal of improving patient outcomes. However, the value embedded in the knowledge is not released until it is integrated into care. LNs may therefore be thought of as a platform, operating on two main layers: A technical layer, for sharing data, and a social layer, to build a community for collaboration, where process improvements are enabled through sharing of best-practices. Furthermore, the LNs increasingly take on other processes, such as *co-production* (von Hippel, 2007; Vargo & Lusch, 2008), finding ways to replace trained professionals by other

stakeholders in the caregiving activity. The initial LNs have indicated several positive effects: Tighter feedback loops in trials, (Nikolakopoulou et al., 2018), faster research (Borch et al., 2011), and more tailored care at lower costs (Forrest, Margolis, Seid & Colletti, 2014). Despite such successes, the proliferation of the LNs is not given. In fact, the organizations facilitating the networks are struggling for survival. This is well exemplified by the U.S. LN organizations this thesis investigates. These have relied on grants and philanthropy – the traditional approach of funding healthcare research – and are therefore hit hard by new tax reforms and a potential roll-back of the public health program PPACA ('Obama-care'). The root problem, however, goes beyond funding: The LNs integrate a diverse set of organizations, of different goals and capabilities – where network participation impacts different actors in different ways. This creates an alignment problem. On the one hand, the LNs are, as self-organizing systems, fundamentally dependent upon committed actors in order to create value. On the other hand, the actors can be organizations, or individuals employed in organizations, who need to offset their direct- and indirect costs, to justify commitment. Furthermore, the LNs, as socio-technical systems (Trist, 1981), require extensive integration between the organizations in order to function effectively. This integration is facilitated by the network organization, which too requires funding to operate. For LNs, and indeed CNs in general, a fundamental problem is how self-organizing schemes potentially exposes the organizing firm to free-riding (Olson, 1965). In order to evolve and sustain the LNs, the understanding of their business models needs to be advanced (Fleurence, Beal, Sheridan, Johnson & Selby, 2014; Batalden et al., 2016).

1.3 Business Model

A business model integrates both an organization's value creation and its value appropriation (Chesbrough and Rosenbloom, 2002). This integration is important, as a fundamental concern in healthcare is that not all value creating activities are fundable (Christensen et al., 2009). Insights on value creation and value appropriation has traditionally been considered from different literatures, such as the resource-based (e.g. Barney, 1991), activity-based (e.g. Porter, 1985) and innovation focused literatures (e.g. Teece, 1986; Jacobides, Knudsen & Augier, 2006). Notably, these streams have typically emphasized either value creation (e.g. Porter, 1985; Stabell & Fjeldstad, 1998) or value appropriation (e.g. Barney, 1991;

Teece, 1986), viewing these as distinct processes – all while acknowledging the existence of the other (Ramaswamy & Gouillart, 2010). What is more, these literatures have a strong firm-focus, not capturing the complexity which multi-firm networked structures yield. These issues are elevated in self-organizing schemes, whose form blurs traditional understandings of organizational boundaries (Benkler, 2006). This matters, as organizations are goal-directed, socially constructed, *activity systems*, whose survival depends on the ability of the organization to control its boundaries (Aldrich & Ruef, 2006). As activity systems consists of humans, this calls for an understanding of the underlying social processes in organizations. We will use the business model construct as a template for how organizations conduct their activities (Magretta, 2002; Baden-Fuller & Morgan, 2010; Zott & Amit, 2010).

1.4 Research Question

Despite the convergence amongst scholars on the key business model constructs, the literature remains, at large, firm-centric and does not adequately explain how value is created and appropriated by a network of actors, such as in a CN. Scholars have recognized this gap and are calling for research on how value is created and appropriated in CNs (Fjeldstad & Snow, 2018). Our research question is as follows:

"What characterizes the value creation and value appropriation system used to implement and sustain co-creation and co-production within Collaborative Networks in healthcare?"

1.5 Thesis Structure

This Master Thesis consists of six chapters: Following this introduction chapter, the second chapter will review relevant literature from Strategic Management. We will adopt an activity perspective on business models, emphasizing the mechanisms for value creation and -appropriation. As the CNs rely on knowledge creation and -exchange, we will elaborate on the dynamics related to this key activity. Lastly, we will build an organizational understanding of how such CNs are arranged. The third chapter outlines our research methodology, which includes a brief introduction of our qualitative case context, the LNs. The fourth chapter presents the findings from our case study, which are then discussed in chapter five. Our thesis concludes with a summary of our discussion, as well as recommendations for further research, highlighting implications for CN facilitators and healthcare managers.

2. Theoretical Framework

The following thesis investigates how Collaborative Networks can be sustained in healthcare. In order to develop our theoretical framework, we start by presenting an activity based approach to business modelling, emphasizing value creation and value appropriation[1] mechanisms. Next, we elaborate on the relevant conception of generating value for our research subject, the LNs, by exploring knowledge and learning in order to gain insights into relevant mechanisms and activities. Lastly, we show how these concepts are combined and arranged in collaborative structures.

2.1 An Activity Perspective on Business Models

Business models have emerged as a field of interest for both academics and practitioners during the last two decades, as a response to the emergence of the Internet; whose rapid changes and value logic has forced organizations to "rethink their business models" (Teece, 2010, pp. 178; Amit & Zott, 2001; Porter, 2001). However, despite increased attention, a unified definition of business models is yet to emerge (Teece, 2010; Zott, Amit & Massa, 2011; Wirtz, Pistoia, Ullrich & Göttel, 2016; Foss & Saebi, 2017; Fjeldstad & Snow, 2018). Academics diverge in the level of abstraction, choosing different levels of analysis, e.g. firm and network, and representations, e.g. general taxonomies or prescribing frameworks. As a result "there are almost as many definitions of a business model as there are business models" (Teece, 2018, pp. 41). Baden-Fuller and Morgan (2010) argue for a level that is not too specific, so it can be re-applied in other context, yet not so general that the model loses prescriptive power. For the purpose of this thesis, we will deploy business models in the Baden-Fuller and Morgan sense, in order to structure and understand how the CNs' business model may be sustained.

Despite the lack of a convergence in the definition of business models, Massa, Tucci and Afuah (2017) observe a convergence among academic scholars on the high-level classification of business models as focusing on answering the question of 'how *value creation* and *value appropriation* occurs' (e.g. Chesbrough and Rosenbloom, 2002; Magretta, 2002; Baden-Fuller & Morgan 2010; Teece, 2010; Zott & Amit, 2010; Massa et al., 2017; Teece, 2018). Whereas previous

[1] Note that some scholars use 'value capture' instead, e.g. Chesbrough, 2002; Zott et al., 2011.

concepts in Strategic Management have emphasized either value creation *or* value appropriation, the business model construct argues for an integrated, holistic perspective (Chesbrough & Rosenbloom, 2002; Massa et al., 2017). Organizations are goal-directed, boundary-maintaining activity systems, "coordinating activities of two or more persons", which stresses the need to capture the social processes within (Barnard, 1938, pp.73; Aldrich & Ruef, 2006). By taking a wide array of stakeholders into account, the business model phenomenon yields valuable insights into the activities that distinguish the actors (Zott & Amit, 2008; Teece, 2010). Notably, business models stresses the need for alignment between different actors, and does so by investigating the activities (Magretta, 2002; Baden-Fuller & Morgan, 2010; Teece, 2010; Wirtz et al., 2016).We will therefore adopt an activity-based perspective for our thesis, based on the insights provided by Porter (1985, pp. 33), establishing "a systematic way of examining all the activities a firm performs and how they interact".

2.1.1 Activity Analysis

Porter's core proposition was that the firm's activity configuration defines its ability to create *value*, with value being "the amount buyers are willing to pay" (1985, pp. 38). The goal is identifying activities with an impact on competitive advantage, distinguished by different economics. Achieving competitive advantage implied creating unique configurations of activities which yielded cost or differentiation advantages (Porter, 1980, 1985). The level of analysis was maintained at the firm level, with implications for the definition of activities, which were identified by isolating "technologically and strategically distinct" activities (Porter, 1985, pp. 39). Activities are analyzed using *drivers*, which represent the second-level analysis (Porter, 1985, 1991).

Drivers and linkages. Porter (1985, pp. 70) sees drivers as "the structural causes (…) more or less under a firm's control (…) which determines the cost behavior of a particular activity". "The mix and significance of individual drivers varies by activity, by firm and by industry" (Porter, 1991, pp. 104). It is the activity *combinations* the drivers enable that give rise to competitive advantage, not individual drivers. Indeed, value creation and value appropriation imply a different set of drivers. As multiple drivers may impact a single activity, and, transversely, a single driver may impact multiple activities, *linkages* emerge. Porter (1985, pp. 49)

defines these as the "relationships between the way one value activity is performed and the cost or performance of another". Linkages imply that one has to consider the interplay of drivers, avoiding "logical inconsistencies" (Porter, 1991, pp.102).

Fit. A way of addressing inconsistencies is through focusing on fit. Miles & Snow (1978) provide a typology of different types of fit: *Internal fit*, maintaining alignment between strategy and structure, *external fit*, strategy and environment, and *dynamic fit*, e.g. maintaining internal and external fit over time. As such fit is both a state, and a process. The latter is rooted by their observation of how firms move through an adaptive cycle, tackling entrepreneurial-, engineering- and administrative problems respectively. In turn, it is the degree of fit, which determines whether firms are effective. Indeed, misfits can make firms unsustainable (Miles & Snow, 1994). Miles and Snow (1978) identified three effective forms of organization: *Prospectors*, first-to-the-market; *Analyzers*, second-in market, and; *Defenders*, who mainly compete on value and/or costs. These differ in the way they achieve fit. For example, both prospectors and defenders are innovative "but in different ways"; emphasizing new technology or refinement of existing product respectively (Miles & Snow, 1994, pp. 13). This is not to imply one form is superior to another, as they yield to different strengths under different circumstances. According to the concept of 'equifinality' in biology, a "system may reach the same final state [e.g. activity set] from differing initial conditions and by a variety of paths" (Doty, Glick & Huber, 1993, pp. 1199). However, path dependency (Ghemawat, 1991) implies changes and creates implications for future changes, and ability to adapt. This complexity also makes configurations hard to imitate, and thereby a source of competitive advantage. Below we examine how configurational fit can be analyzed.

Value Configuration Models. In order to structure the activity analysis, Porter (1985) proposes a general activity template – the *Value Chain* (see Appendix A.1). The Value Chain outlines the generic activities which an entity performs in order to generate value. By adjusting the activity configuration, organizations may affect both their value creation and value appropriation. Although Porter never employs the phrase 'business model', "it incorporates many features that could be included in such a model" (Hedman & Kalling 2003, pp. 51). In particular it emphasizes fit both *within* the firm, but also the fit towards the *environment* (Porter, 1996). This echoes Magretta's (2002, pp. 91) definition: "Business models

describe, as a system, how the pieces of a business fit together". The high-level abstraction allows parallels to be drawn between firms and industries, which for outsiders would otherwise appear to be unique. However, scholars and practitioners started questioning the universality of the framework over time (Armistead & Clark, 1993; Normann & Ramírez, 1993; Ramirez, 1999). Stabell and Fjeldstad (1998) proposed that the Value Chain was not relevant to all firms, due to *differences in activities and the linkages* between them. Based on Thompson's (1967) typology of long-linked-, intensive- and mediating technologies, Stabell and Fjeldstad (1998) show how the activity sets of firms can be classified into three generic value configurations, based on the way in which they create value: *The Value Chain*, *Value Shop* and *Value Network* (see Appendix A.3 for a comparison). The configurations help decipher what Stabell and Fjeldstad (1998) refers to as the value creation logic and technology of the firm. Hybrid configurations are possible, as a "single firm may employ more than one technology and hence have more than one configuration" (Stabell & Fjeldstad, 1998, pp. 434). Following Afuah and Tucci (2000), Christensen et al. (2009) and Fjeldstad and Snow (2018) we deploy these three value creation models as generic templates for business models. Notably, Christensen et al. (2009) identifies the presence of all three models in healthcare[2], each with their distinctive value creation logic. As we are studying CNs, the most relevant configuration to review is the Value Network, where the value creation spans multiple actors through a coproducing layer of mediation. An introduction to the two remaining configurations is included in Appendix A.

2.1.2 Value Creation in Value Networks

Value Networks enable exchanges, through the mediation between nodes (Stabell & Fjeldstad, 1998). The network nodes are represented by actors, e.g. as people, firms or location, with value being embedded in the linkages, e.g. the relationship between them. The focal firm is not to be confused with being the network, instead it supports the network service through provision of infrastructure, by utilizing what Thompson (1967) calls *mediating technology*. Examples of firms offering

[2] Note that Christensen et al. (2009) employ a different terminology in their work, referring to Value-Adding Process-business, Solution Shops and Facilitated Networks respectively. On a similar note, it is worthwhile to highlight that Porter (1985) gives 'value configuration' a different interpretation. For sake of clarity: This thesis will employ Stabell & Fjeldstad's (1998) terminology.

mediation services include communication providers and financial institutions. In the case study this thesis is built upon, the LNs act as a Value Network, and creates value by facilitating joint problem solving.

Value Creation Logic. Stabell and Fjeldstad (1998) propose that Value Networks have three distinct primary activities: 1) Network promotion and contract management, 2) service provisioning and 3) infrastructure operations. In contrast to chains activities are not sequential, but layered. And in contrast to the shop, activities are typically executed in parallel. Notably, in contrast to the previous two activity systems scale is thus a driver of both value and cost in Value Networks.

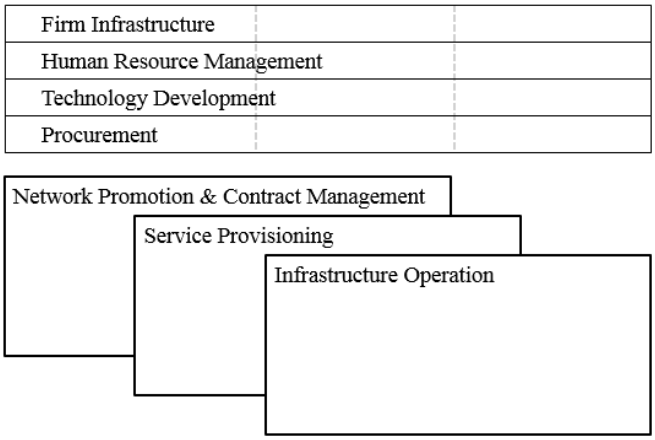

Figure 1: The Value Network diagram.
Source: Stabell & Fjeldstad (1998).

Costs. Value Networks usually have large fixed cost base and close-to-zero marginal costs, stemming from membership acquisition and infrastructure operation. Transaction services (North & Wallis, 1982; North, 1994) reduce cost of exchange, e.g. transactional costs (Coase, 1937). In Value Networks it is often difficult to distinguish infrastructure operation from service provisioning. Networks may thus be understood as platforms. Indeed, Value Networks generate value from connectivity and conductivity: Connectivity stems from network composition and scale, e.g. who can be reached. Conductivity are properties of the network, e.g. what can be exchanged, and at what quality (Fjeldstad & Haanæs, 2001). Interestingly, as the value creation occurs *between* participants of the network, the members themselves often constitute part of the value (Stabell & Fjeldstad, 1998). This gives rise to relational dynamics between the actors, such as dependencies and power (Emerson, 1962; Pfeffer & Salancik, 1978; Casciaro & Piskorski, 2005).

Scale. The presence of network effects imply that the value created is not only pending on individual actor effort, but accumulated factors, such as network scale and maturity (Katz & Shapiro, 1985; Stabell & Fjeldstad, 1998). As such, an actor may add value through mere (passive) participation – by simply enlarging market. Central to facilitating exchange is the network infrastructure, whose

complexity increases with scale. However, as scale drives costs, a balanced perspective of scale and variety is needed (Shapiro & Varian, 1999). Value Networks choice of competitive scope therefore depends on the size of community served (horizontal scope, e.g. scale) and range of services exchanged (vertical scope) (Fjeldstad & Haanæs, 2001). Typically, networks will aim for wide horizontal scope, however, scale is not enough; composition matters (Stabell & Fjeldstad, 1998; Fjeldstad & Ketels, 2006; Fjeldstad & Sasson, 2010). This makes member identification, -attraction and -retention core activities within a Value Network. Hence we see how scale is thus both an outcome of success, as well a catalyst for further growth.

2.1.3 Value Appropriation in Value Networks

The traditional perspective (e.g. Porter, 1980, 1985) on value appropriation is that it is a secondary process to value creation: First value is created, then divided among stakeholders (Arrow, 1962; Jacobides et al., 2006). Under this setting, appropriation was merely a choice between licensing and in-house production. However, since *how* the (value creating) activities are configured, i.e. competitive scope, affects value appropriation, a more balanced approach is needed. This sub-section therefore will present extant literature on appropriation, relevant for capturing value in a collaborative networked settings - starting with the most prevailing: *Power*.

Power. When value is created in activities involving multiple actors, this creates dependencies - which leads to *power* (Emerson, 1962; Freeman, 1984). Power in turns affects value appropriation through relative bargaining positions; both versus (internal) stakeholders and against (external) competition (Pfeffer & Salancik, 1978; Burt, 1992). Stakeholders with a strong position will appropriate a larger share of value, as compared to stakeholders with weaker position. However, if the actors have a mutual dependence, the assessment of bargaining positions *ex ante* becomes more complex (Brandenburger & Stuart, 1996). Actors, be it (human) individuals or (virtual) platforms, may gain a valuable network position by spanning structural holes, acting as knowledge brokers and deriving profits from controlling informational flow (Burt, 1992). Since appropriation entails distributing already created value, one actor's gain is another actor's loss. Such redistribution may cause friction and lead to value destruction; disincentivizing actors to collaborate in the first place (Bowman & Ambrosini, 2000). Although power is

often seen as static, some authors postulate it is in fact a dynamic element (Coff, 2010). This implies that power may be manipulated by firm's activity choices.

Profiting From Innovation. Observing how innovative first-mover firms, i.e. prospectors, often failed at profiting from their innovations, Teece (1986) argued that firms had to actively shape their strategy for appropriation. He identified three determinants for appropriation: (1) *The firms appropriability regime*, (2) *control* and (3) *complementary assets* (Teece, 1986). These will now be reviewed.

The firms appropriability regime relates to the presence of so-called *isolating mechanisms* (Rumelt, 1984), which prevents imitation by another party - such as legal and contractual mechanisms or tacit knowledge. In classical economic parlance, property rights can be seen as the ability to exclude others, either *de facto*, based on power, or *de jure*, based on law; thereby weakening the opposing party's relative bargaining power (Baldwin, 2015). Such property mechanisms are strong when effective, but also have several practical shortfalls (e.g. Mansfield, Schwartz & Wagner, 1981). Therefore Teece (1986, pp. 287) identified that the appropriability regime was either strong or weak. If strong, then imitation is hard. If weak, then the firm was exposed to competition both from incumbents and new entrants (Pisano, 2006). As a response, Teece (1986) argued for other mechanisms to appropriate value.

The second mechanism is potential for control: Recognizing that industries look different pending on the life cycle, Teece (1986) argued that the innovator needed to evaluate whether or not a dominant design had emerged in the market, and if not, attempt to gain control over the standard – or even become the standard. Embodying the dominant design can yield a basis for appropriation over time; "Once an industry architecture emerges and stabilizes, it is difficult to stray from it" (Jacobides et al., 2006, pp. 1205). However, such instances are hard to come by.

The third and final mechanism was using *complementary assets* as a response. Complementary assets were defined as supplementary tangible and intangible assets and capabilities, for example infrastructures or services, needed to commercialize an innovation or enhance its value (Teece, 1986; Pisano, 2006). Put simply, when an innovation is hard to sell directly, it is embedded into another product. If the complementary asset is not created by the focal firm, this leads to a secondary level of competition – between the firm and the supplier. According to

Teece (1986) this leads to a new bargaining situation: The appropriability regime is dependent on the relative power position of the focal firm, versus the supplier of the complementary asset, as well as potential supply of similar competing complementary assets. To understand these dependencies, Teece (1986) suggest a classification of three classes of complementary assets: *Generic*, with no tailoring between the asset and innovation; *specialized*, with unilateral tailoring, and; *co-specialized*, requiring bi-lateral dependence. Through complementary assets the appropriation might be de-synchronized from the value generation, in time or space. This enables the seller to adjust prices later, if needed.

This reflects an underlying idea in the framework: *Bottlenecks*. Bottlenecks are segments where "mobility is limited and competition softened" (Jacobides et al., 2006, pp. 9). Jacobides et al. (2006) argue how firms may arrange their activities, manipulating the industry architecture, to become bottlenecks. Indeed Baldwin (2015, pp. 6) elaborates how organizations "wishing to capture value are advised to control bottlenecks, become a bottleneck and beware of bottlenecks controlled by others". Teece later summarized the key challenge of the framework as identifying the fitting business model and controlling bottlenecks (Teece, 2006, 2010), echoing the fact that value is often appropriated by other parties.

Value Slippage. Lepak, Smith and Taylor (2007, pp. 181) deploy the term 'value slippage' when referring to situations where "value created by one source or at one level of analysis may be captured at another". The authors observe that some activities are more likely to experience value slippage, such as knowledge transfer. They generalize that such spillovers happens when there is value created, which many stakeholders could benefit from. Or put in the parlance of Bowman and Ambrosini (2000): Use value is high while exchange value is low. Lepak et al. (2007) observe how excessive value slippage creates little incentive to sustain value generation long term. In such cases vertical and/or horizontal integrations are needed, where the thinking is that this encapsulates the value. Chesbrough and Rosenbloom (2002) proposes that spin-offs could an effective vehicle to manage competing interests within a firm's business model whenever new activities causes misfit (Chesbrough, Vanhaverbeke & West, 2006).

Although being fairly robust, other scholars have added to Teece (1986) framework, such as Pisano (2006) on the endogenous nature of intellectual property

rights, i.e. appropriability regime, and Jacobides et al. (2006) shifting focus to the broader industry architecture, the core ideas and insights have remained remarkable robust. While recognizing room for more detailed strategizing on Value Appropriation for our given context, we conclude this section with the core insight: Shaping the activities begins with understanding the sustainable appropriation strategies. Notably, rather than only arguing for strong appropriation regime, Teece logic really calls for manipulating the appropriability regime to fit the firms strategy: Softening the appropriation of itself and competitors in areas where it benefits the firm, and strengthening. In order to realize this, a firm has to recognize its power position, to actively shape its competitive environment (Pisano, 2006).

2.1.4 A conception of 'value'

So far in this chapter, we have relied on Porter's willingness-to-pay definition of 'value' (Porter, 1985, pp. 38). From an economics perspective, authors such as Brandenburger and Stuart (1996) and Bowman and Ambrosini (2000) have highlighted shortcomings in Porter's concept. Bowman and Ambrosini (2000) argue Porter, through 'willingness-to-pay' is in fact describing *use value*, rooted in industrial economics. Use value is inherently subjective. These (one-sided) market transactions occur at equilibrium, at the *exchange value* (price), which, absent transactional costs, are deemed as efficient (Coase, 1937; Williamson, 1975). The difference between 'use value' and 'exchange value' equals consumer surplus, which Porter labels as *total value*. However, Brandenburger and Stuart (1996) also point to the producers' equivalence of 'use value'; *opportunity costs*. These are the economic costs firms derive from activities tied to deliver value. According to this view, a more balanced approached to created value is opportunity costs minus use value (Brandenburger & Stuart, 1996; Coff, 1999; Bowman & Ambrosini, 2000). Under Brandenburger and Stuart's (1996) interpretation, total value represents the upper limit of extractable value for all stakeholders. Conversely, the lower bound is defined by a positive use value, where the firm needs to maintain its opportunity cost *below* the use value to retain a positive margin. Hereby we have derived at a more extensive understanding of how value can be manipulated through the activity configuration.

2.2 Knowledge creation in organizations

The literature on knowledge has traditionally been approached from an *intra*-organizational perspective, with a focus on organizational learning (Argote & Miron-Spektor, 2011). However, the growing importance of knowledge as a resource (Grant, 1996), and increasingly as a source of innovation (Powell, Koput & Smith-Doerr, 1996), has shifted attention towards *inter*-organizational perspectives.

2.2.1 Intra-Organizational Knowledge

Knowledge is a "multifaceted concept with multilayered meanings" (Nonaka, 1994 pp. 15). At its core, knowledge is a social process (Nonaka, 1994), with organizations learning through its members (Senge, 1990). For this reason, the organizational learning stream has mainly focused on how to effectively administer activities related to the creation, transfer and retention of knowledge (Argote & Miron-Spektor, 2011). In its most basic form, learning is based on the combination of information, enabling new activities. This, in turn, affects activity linkages, which gradually enables firms to evolve their competitive scope (Porter, 1991). Notably, the firm's problem solving activities is a source of learning (Weick, 1979). Argyris and Schön (1978) highlighted two prevalent types of learning: Single-loop learning, based on repeated problem solving, and double-loop learning, where the mental models defining the problem itself are challenged. The latter is more likely to lead to new activities; replacing current practice. As learning accumulates, it evolves into knowledge stocks. Relevant knowledge dimensions include the degree of tacitness (Polanyi, 1966) and stickiness (Szulanski, 1996). In organizations, knowledge can be separated into declarative and procedural knowledge (Kogut & Zander, 1992). The first is factual, while the second is embedded into activities, which represent organizational routines (Teece, Pisano & Shuen, 1997). March (1991) highlighted how a balance between exploration, of new opportunities, and exploitation, of existing knowledge, is needed to sustain value creation in a firm. An important realization was path dependency, e.g. that past learning affects further knowledge, which could leave (closed) firms exposed to other firms' disruptive innovations, and impair performance (Christensen, 1997). Traditionally, knowledge has been treated as a scarce resource and exchange has not been deemed valuable. Firms even deployed extensive mechanisms, such as patents, to retain knowledge internally (Teece, 1986). However, knowledge is unevenly distributed (Hayek, 1945). The rise of knowledge intensive firms (Starbuck, 1992), utilizing

knowledge as the means of production (Drucker, 1993), has therefore shifted the focus towards inter-organizational perspectives on knowledge.

2.2.2 Inter-Organizational Knowledge

Initially viewed as a supplement to internal knowledge sources, external knowledge has been recognized as a key source for innovation (Chesbrough et al., 2006; Pisano, 2006). Yet, knowledge is socially complex (Grant, 1996), tacit (Polanyi, 1966; Nonaka, 1994) and the organizational ability to integrate knowledge fundamentally differs (Cohen & Levinthal, 1990). This makes sharing difficult (Argote & Ingram, 2000; Szulanski, 2000). What is more, knowledge "is reproducible at close to zero cost and non-rivalrous in use" (Adler, 2001, pp. 224). Scholars have therefore long observed how markets for knowledge breaks down, due to "indivisibilities, appropriability and uncertainty" (Arrow, 1962, pp. 609). Knowledge exchange requires coordination and entails hazards, such as free-riding (Dyer & Nobeoka, 2000), leading to costs (Coase, 1937; Williamson, 1975). Therefore, there is a clear tension between optimal allocation (free), and optimal production (costly) (Adler, 2001). Knowledge also suffers from the paradox of openness: The value of second receipt is zero, and hence revealing the knowledge risks losing the incentive to acquire it (Arrow, 1962). These characteristics makes it difficult to contract exchanges (Williamson, 1975). This strikes to the very core of what a firm should be, e.g. how the organizational boundary should be defined (Aldrich & Ruef, 2006). Absent efficient market (price) mechanisms, the traditional conclusion has been that knowledge is best managed internally, guarded within a managerial hierarchy (Williamson, 1975; Kogut & Zander, 1992). However, if knowledge mainly resides outside the firm, then closing off restricts a firm from expanding its knowledge (Chesbrough, 2003); spawning new thinking on how to organize for learning. Distinct from traditional market- or hierarchical ways of coordinating, Powell (1990) proposed *networks* as a third way of coordination. These are characterized by reciprocal patterns of exchange, where firms pool knowledgeable actors. Indeed, Powell (1990) highlights knowledge exchange and dissemination of information as the main advantage of networks. While hierarchies leverage authority to coordinate actors and the market relies on price (Thompson, 1967; Williamson, 1975), Adler (2001) argues that community-based organizations primarily are trust-based – calling for new ideas on control and coordination.

2.3 Collaborative Networks

So far, our literature review has covered two distinct domains on theorizing in Strategic Management; business models and knowledge-based theories. The following section will link these theoretical nodes to Collaborative Networks (CNs), emphasizing organizational issues. In order to bridge these domains, we will introduce this section by extending our notion of networks, drawing insights on value creation based on our introduction of Value Networks, adding nuances important for learning dynamics and value appropriation. Next, we will review the emergence of collaborative communities, maintaining a focus on dynamics for understanding the implications for collaborative business models. Lastly, we will present an architectural template fitting for such collaborative network structures.

2.3.1 Evolution of Network Forms of Organizing

Historically, both value creation and value appropriation have been analyzed with individual, hierarchical firms as the level of analysis (Snow, Fjeldstad, Lettl & Miles, 2011). Due to the focus on retaining knowledge (section 2.2), inter-firm collaborations were limited. Collaborative relations were mainly conducted as dyadic, contracted relationships, e.g. in the form of joint ventures (e.g. Kogut, 1988; Hennart, 1988) and strategic alliances (e.g. Hamel, 1991; Das & Teng, 2000). However, the current fast-changing, hypercompetitive environment has led to the emergence of different forms of *multi-firm networks*, in practice often addressing different sections of the industry Value Chain (Porter, 1985; Miles & Snow, 1986; D´Aveni, 1994). Despite representing a new organizational *form*, the organizational *logic* of networks was not yet internalized - mainly representing "improvements to existing hierarchical design" (Snow et al., 2011, pp. 7). Scholars and practitioners have started to question the effectiveness of hierarchical coordination, and new logics of organizing are emerging (Snow et al., 2011; Fjeldstad et al., 2012). One such emerging organizational scheme is collaborative communities, which we will explore in sub-section 2.4.3. However, in order to advance our understanding of the impact of changing organizational logics, we will first elaborate on some key network characteristics, and how they differ in different organizational forms.

2.3.2 Network Characteristics

A network consists of *nodes* (actors), connected through *ties* (links) in formal (contractual) or informal arrangements (Simard & West, 2006). In social networks, actors can be individuals, organizations or groups thereof, who are seen to occupy *network positions* (Burt, 1992). The *ties* between the actors is the focus of analysis, as it influences the interactions, such as knowledge sharing, in the networks (Reagens & McEvily, 2003). Based on the basic notion of learning in sub-section 2.2.1, we recognize how learning is a natural product of interactions (linkages) between network actors. Indeed, value is created in the *interactions* between actors, and as more knowledge is accumulated, the learning accelerates through scale (Stabell & Fjeldstad, 1998). Hence, a network can itself be regarded a "repository of knowledge" (Kogut, 2000, pp. 407; Dyer & Nobeoka, 2000).

Initially, few, strong and formal ties were emphasized. This gave rise to formal inter-organizational networks, with contracts to reduce opportunism and protect knowledge embedded in the firm, such as strategic alliances (Simard & West, 2006). However, not everything can be contracted. In a study of a supplier network, Dyer & Nobeoka (2000, pp. 364) noted how "clear rules for participation in the network's knowledge-sharing activities" enhanced motivation to share knowledge, by establishing trust between participating actors – as knowledge transfer is difficult to contract. Further, as firms differ in their willingness to share knowledge (Dyer & Singh, 1998), differences in network density, network position and knowledge bases can become a source of power (Inkpen & Beamish, 1997). Organizations that are able to reduce their partner dependency, by acquiring knowledge or improve their network position, may influence power on its partners, disincentivizing knowledge sharing. As a response to this, Granovetter (1973) highlighted the importance of *weak* ties for generating new and valuable information. Similarly, Burt (1992) observed the existence of structural holes, e.g. ties to non-redundant, non-connected actors, and argued to span these holes. Indeed, having mixture of multiple weak, informal ties, *in addition to* strong ties, have empirically been linked to enhanced knowledge transfer and innovative capacity (Powell et al., 1996; Baum, Calabrese & Silverman, 2000). Such ties are often temporary in nature (Miles & Snow, 1994). Instead of atomistic, firms were increasingly embedded into a network of relationships (Gulati, Nohria & Zaheer, 2000). Notably, instead of merely organizing other firms, such networks

increasingly included a wider set of actors outside the firms boundaries – such as customers. Hierarchical coordination mechanisms, imposes "filtering and delay", which no longer suited the "rapid, effective responses to opportunities and challenges" needed (Fjeldstad et al., 2012, pp. 738-739). Realizing the benefits of this flexibility, an entirely new way of organizing emerged, leveraging *communities* to organize as CNs (Snow et al., 2011). Decentralized, cooperative and self-organized problem solving stands in contrast to traditional innovation (von Hippel and von Krogh, 2003; von Hippel, 2005). Consequently, scholars have advocated for new ways to organize such relationships (von Hippel & von Krogh, 2003; Miles et al., 2010), mirroring Mintzberg's (1979) adhocracy.

2.3.3 Collaborative Communities

Collaborative communities have emerged in different forms, including open innovation (Chesbrough, 2003), crowdsourcing (Howe, 2009) and self-organizing communities (Benkler, 2002). Communities open up their value creation processes, benefitting from a larger pool of knowledge than closed, single firms (Fjeldstad et al., 2012). Large scale multi-party collaboration has benefited domains diverse as encyclopedias, space exploration and medical equipment (von Hippel, 2005; Lettl, Herstatt & Gemuenden, 2006). Information and communication technology plays a key role in these processes, as they help gather and structure information which was not previously available (Dahlander & Gann, 2010). Indeed, new technology has affected "how knowledge is managed and governed, including how it is generated, stored, and preserved" (Ostrom & Hess, 2007, pp. 9). According to Benkler (2006) this democratization of knowledge production is driven by digitalization, and by emergence of low-cost communication which allows actors to self-organize and distribute knowledge and know-how. Thus, at its core, collaborative networks are a combination of "people, technology, and organizing ability" (Snow et al., 2017). Since CNs typically modularize the problem (Baldwin & von Hippel, 2011) this changes the roles of actors (Prahalad & Ramaswamy, 2004).

Co-creation versus Co-Production. In CNs, actors collaborate both inside and outside the organization (Powell, 1990) to *co-create* or even *co-produce* products or services (Normann & Ramírez, 1993; Prahalad & Ramaswamy, 2004). Initially used interchangeably (e.g. Vargo & Lusch, 2004; Voorberg et al., 2015), scholars such as Payne, Storbacka and Frow (2008) and Vargo and Lusch (2008)

distinguish between co-creation and co-production. Although different definitions exist, Voorberg, Bekkers & Tummers, (2015) argues that co-production may be understood as a more distinct version of co-creation. This can be exemplified through the logic of the previously presented Value Chain model (sub-section 2.1.1): In co-production the customer *takes over* certain activities, whereas in co-creation the actor merely *complements them* by *active* participation (Vargo & Lusch, 2004; von Hippel, 2007). This distinction is important, not least in healthcare, where the system fundamentally is collaborative. At the same time, medical problems are diverse and the knowledge is complex. For this reason traditionally only healthcare professionals created and disseminated new knowledge, whereas patients remained mostly passive. However, authors such as Margolis, Peterson and Seid (2013) underline how patients presently have a strong untapped motivation, which makes healthcare particularly well suited for collaborative models, where patients and doctors co-create, or even co-produce, healthcare services. This would change the role of doctors and patients; which in turn would challenge established organizational structures (Ramírez, 1999). In the end such organization entails fundamentally different activity logics.

Open Innovation. As a response, organizations are opening up their innovation processes – with the purpose of capturing returns (Chesbrough, 2003; von Hippel, 2005). This creates a paradox: Motivating collaborative creation of value, while supporting fair appropriation of returns (Chesbrough et al., 2006; West & Gallagher, 2006; Reitzig & Puranam, 2009). However, such collaborative modes have been described as a 'double-edged sword' for firms (Chan, Yim & Lam, 2010), potentially reducing firm control, increasing external dependence, inducing risk into internal processes and yielding negative effect upon workers motivation. Actors typically only do part of the work, relying on the network to do the rest, potentially inducing free-riding (Olson, 1965; von Hippel & von Krogh, 2003; Baldwin & von Krogh, 2011). This calls for a balance on openness, with engagement; a business model choice (Magretta, 2002). Chan et al. (2010) highlight a need for matching processes, to ensure organizational fit (Miles & Snow, 1978; Porter, 1996). The multiple and interdependent activities within a CN thus requires fit across the differing actors' business models. This calls for novel thinking on how to design organizations to effectively create and appropriate value from knowledge contained in communities (Miles et al., 2010).

2.3.4 The Actor-Oriented Architecture

An example of such novel organizational design, emerging from the realization of the inefficiencies related to hierarchical coordination, is the Actor-Oriented Architecture (Fjeldstad et al., 2012). A core argument is that these collaborative structures may be deliberately designed. Drawing on principles from object-oriented programming, the architecture consists of three main elements: (1) *Actors*, who have the capabilities and values to self-organize; (2) *Commons*, where the actors accumulate and share resources; and (3) *Protocols, processes, and infrastructures* that enable and facilitates multi-actor collaboration (Fjeldstad et al., 2012, pp. 739). These must be aligned to fit the organizational purpose.

In contrast to the multi-firm networks covered in the previous sub-sections, "control and coordination are accomplished primarily via direct interaction among the actors themselves rather than by hierarchical sub-ordination", although, notably, some degree of hierarchy is typically retained for control (Fjeldstad et al., 2012, pp. 739). The actors may be human or virtual, and might have different roles (Snow et al., 2017). Protocols act as codes of conduct, helping to coordinate interaction, which, together with efficient infrastructures enable effective self-organizing. One notable example of such a protocol shared situational awareness: According to Snow et al. (2017, pp. 7), "when actors share up-to-date awareness of the organization's situation (…) [actors] can make the right decision or take correct action without seeking direction or authorization from the hierarchy". Whereas hierarchies guard their resources, cf. section 2.2, collaborative communities use common values to voluntarily share key resources through the *commons* (Ostrom, 1990). Notably, commons do not have to imply universal (free) access (Ostrom & Hess, 2007), it may also be conditionally managed as the focus is on the social creation of such commons (Benkler, 2006). Interestingly, according to Buckley and Casson (1988), information exchange may even help promoting common values, creating a reinforcing effect. Fjeldstad et al. (2012) argue that the scheme is particularly suitable for knowledge-intensive, digital and collaborative organizations. Indeed, Snow et al. (2017, pp. 3) argue how self-organizing collaborative are "faster and more effective than a hierarchical response".

The Actor-Oriented Architecture outlines the *principles* for engagement, as opposed to an explicitly designed organization (Fjeldstad et al., 2012). This implies an *adapting* structure. The scheme is thus proposing what in Thompson's (1967) language represents an *administrative technology*. By disassembling hierarchy, and instead deploying trust based coordination, such architectures could yield more efficient and effective modes of control (Fjeldstad et al., 2012). The networks may be both formal and informal, i.e. purposely adopting this scheme – or not. Although formalization of rules and process is not necessary, scholars such as Kolbjørnsrud (2017) argue, that organizations need to be aware of their collaborative maturity.

To ensure sustainability, a holistic perspective on collaboration needs to be taken. In particular, the degree of openness has been shown to yield a trade-off between value creation and value appropriation (West, 2003; Boudreau, 2010). Both value creation and value appropriation becomes more complex under collaborative settings. Under such collaborative settings "issues regarding innovation, knowledge creation, invention and management gain prominence" (Lepak et al., 2007, pp. 183). Collaborative relations imply an interlinked value creation process, with the interactions being the main source of value (Stabell & Fjeldstad, 1998). These interactions must be facilitated by an actor, which, by providing a platform (Gawer, 2014), may enable such interactions to occur. Such actor may also be seen as a Value Network, with distinct processes for creating and appropriating value from their mediating services (Stabell & Fjeldstad, 1998). In order to sustain participation each stakeholder needs to create value for themselves (Ramaswamy & Gouillart, 2010). This contrast to traditional approaches where customers were assumed to automatically participate as long as they could derive a positive consumer surplus from transactions, as mediated in the marketplace (Teece, 2010). However, in networked settings, the traditional buyer and sellers are less likely to be at the same level. This makes *distribution* of value more difficult. This implies that value appropriation needs to be simultaneously be considered with value creation, and that business models must be investigated beyond firm boundaries (Fjeldstad & Snow, 2018).

3. Research Methodology

The following section outlines the methodological approach. First, we present the phenomenological route taken to arrive at our research question. Second, we introduce the chosen – qualitative – approach, elaborating on the method, structure and execution of research. Lastly, we evaluate our design, highlighting the compensating measures taken.

3.1 Sampling Process

As fellow students of the 2018 Strategy class at BI Norwegian Business School we were united by a common interest in the impact of technological innovation on organizations. In particular, we were eager to study the impact of artificial intelligence, big data and machine learning. Based on priori experiences with the healthcare system, we were intrigued to learn more about how this industry in particular could be affected by such potentially disruptive innovations (Christensen, 1997). This became the starting point of our thesis, which thereby is founded on a phenomenological approach (Groenewald, 2004).

We approached the topic seeking insights from thought leaders. Amongst others we targeted IBM, one of the leading innovators within this field. Notably, IBM has set up a separate health-division for their cognitive system *Watson* focusing on, among other topics, precision medicine (IBM Watson Health, n.d.). Our initial ground-digging culminated with a meeting with their Global Chief Strategist in late August 2017. The meeting became pivotal for our research effort, as we realized how dependent advanced technology is on basic organizational processes. This shifted our focus from technology, to administrative issues. The insight was resonated by other early sources, who highlighted how organizational issues could act as impediments to technological innovation.

Up to this time, our efforts had been autonomous, with limited supervision. Therefore we were encouraged to discover that our Professor, Øystein D. Fjeldstad, happened to be academically invested in the healthcare industry himself: His value configuration framework (co-authored with Professor Charles B. Stabell, 1998), as presented in literature review of this thesis, was the cornerstone in Harvard Professor Clayton M. Christensen's book *The Innovator's Prescription* (2009), which argued how both cost and quality could be improved in healthcare. Among

its readers were Senior Executives of the James M. Anderson Center for Health System Excellence (hereafter 'The Anderson Center'), at Cincinnati Children Hospital Medical Center (CCHMC), who were searching for insights to improve their LN *ImproveCareNow* (ICN), with the purpose of creating a scalable learning

Fact box: ***Cincinnati Children's Hospital Medical Center***

CCHMC is a 629-bed non-profit academic medical center, established in 1883 and located in Cincinnati, Ohio, USA. In 2017 it had about 1,3 million patient encounters, from all U.S. states as well as 587 patients from 58 countries. CCHMC has long put heavy emphasis on research, and among its medical discoveries are the oral polio vaccine and the heart-lung machine, the basis for modern open heart surgery. As a prolongation of this legacy, and as part of its vision "to be the leader in improving child health" the CCHMC established the Anderson Center in 2010 to intensify work on Quality Improvement. However, research on children's disease is fundamentally challenging as most pediatric diseases ultimately remain rare (Lannon & Peterson, 2013) – even at specialized institutions such as CCHMC. Initially internally focused, the Anderson Center has over the last years increasingly focused on external collaborative activities, such as LNs. Since then, eight more networks have been affiliated with the Anderson Center's 'Learning Network Program', cf. Appendix B. Arguably as a reflection of its efforts, the hospital was recently recognized as the No. 2 U.S. Pediatric institution, in the 2018-2019 U.S. News & World Report Ranking.

Sources: CCHMC (n.d.) & U.S.News (June 26 2018)

platform. ICN will be introduced in more detail in section 3.2.1, as we present the case context, but for now the reader should note that ICN adopted our Professor's Actor-Oriented Architecture (Fjeldstad et al., 2012) – thus becoming one of the first sites of *active* deployment of his architecture. Based on this link we contacted the Anderson Center with our request for research.

Initially intending to study ICN as an archetype of collaborative networks, we quickly learned that the Anderson Center was involved in the development of other networks, through the national network-of-network PCORnet. Coincidentally, PCORnet was planning to expand with four networks during spring 2018 - the first time multiple networks were to be on-boarded simultaneously. Notably, the Anderson Center was going to lead the onboarding and intended to use

ICN as a template, with the purpose of learning how to scale such networks. As sustainability had remained a key concern for these networks our contacts found great interest in our thesis, and invited us to interview their networks, as well as participate first-hand in the onboarding conference and the bi-annual networking conference. This was of course extremely interesting, as it not only allowed us to study an existing LN, but also the onboarding of new networks. We accepted.

3.2 Research Design

This thesis aims to explore business models for CNs, with the organizational model of Fjeldstad et al. (2012) as an archetype. Our research topic entails certain novelty, both from a theoretical and applied perspective. This justifies an inductive approach, which aims to create "generalizable inferences out of observations" (Bryman & Bell, 2015, pp. 13). Eisenhardt (1989) argues for using such a qualitative design when extending existing theory. Different qualitative techniques can be employed, such as observations, interviews, archives, focus groups and surveys (Eisenhardt, 1989; Yin, 2009; Bryman & Bell, 2015). As was elaborated on in the preceding section, we successfully identified organizations engaged in challenges directly relating to our problem statement. This enables us to study these as cases. As we studied interactions between individuals, capturing their behavior was key (Eisenhardt, 1989; Yin, 2009). Although conceptual frameworks can be created from combination of "previous literature, common sense and experience", empirical reality is needed to create "testable, relevant and valid theory" (Eisenhardt, 1989, pp. 532). Indeed, Porter (1991, pp. 99) states that "the nature of strategy requires it", e.g. case studies, to generate the necessary progress in the field. Although the focus of our thesis is on the network, our research question calls for a multilevel analysis – both on the network, but also the actors within (Eisenhardt, 1989). Our focus is identifying both similarities and contrasts (Eisenhardt, 1989). The subject for our interviews will be the actors, whom we view as *knowledgeable agents* (Gioia, Corley & Hamilton, 2013) of the networks. That is, we adopt a view of the networks as being socially constructed (Weick, 1979), and therefore put a premium on our actors descriptions.

Using a grounded theory approach to surface concepts (Glaser & Strauss, 1967), we will employ the Gioia-methodology (Gioia, et al., 2013), explained in section 3.2.4, in order to generate theories from the case interviews, influenced by

the previously presented theory. We nuanced our findings through additional data sources, such as network documentation ('commons') and conference (field) observations (Yin, 2009; Gioia et al., 2013). In the following sections, we will introduce the case context, which has been the subject of our investigation over the past nine months, before we elaborate on the execution of our research.

3.2.1 Empirical Context: The ImproveCareNow and PCORnet

The healthcare industry forms the context for our case study. Specifically we study ImproveCareNow and PCORnet. ImproveCareNow is a (single) Learning Network. PCORnet is the world's largest network-of-networks within healthcare, see Appendix C for an overview. The multi-site, multi-level nature of ICN and the other PCORnet networks, implies there is a multitude of actors across the networks. It is out of scope for this thesis to elaborate on all LNs contained in PCORnet, hence we instead focus our attention on describing the ICN and PCORnet organizations, as these represent two distinct levels within our context: ICN is an archetype for an individual LN, while PCORnet captures the complications encountered for network-of-networks organizations.

ICN. ImproveCareNow (ICN) is a disease-based collaborative care network focusing on children with Inflammatory Bowel Disease (IBD, see fact box below) (Forrest et al., 2014). Initially a physician-led Quality Improvement (QI collaborative, ICN adopted the IHI Breakthrough Series model for collaborative improvement (IHI, 2003) and "the National Institutes of Health-funded Collaborative Chronic Care Network (C3N) Project to become the first C3N - a learning system in which everyone can be involved in improving health and healthcare" (PCORI, n.d.). The design process of how they became a learning system is explained in detail by Seid et al. (2018). In the decade since the launch in 2007, the network has grown from 8 to 109 care centers, and today caters for 29.800 children with IBD - about 1/3 of all IBD patients in the US (ICN, n.d.). The network has yielded strong results: As of July 2018 the share of patients 'in remission' had increased from 55% to 81%, with 54% of patients having 'sustained remission' (>1 year) (ICN, n.d.).

Fact box: ***Inflammatory Bowel Disease***

Umbrella term employed for Crohn's disease and ulcerative colitis, diseases cause long term injury to the intestines. Simplified, IBD patients experience two main states, periods of severe symptoms, also known as flare-ups, and periods without fewer or no symptoms, called remission. Although no cure currently exists, there are numerous treatment options. Without going into further details on the medical aspects, the reader should take note that these are distinct diagnoses that leads to a chronic, lifelong condition, with significant variation from person to person. The primary goal of ICN is therefore to improve patient outcomes, with the remission rate of enrolled patients as the main performance metric. Building on the National Academies Institute of Medicine's concept of the Learning Health System (LHS), the main mechanism for increasing remission rates is the network, wherein standardized data is collected, monitored, studied and shared – in order to encourage new ideas and development of practices.

Sources: Forrest et al. (2014) & ICN (n.d.)

The success of ICN has made it a suitable template for scaling up the national healthcare for children's diseases – PEDSnet (Forrest et al., 2014; PEDSnet, n.d.). PEDSnet is part of the national network of healthcare networks *PCORnet*-initiative, launched in December 2013 by the Patient-Centered Outcomes Research Institute (PCORI). PCORI is an independent, non-profit health research organization, authorized by the Patient Protection and Affordable Care Act of 2010 (PPACA) section 6301, which aims to put patients in the center of care by conducting research on outcomes (Fleurence et al., 2014). PCORI receives its funding from a flat tax on health insurers/-plans – USD 2.[39] per enrollee as of July 31st 2018 (IRS, n.d.), which it uses to fund activities, such as LNs.

PCORnet. PCORnet consists of 13 so-called Clinical Data Research Networks (CDRN's, wherein PEDSnet is one of the 13), as well as 20 patient powered research networks (PPRN's, wherein ICN is one of the 20) and 2 Health Plan Research Networks (HPRN's). Although other nationwide networks of LNs exist, PCORnet is the largest, with 135 participating health systems and data on roughly 100 million patients across the U.S., see Figure 2 on the following page (PCORnet, n.d.). PCORnet offers both a common data model, and an organizational framework which helps ensure insights are embedded into care – 'closing the loop'. Indeed, PCORnet's novelty is that it is the first clinical research network which is

directly integrated into the point of care, and thus represents as a government trial on the Institute of Medicine's Learning Health System (LHS) model (PCORnet, n.d.; Institute of Medicine, 2007).

Figure 2: Case overview and PCORnet's U.S. presence. Source: PCORnet (n.d.) and authors' contribution.

Ultimately, we see five main reason for choosing our case: First of all, the case represents operational Collaborative Networks, and the largest of its kind. We redeem the scope, scale and maturity of our case to benefit this thesis. Second, the case networks have – independent of our inquiry – highlighted our research problem as a topic of interest. Indeed, PCORnet lists a long-term business model as one of the five prerequisites for achieving a Learning Healthcare System (PCORnet, 2017). "The issue of sustainability for the individual networks and for PCORnet as a whole is a real concern" (Fleurence et al., 2014, pp. 1217-1218). Third, we found ICN as an interesting starting point, as they have actively adopted the Fjeldstad et al. (2012) Actor-Oriented Architecture for their network. The network therefore serves as a natural context to expand the theory within this realm. Equally important, however, other networks existed who had not explicitly adopted the framework, yet rely on similar principles, as well be discussed. Lastly, at the time of writing of this thesis PCORnet was facing a distinctive event in its evolution, as it attempted to scale by admitting further networks. The timing of our thesis implied we could witness and document this expansion first hand, yielding nuancing longitudinal observations. This facilitated access, which is a critical factor for doing a representative case study, especially since the opinions of different stakeholders is key for our insights.

In summary we redeem the case as being highly relevant, offering both a relevant context as well as a dynamic dimension. This should yield relevant theoretical and practical insights. We will hereby describe the process of how we captured insights from the case, based on our research design.

3.2.2 Interview Process

As this thesis is authored by students at BI Norwegian Business School, located in Oslo, Norway, while the interview subjects of our case study were predominantly located in Cincinnati, Ohio, USA, this put some additional demands on the execution of our study, which we will hereby elaborate. As presented in section 3.1 Sampling Process, we were invited to attend two key events, which coincided with the writing of this thesis: The 'LHS Launch Meeting', for the new four networks, and the 'Learning Networks Community Conference', the bi-annual conference for all networks - including the four new members. Being hosted the same week in February 2018, in Cincinnati, the events brought together key network stakeholders. In addition, further network stakeholders were available at CCHMC. The one-off nature of the events and intensity in interview opportunities made an in-person visit to Cincinnati a natural priority. In-person interviews had several advantages: First of all, face-to-face dialogue ensures full attention and response from the participants. Second, we were able to better tailor our responses by catching up on non-verbal cues, using these to further tailor each individual interview. Lastly, being physically available we could schedule additional interviews in connection to the conferences more spontaneously.

As will be elaborated in the upcoming section we used an interview guide as a structuring device for our interviews. The focus was always to understanding the respondents point of view (Yin, 2009). To ensure reliability and attention we always conducted our interviews with both thesis authors present. In order to foster a fluent dialogue, we delegated the task of interviewing to one of us, while the other was responsible for transcribing and coding the interview. The interviews were typically scheduled for one hour, which we deemed sufficient for most interviews – although both shorter and longer, even follow-up interviews were conducted whenever appropriate. The interviews were executed in English, the primary language of all our interviewees. As we acknowledged that anonymity would help our actors speak more freely, without obstructing our research, we informed and granted it to all interviewees. Between interviews we followed-up on statements and aspects which could be added. After the conference and interview trip we reviewed the material, the ensure all relevant information was captured. The interview guide and structure will be further elaborated in the next section.

3.2.3 Interview Design

In order to increase the reliability of our case study, we employed an interview guide. The initial protocol was rooted in our research question and nuanced by the theoretical model (Bryman & Bell, 2015). However, as Gioia et al. (2013, pp. 20) point out: "Adhering to some misguided sense that the protocol must be standardized so that there is consistency over the course of the project is one of the reasons why traditional research sometimes is not very good at uncovering new concepts to develop". For this reason, we adopted a semi-structured approach and adjusted the protocol as required (Glaser & Strauss, 1967; Gioia et al., 2013). This ensured that key topics were covered, avoiding disturbances that can occur from excessive information, while allowing flexibility to capture supplementing information that might prove relevant for the project (Eisenhardt, 1989). For this reason, we allowed some to be guided be the responses of our interviewees, although we ensured that the main elements of our interview guide was covered. Our focus was understanding the interviewees' point of view (Gioia et al., 2013).

Our final interview guide is attached in Appendix D. It is structured around five main themes: Interviewee background, network participation, network cost, joining the network and network facilitation. In total, we had 35 questions. The questions were formulated in a generic manner, deliberately minimizing the use of technical/internal terminology. Some questions were descriptive, while others required the interviewees to reflect on the network structure and actor behavior. Due to the deliberate diversity of interviewees' connection to the actors, the actual wording was adjusted to remain relevant. Not all questions of the interview guide were asked, but we ensured all topic were covered. Before ending the interview, the questioner always summarized the discussion, unveiling our structure – giving the interviewee an extra opportunity to add complementary perspectives. All interviews were transcribed, in full, immediately after ending the interviews to capture any non-verbal nuances. In total we have transcribed 335 pages of interviews. In the upcoming section we will outline how we analyzed the transcribed interviews.

3.2.4 Interview Analysis

In order to facilitate the analysis all interviews were recorded and transcribed verbatim in full using a professional qualitative research software package, NVivo. This implies that replies to questions outside the questionnaire or answers to questions not asked are also found in our data collection. The software allowed us to code the interviews, capturing wording patterns. In order to increase validity, both authors separately reviewed the coding. We adopted the afore-referenced Gioia-methodology to structure our inductive approach (Gioia et al., 2013).

The Gioia-methodology emphasizes rigor in the research, emphasizing on developing concepts, rather than refining existing theoretical constructs in order to capture the core "qualities that describe or explain a phenomenon of theoretical interest" (Gioia et al., 2013, pp. 16). The initial step is to develop the *1st order*-concepts, based on the interviewees' own terminology. This is purposely done to avoid imposing judgement or standpoints upon their views. The second step is to combine these 1st order concepts with our theoretical dimensions into distinct *2nd order*-themes, based on our theoretical lens. The third and final step is to combine the 1st and 2nd order categories, based on interviewee and researcher concepts, into overarching *aggregate dimensions.* Figure 3 illustrates this approach.

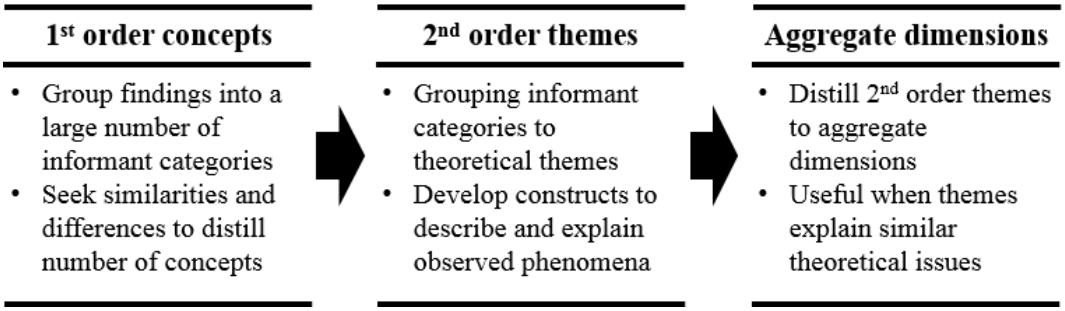

Figure 3: Data structuring approach, based on the Gioia-method. Source: Authors' contribution.

In conclusion, this method provides a clear transition from the empirical data that is collected, to the theoretical approach employed – as guided by the research question. This facilitates inferences from the research to be drawn, extending the current understanding. Gioia et al. (2013, pp. 21) advocate an iterative process, in which "data and existing theory are (…) considered in tandem", in order to refine emergent concepts. This implies an abductive process (Dubois & Gadde, 2002), where the literature is revisited.

3.2.5 Stakeholder Analysis

In our theoretical section we identified how actors in CNs actively impact network activities, through control and influence. The literature defines "groups or individual[s] who can affect or is affected by the achievement of the organization's objectives" as *stakeholders* (Freeman, 1984 pp. 46). Due to their relational roles and dependencies, stakeholders influence outcomes – calling for analysis (Mason & Mitroff, 1981). *Stakeholder analysis techniques* are used to surface issues which deserve attention - see Bryson (2003) for an overview. Given the complex social nature of our empirical case context, we have identified how a stakeholder analysis tool could aid in structuring select parts of our research.

We will employ the *power versus interest grid* (P/I-grid) to nuance our findings and discussion (Eden & Ackermann, 1998). The grid maps out different stakeholders, based on their relative power and interest in the focal matter, see Figure 4. The analysis helps identify whose interest and power bases should be considered. The resulting grid yields four distinct segments, each with their own characteristic: (1) *Players*, top right quadrant, "who have both an interest and significant power"; (2) *Context setters*, lower right quadrant, "who have power but little interest"; (3) *Subjects*, upper left quadrant, "who have an interest but little power", and; (4) *Crowd*, lower left quadrant, "which consists of stakeholders with little interest or power" (Bryson, 2003, p14). Bryson (2003) underlines how stakeholder techniques represents a static reflection of the stakeholder dynamics, which may change over time and across contexts – calling for a granular analysis. In our thesis, we will deploy the P/I-grid for a holistic overview of different stakeholder interests, as well as their power to influence networks directly and indirectly - highlighting levers for manipulation. The P/I-grid also contains an actor influence map, highlighting "formal or informal influence links that exist between subjects, players and strategy context setters [stakeholders] on the power/interest grid", by arrows (Eden & Ackerman, 1998, pp. 349). We are confident that the deployment of this framework will aid to nuance insights from the sources, which we will introduce in the upcoming section.

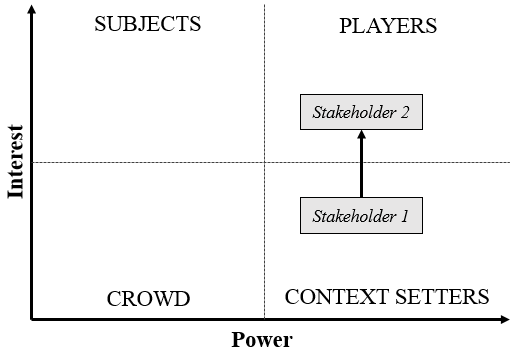

Figure 4: Illustrative P/I-grid.
Source: Eden & Ackermann (1998).

3.3 Data Sources

The following section summarizes our data collection, which spanned over a period of nine months. The primary data was based on semi-structured interviews, while our secondary sources consisted of conference and network documentation (including from the commons). An elaboration follows.

3.3.1 Primary Sources: Interviews

We used our contacts at the Anderson Center to pre-plan our interviews, employing a snowball sampling technique to map out relevant stakeholders, stopping once we reached theoretical saturation (Noy, 2008). Guided by our research question we targeted interviewees affiliated with the commercial aspects of the network(s), such as corporate staff and executives of the hospital/clinics involved. This included external representatives from affiliated business, patients- and parent groups. This was further supplemented with additional video interviews, allowing us to capture any changes in perspective by the four newly included networks, adding a longitudinal dimension. In total we conducted 18 formal interviews, using our interview guide, with a total duration of 1029 minutes. Relating back to the Gioia-methodology, 3.2.4, these resulted in twenty-six 1st order concepts, thirteen 2nd order themes and three aggregate dimensions, cf. Figure 11. Table 1 below, summarizes our formal interviews. We also participated in, and recorded large parts of, three conferences. Two of these were on site in Cincinnati during the launch of the four new networks and bi-annual conference. In addition, we participated in a

Interviewee	Format	Duration	Recorded	Transcribed
External Partner #1	Semi-structured	41 min 29 sec	Yes	Yes
External Partner #2	Semi-structured	76 min 14 sec	Yes	Yes
External Partner #3	Semi-structured	73 min 02 sec	Yes	Yes
External Partner #4	Semi-structured	56 min 22 sec	Yes	Yes
External Partner #5	Semi-structured	34 min 22 sec	Yes	Yes
Project Manager #1	Semi-structured	54 min 01 sec	Yes	Yes
Project Manager #2	Semi-structured	43 min 30 sec	Yes	Yes
Project Manager #3	Semi-structured	44 min 51 sec	Yes	Yes
Network Executive #1	Semi-structured	75 min 48 sec	Yes	Yes
Network Executive #2	Semi-structured	120 min 59 sec	Yes	Yes
Network Executive #3	Semi-structured	59 min 06 sec	Yes	Yes
Network Executive #4	Semi-structured	49 min 27 sec	Yes	Yes
Network Executive #5	Semi-structured	51 min 10 sec	Yes	Yes
Network Executive #6	Semi-structured	47 min 57 sec	Yes	Yes
Network Executive #7	Semi-structured	59 min 11 sec	Yes	Yes
Network Member #1	Semi-structured	48 min 08 sec	Yes	Yes
Network Member #2	Semi-structured	42 min 58 sec	Yes	Yes
Network Member #3	Semi-structured	50 min 35 sec	Yes	Yes

Table 1: Anonymized overview of conducted thesis interviews. Source: Authors' contribution.

conference at Dartmouth Hitchcock Hospital in Lebanon, New Hampshire. The theme of the conference was 'development of a value-creation model for use in healthcare service settings', and was organized by Professor Paul Batalden. These conferences served as natural arenas for our topic, and supplemented our interviews.

3.3.2 Secondary Sources

A benefit of studying a Collaborative Network, such as ICN, is that further case documentation is readily available in the form of community 'commons' (Fjeldstad et al., 2012). Intended to facilitate collaboration, the commons mainly exist to facilitate and coordinate exchange between different stakeholder groups. In general, written sources provide information that arguably is more objective and less subject to personal view-points. However, for the purpose of answering our research question, rooted in more administrative issues, the use of these commons was limited to mainly providing nuance or sources for interviews and/or material. More valuable were tools and presentations provided during the conferences or as follow-up to interviews, which gave access to material we would otherwise not have been able to leverage into our research. Thus, the main added value of the secondary sources was the triangulation it enabled (Eisenhardt, 1989).

3.4 Methodological Considerations

Qualitative case research has some potentially shortcomings that should be addressed (Eisenhardt, 1989; Bryman & Bell 2015). Below, we have addressed some of the usual pitfalls related to the methodology deployed, with the purpose of ensuring the validity and reliability of our findings.

3.4.1 Lack of Generalizability

Case studies are often cited to have varying applicability to the broader population (Eisenhardt, 1989). Harrigan (1983) highlights how in particular single case studies can provide richness but also tradeoff in terms of generalizability. Although we recognize this argument - which perhaps in our case even is exacerbated by the specificity of our industry, healthcare, and the context under which the case is moderated, the U.S. healthcare system (which differs from many other countries) - we would argue that our case is not meant to reflect the population, e.g.

healthcare/healthcare networks/U.S. healthcare. Instead of generalizing for a population, our intent and clear focus is generalizing for theory (Mitchell, 1983). The multi-level nature of our case also implies we should have a broad base of interviews, and secure a diversified overview of the topics under research. This should support making the inferences drawn generalizable to other settings with similar dynamics, e.g. knowledge intensive industries. What is more, as business students living outside the U.S., without any undisclosed relations to any parties in the organizations of this study, we do not deem to have any predominance for subjectivity in the analysis. We took preemptive measures to increase the validity of our findings, for example by triangulation of data sources (Eisenhardt, 1989).

3.4.2 Interview Biases

The interview process exposes any qualitative study to biases. We have made our greatest efforts to ensure the viewpoints of our interviewees was accurately captured and reflected in our study. However, ultimately, our interview approach leads the interpretation of the interviews themselves exposed to issues of validity and reliability (Bryman & Bell 2015). Biases in the interview process may occur on the account of both the interviewer and the interviewee. For the former, Bryman and Bell (2015) argues that biases may occur if researchers are having prejudices towards what they think is correct. By transcribing the interviews, and thereby being able to analyze whether the interviewees are being lead towards certain answers by the researchers, in terms of follow up questions and expression of assumptions, one is able to reduce the risk of this bias affecting the research. Furthermore, Bryman and Bell (2015) highlight social desirability bias as a common interview bias, occurring when interviewees alter their responses based on what is socially accepted. We have therefore specifically analyzed our collected responses for biases. For example by analyzing differences by interviewees in similar roles. By thoroughly informing the interviewees of their anonymity, we tried to prevent them from altering their answers to be perceived in the mentioned desirable way.

Finally, we will not ignore how our direct access to the managers of the networks and network-of-networks could have affected our collected responses – either elevating or demoting our role towards the interview objects. This became an extra justification for stressing the anonymity of our interviewees.

3.4.3 Legal Considerations

This Master Thesis was written during 2018, at BI Norwegian Business School, and falls under Norwegian jurisdiction. As our project records and processes personal data our Master Thesis has had to be notified to the Norwegian Centre for Research Data (NSD), in accordance with the Norwegian Personal Data Act (Norwegian: 'Personopplysingsloven') §31. The approval has been included in Appendix E. Specifically, it instructs that statements must be anonymized to the extent possible, and that all interviews and recordings have to be deleted upon submission of this thesis. To our knowledge this research is not in breach of any legal requirements.

3.4.4 Ethical Considerations

Qualitative research, in particular whenever involving interviews of individuals, triggers natural ethical considerations. Ethical boundaries in this regard are not clear cut, yet for us as researchers it was important to maintain respect towards the issues covered, and how the research may affect the subjects under research (Bryman & Bell, 2015). This was especially relevant for us, as we were interviewing actors within the same sphere of networks, or even the same network, on topics which we know is a basis for divergent views among the stakeholders. As a response we used informed consent for all parties (Groenewald, 2004). Further we anonymized the collected data and been considerate in the use of potentially identifying statements.

What is more, our study is focused on a sensitive area, medicine, and arguably even a very sensitive subfield – pediatrics (children medicine). However, the input of patients and their parents/relatives is not the primary focus of this study. Hence it became natural for us to provide all interviewees will full anonymity, and avoid collecting information that could have triggered ethical considerations.

3.4.5 Conflict of Interest

The authors have not identified any conflicts of interest.

4. Findings

The following chapter presents the main findings from our formal interviews, supplemented by observations made during the attended conferences and supporting secondary sources. As these contexts are complex, we start this chapter with establishing the setting and the vocabulary deployed (section 4.1). As introduced in 3.2.4, our analysis uses the Gioia-methodology (Gioia et al., 2013). This makes it natural to utilize the three identified aggregate Gioia dimensions to structure the rest of this chapter: *Motivation to collaborate* (4.2); *Coordination of Network Collaboration* (4.3), and; *Sustainability of Networks* (4.4). The 1st order concepts populates the content, structured according to the 2nd order Gioia-themes, which are used as headings for each sub-section. Each section concludes with the visual data structure, summarizing the elements for that specific section. These visual data structures are merged into our final data structure model, (4.5). Concluding this chapter, we summarize our observations through a stakeholder analysis (4.6), and an Inductive Model (4.7), yielding additional perspectives and structure for the upcoming discussion chapter.

Interview quotes. Consistent with the Gioia-method, we use interview citations to exemplify findings. Since we granted full anonymity, cf. 3.4, the quotes remain unreferenced throughout this chapter.

4.1 Network Activities

Our multi-level, multi-actor case study, calls for clarification of the terminology deployed. We will hereby establish our vocabulary for the different network levels.

Individual networks. Our study contains two broad individual network classes: (1) The participating *networks* of actors, e.g. sites and the stakeholders interacting in LNs. These are hereafter referred to as 'LNs' or simply as 'networks'; (2) the network *organization*, which enables and facilitates the interactions between the actors and stakeholders in (1), e.g. ICN, which acts as the network facilitator. These are referred to as 'LN organizations' or 'network organizations'.

Network-of-network level. Further, we define the network-of-networks, e.g. PCORnet or The Anderson Center, as the facilitators of the interactions between the network organizations described in (2).

Observed interactions. As will be elaborated in more detail, we mainly observed intra-network interactions in our study. These have been illustrated in Figure 5, by the red and blue linkages, i.e. referring to the interactions within the LNs communities. The network-of-networks level interactions (black link) were limited, this is a finding we will come back to, and restricted to interactions between the network facilitators, not between actors in different individual networks (green linkage). The LN organizations can be understood as the large red and blue circles, which creates the arena for the network interactions (red and blue linkages) and has a defined organizational boundary, represented by the outer circle. Before presenting our findings, we will describe what activities the networks actually perform. As a detailed description of all the networks contained in PCORnet (see Appendix C) is out of scope for this thesis, we will exemplify the activities performed using the network introduced in sub-section 3.2.1, the ICN network. ICN is considered to be the archetype of the studied PCORnet LNs and also the template for the newly on-boarded networks.

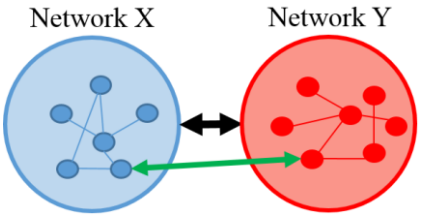

Figure 5: Network interactions. Source: Authors' contribution.

ICN. Although referred to as one organization, ICN is, as all the other LNs, really a collection of 109 hospital sites, i.e. at least 109 different participating organizations, from which clinicians, researchers, parents and patients come together in collaborative research- and QI activities facilitated by the network organizer; ICN. As such, ICN is in itself an organization, with leadership groups and dedicated resources who facilitates workflow, usually recruited from the abovementioned stakeholders. In addition to human resources, acting as a social infrastructure, ICN has its own technical infrastructure, the so-called network registry, which is deployed to collect, share and aggregate healthcare data for reporting and research purposes (Marsolo, Margolis, Forrest & Colletti, 2015). In addition, ICN has supplementary tools to facilitate the social interactions, such as a commons, called the ICN "Network Hub" which not only is a shared knowledge repository but also hosts different resources, from administrative tools to drive engagement, to sharing of photos and videos and the IBD registry. Collectively, the stakeholders work to improve the quality of care. While the range of ICN's resulting research and QI activities is large, we exemplify some of the most relevant ones for our study on the following page:

- ***Patient data research.*** The ICN registry allows centers to "run queries against their own patient population, generating aggregate results with the ability to drill down into patient level data", with the purpose of co-creating treatment insights (Marsolo et al., 2015, pp. 13).
- ***Learning sessions.*** ICN regularly organize physical and virtual learning events, where patients, relatives, clinicians and researchers come together to share their knowledge and co-create best-practices. Notably, these insights are not only directed towards clinical usage, but also practical day-to-day advice for patients.
- ***Pre-visit-planning.*** Pre-visit planning reports is a tool facilitated by ICN, to improve the effectiveness of patients' hospital visits. By having patients complete a survey prior to their hospital visit, the physicians have information available upon patient arrival, thereby increasing the effectiveness and quality of the visit. This creates a dialogue between the patient and clinician, where the patient may highlight issues they want to address. The pre-visit planning may therefore be regarded as a co-productive activity, as the patient is taking responsibility for part of the caregiving process, although minute. This contrasts ordinary patient encounters, where care is co-created, through a more passive, physician-led, interaction.

Activities such as these have yielded outstanding medical results for ICN, see Appendix B. Perhaps as impressive as the results, is the consistent manner in which the results have accumulated, see graphs in Appendix B. This clearly illustrates the continuous learning in the network. The remainder of our findings will describe how such activities are brought to existence, coordinated and sustained.

4.2 Motivation to Collaborate

In the LNs we observed, participating actors may enter and exit the networks at their own discretion, and have varying degree of involvement at different times, as well as in different activities. In the lack of formal (contracted) participation, the *motivation* to collaborate has surfaced as a key theme in our interviews. We observed how different factors impact motivation, such as personal and financial incentives, goals and reputation. In addition, the organizational context seems to influence the *alignment* of networks' and stakeholders' individual goals. As motivation affects activity level and commitment, it is a key value creation driver.

4.2.1 Network Formation

Collaborative approaches to organizing is a relatively new phenomenon within the medical community, and is already spurring considerable interest, see Figure 6 below. Indeed, one of the network-of-networks executives stated how "we're having people call us every week, wanting to be a network (…) and more are saying: '*I wanna learn more, can I go to the next step?*'". The successes of early networks have fueled motivations to start: "In the beginning it was an idea, it was a concept (…) now there's actual examples, both of the results, and there's actual people who they can talk to, who've seen it's reasonable". Several of our interviewees independently referenced Rogers' (1962) 'diffusion of innovation' curve, observing how "we're starting to get from the innovators, and we're starting to get a little bit into the early adopters". This indicates how the earliest networks were formed by innovators, motivated by their own conviction. Future actors (e.g. early adopters, early majority) might be less self-motivated, calling for a deeper understanding of potential motivations. Indeed, participation in the networks requires operational changes for participating sites, which often prove difficult to overcome: "Fundamentally, they've been operating the way they've been operating for years, decades". Many therefore back down once they realize what it really requires to run a successful LN, unwilling to "change the way you run your department" or adapt a collaborative culture.

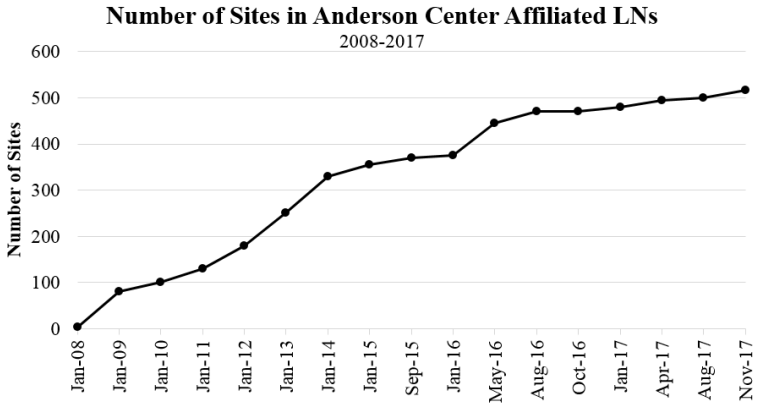

Figure 6: Overview over LN site growth.
Source: Learning Networks Community Conference material.

4.2.2 Inter-Network Interaction

From a network organization perspective, one reason for collaborating with other network organizations is synergies; sharing infrastructures, tools and best practices. Although the LNs are often tailored according to different medical conditions, most of the LNs under our observation came from the same specialty - pediatrics. This implied that they could unify under a common, altruistic goal: Helping children.

Indeed, “the pediatric world, has a culture that's more collaborative”. Since “almost all pediatric conditions are considered rare” it is hard to materialize statistically significant research samples at an individual hospital. Pediatricians therefore have to collaborate to advance the knowledge in their field. This has unified LNs. Interestingly, as positive network-results have started to accumulate, the community has started to recognize LNs as “a better way to practice medicine”.

4.2.3 Intra-Network Interactions

In a LN, stakeholders participating in (network) activities include “patients and families, caregivers, clinicians, and researchers” - and combinations thereof (Margolis et al., 2013, pp. 200). Our interviewees reported that within the networks, different stakeholders have a different degree of involvement in network activities. Involvement ranges from passive participation, e.g. patient consent for data collection in a network registry, to active contributions, e.g. steering the networks’ agenda, by participating in integral parts of the networks’ organization, such as stakeholder leadership groups. In terms of value, both active- and passive stakeholders are important, as both contribute to network goals; but in different ways. Notably, wide engagement, “engaging patients and parents from the very beginning”, appears to be a characteristic of successful networks. Our interviewees highlighted how the network organizations may affect engagement of both existing, passive, members (4.2.4), and expand the total number of members (4.2.5), for example through site recruitment.

4.2.4 Stakeholder Activation

At the network organization level, a central success criterion, according to our interviewees, is to increase individual stakeholders’ engagement - sustaining activities over time. Historically, the PCORnet network organizations had been, at large, individually responsible for developing their networks. As a result, the networks have different degree of involvement of the various stakeholder groups, pending on organizational legacy and preferences: “Some of them already have very well developed research capabilities (…) but they have no engagement with the other key audiences. The flip side is, there are some that have tremendous engagement with their patients (…). But they don't have anything set up, in terms of research, or the other aspects”. Our observations of the network organizations

confirmed this (cf. Appendix C): The CDRNs are typically less connected to patients; PPRNs have more patient interaction, but less research; HPRNs focus on neither, mainly providing supplementary data. These differences are particularly apparent when it comes to their ability to engage patients and parents, who traditionally have remained outsiders to the professional clinical community. These have a strong motive to participate: Improving their own health outcomes and quality of life. Despite this, the involvement of the average patient is cited to be low. We identified several reasons, for example the social stigma related to being sick; "the nature of the condition can be really difficult for a patient to talk about". This can make it difficult for networks to engage patients. Another observed barrier is legal: Privacy laws inhibit networks from gaining access to patient information without prior consent, a matter further complicated if the patients are under-aged. The last commonly cited inhibitor of engagement is underdeveloped social platforms, a topic which we will revisit in sub-section 4.3.2.

In contrast to other stakeholders, organizations have a discretion in instructing their employees, e.g. caregivers, to engage in network activities. The networks we have observed in turn rely on this administrative option to engage members outside the organizations, e.g. patients, leveraging their professional authority as caregivers to instruct members beyond the organizational boundaries. Indeed, networks rely on caregivers to make patients aware of, and involved in, the networks. According to our interviewees, the clinicians are stated to vary in their ability to involve and engage patients.

As a response, the network organizations are directly engaging in activities to activate parents and patients, leveraging their community. For example, one of the examined network organizations facilitates learning sessions, where "half the teachers are parents and patients". In addition to increasing the network activity level, the inclusion of non-trained professionals have surprised the trained healthcare interviewees, by their ability to constructively contribute to prioritizations based on their "unique perspectives". Hence, an important observation for optimizing learning is the ability to activate the broader stakeholder community. The networks are doing this well: One of our patient-group interviewees stated that he/she feels "they have truly included parents and patients in the collaboration".

However, our interviewees underlined that also the professional stakeholders need to be engaged. One cited avenue for the network organizations is to provide opportunities for publishing: "[One form of] value that we give to at least clinicians and academicians is access to data to publish, so there have been a number of physicians who have published a number of papers leading to their own career development and promotion". An interesting observation is the cyclical relation between such activities: Increased activity yields increased opportunities for research, which enables more activities; which makes research more valuable.

4.2.5 Expanding the Networks

In addition to activating (internal) stakeholders, a key activity for the network organizations is to recruit additional members. This is most efficiently done by approaching sites, such as hospitals, instead of individual actors. With pools of patients and practitioners, sites give potential for exponential member growth. However, as highlighted by our sources, these need to be properly engaged and on-boarded. The network organizations have learned to propagate a sense of community, inviting sites to join a "shared community of knowledge and best practice". Clinicians "find value in the connectivity with their peers", and they "love to see if, over time, they are improving as a center. They get a lot of pride about that". The community yields positive side-effects for both the new entrants as well as existing participants: "All of them benefit from a much, much, much [sic] larger pool of data. And that enables them to learn faster, it enables to see greater variation from which to learn, and therefore that enables getting to a best practice or a higher standard faster". What is more, patients and their families are increasingly becoming aware of LNs and their successes. Several of our interviewed network organizations therefore stated how they have "had centers join the collaborative based on pressure from parents".

4.2.6 Participation Cost Effects on Collaboration

The network organizations we observed typically charge a yearly participation fee to sites, but not to individual (human) members. Our interviewees indicated that a typical annual site fee is in the USD 10.000-30.000 range, funding the network organizations' administrative expenses and support. Despite seeming high, this fee is cited as being "a drop in the bucket" of the total direct and indirect costs that

participating sites incur. However, that funding comes from different budgets and hence it is the site fee which we identified as being the primary barrier for sites to join. What is more, the administrative approval process and specific arguments differ from institution to institution. As a result, participation is pending upon the clinicians' ability and motivation to "carve out a year [participation fee] to belong to a network". For actors without such mandates or budgets, it is more difficult to justify participating in the LN. Indeed, "I don't think yet they're joining because we've proven that participation actually lead to major [financial] benefits for centers on the administrative side". Hence, not only do the actors themselves need to be motivated - they need to have sufficient motivation to overcome administrative hurdles, i.e. securing buy-in.

One problem is the lack of communicable relevant documentation, supporting the clinicians' arguments for participation, i.e. positive financial contributions: "We haven't done a good job at articulating financial value, like return on investment". We deem that this is due to the networks' research orientation, focused on improving treatments; not providing actual care. This implies benefits are realized in other parts of the 'hospital', typically outside the LNs scope - limiting their ability to generate such data. What is more, several of the sites are in effect competitors. Although medical data is acceptable to share for altruistic reasons, operational insights, e.g. financials, are regarded as too sensitive.

Nevertheless, many of our interviewees cited how few sites drop out once they have joined; citing motivated clinicians as the main proponents for sustained involvement. Put differently, the abovementioned hurdles are mainly relevant for non-member sites - who are unable to justify joining in the first place. At this stage, it is worthwhile to point out that most of the networks actually stem from Quality Improvement (QI) initiatives. QI may be defined as "work to improve "patient outcomes (health), better system performance (care) and better professional development (learning)" (Batalden & Davidoff, 2007, pp. 2). Since QI is an explicitly funded activity within hospital sites, the budget could be leveraged for supplemental relevant activities, such as LN participation. Another non-financial motivation to join is the acknowledgement the networks have been given in hospital rankings. For example, network membership now "gives you a bump in the algorithm" in the prestigious U.S. News & World Report's annual rankings, which could justify funding the project from a wider organizational level.

4.2.7 Aggregated Section Findings and Visual Data Structure

Concluding, we see how motivation emerged as a driver of collaborative activity across our interviewed stakeholders, illustrated in Table 2 below:

	Sample Quotes Regarding Stakeholder Motivation
Patients & Parents	"I think as a parent, you know, we want the best care that we can find for our children, so there's a little social proof in that". "The patient see the focus on outcomes, people working together, when they go to hospitals they often see people don't work together, and things are separate. And they see here's an opportunity to get the system working in one place, and help take care of their disease". "So these parents are… knowledgeable, and they're usually pretty confident in their ability to manage their child, and want to help other parents who are new to the situation, and want to help their care givers, who they love". "Not only do they come to our meetings and teach, and implement quality improvement themselves, but they actually come to me now and say: ...we have an idea, for something this network isn't doing yet, and we want to make it happen".
Clinicians & Caregivers	"One of the things that drives participation, that's harder to measure, is just this wave of culture around collaborative learning and collaboration, versus competition, that I think we've proven and shown the science behind, that centers are grasping on to. And the thing they feel, which is hard to put your finger on, when they come to the meeting, goes back and, sort of, permeates the culture locally too". "Nurses and therapists, dietitians, and others, see the inefficiencies. They often times feel helpless to give more to families, and through improvement, I think they recognize that they're giving more comprehensive care, more reliably". "I've had doctors telling me on the side(…): I'm now a better doctor. I'm excited, this has just changed my whole model of how I practice medicine...".
Researchers	"They want to contribute, they wanna do better by their kids, and they want to publish". "As we build more of a research portfolio, in addition to quality improvement, there are many more opportunities for, you know, physician leaders to, again, get their names on articles and really be seen as leaders in the field of generating new knowledge. So a lot of it, I think, is tied to personal motivation". "Many of the participating sites have some of the leading researchers in the country involved(…) and I think those physicians would say that they're trying to improve and get better, and they also very much like the sense of community".

Table 2: Sample stakeholder motivation interview quotes. Source: Case interviews.

Notably, several of these motivations are altruistic. As highlighted by one of our interviewees, the existence of a shared goal and values unified stakeholders and facilitated collaboration: "At the end of the day, everyone's working in this industry because of a common goal: We want to make kids better". What is more, according to our interviewees, having a shared perspective fostered more tolerance for additional, supplemental, individual motivations. This helps networks to align individual motivation, with the networks' common, shared goals and values. Figure 7 summarizes the transition from our 1st order categories to the theoretical dimension that this finding is related to:

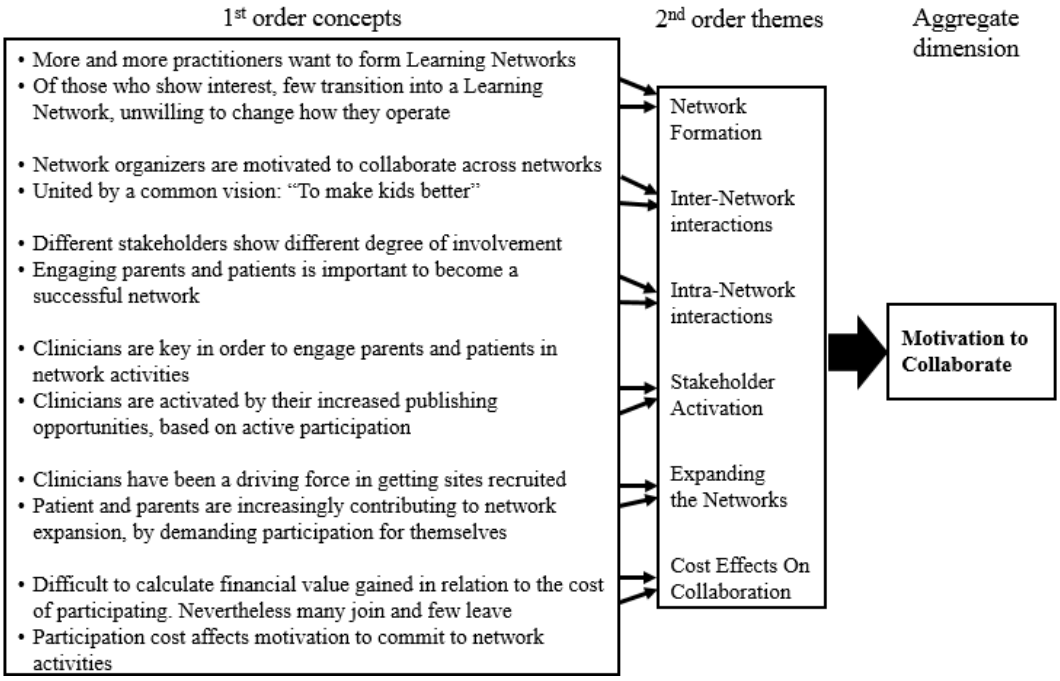

Figure 7: Visual data structure, motivation. Source: Authors' contribution.

4.3 Coordination of Network Collaboration

The network organizations are, according to our interviewees, important for alignment of activities and processes of individual actors: "You have to think about how to mitigate the forces that make it difficult for people to participate" in collaborative activities. Hence, whereas the first section mainly focused on determinants for collaborative activities from an individual (human) actor's perspective, i.e. individual motivation, the following section elaborates on the necessary organizational structures and processes in the network organizations to allow such value creating activities to occur - effectively and efficiently. Hence, our focus will be on technical-, social- and administrative issues.

4.3.1 Facilitation of Network Collaboration

Through our interviews, it became clear that the level of engagement within the different member sites varied. The source of variation goes beyond *individual* motivations, covered in 4.2, and are mainly rooted in *organizational* processes and priorities at the individual sites. Some of our interviewees stated that doctors often are unable to deploy the knowledge, due to lacking experience in process improvement: "Most hospitals will look at a process and go: '*I don't even know what a process is, much less how to fix it, I don't know what to do, all those kind of things*'" (sic). To cope with this, some sites have dedicated resources and tools for

facilitating internal activities. One example is pre-visit planning, a tool employed to facilitate the dialogue between the hospital and their patients prior to consultation, consisting of a review of the current status and a survey. The survey graphically depicts all tracked data, and gives the patient the possibility to highlight issues that they want to focus on during the visit - facilitating a bi-directional dialogue. Other sites leave it up to individual practitioners to self-organize. Similarly, at the network organization level, many of the network organizations have a large number of dedicated facilitators, for example arranging monthly conferences, so-called learning sessions (Forrest et al., 2014), as well as "teaching people systems improvement, quality improvement, and things like that". Others depend more heavily on its participating actors; obliging member-sites to provide facilitating resources. Interestingly, a cross-referencing of our interviews revealed that the intra-network level of interaction could be high both with and without a dedicated facilitator or tools. Other factors, such as actors' motivation and common goals, are more important for the intensity of interactions. However, one of our interviewees stated how the current level of interaction could improve: "I think it's insufficient, it's not optimal", leaving room for other routes to improve interaction.

At the network-of-networks level, the interaction between the network organizations is lower: "For the existing Learning Networks, there is very little interaction between [the network organizations]". One cited reason is that the LNs typically engage in different diseases and stages of treatment, making the process overlap small. In addition, the network organizations might emphasize different goals. Some focus on QI, while others are research focused. According to one of our interviewees, this contributes to the lack of coordination: "You sub-optimize the value if you only work on the research side. That doesn't mean that researchers have to become improvers, you just need to create an infrastructure that allows them to coexist, and move towards the same goal, and make their own individual contribution". Indeed, shortcomings in the network organizations' infrastructure was highlighted multiple times as a barrier for improving coordination of interactions. Hence, we dedicate the next sub-section to elaborate on the technical and social aspects of the existing infrastructures.

4.3.2 Technical Infrastructure in the Networks

Our interviewees highlighted three main challenges of existing infrastructure: (1) The integration of *legacy databases* (EHRs) into a common (network) database; (2) *cross-integrations,* required for sites participating in multiple networks, and; (3) *social platforms* for collaboration within the LNs and between the network organizations themselves across time and space.

Legacy Systems. The advent of Electronic Health Records (EHR) is cited as a pre-requisite for the emergence of LNs. Despite this, variability in the deployment of IT systems is presented as a challenge: "We also actually work with some, like birthing centers and much smaller clinics that actually don't have it [an EHR system] yet". However, merely having EHRs is not enough. Recent figures indicate that 1 out of 5 U.S. hospitals do not have what qualifies for a 'basic EHR' system (Adler-Milstein et al., 2017). In our observational sphere, different IT vendors, platforms and standards are used. For example, CCHMC uses Epic as its main system vendor, while other sites rely on Cerner, Allscripts or others. This makes integration of the sites legacy systems into a common LN structure complex. Further, there is a variability in the *configuration* of systems - as the larger medical centers traditionally pushed for customized systems: "We wanted a system to make ourselves better, we never asked our vendors to design a system that would allow all of us to work together". The systems are designed to archive, not distribute or analyze data. This creates obstacles for data interoperability, as both the data standards and structures differ. The "care centers [enters] whatever fields the hospital requires them to enter", which might not be the same as the network requires – even having different coding for the same data. Often lacking standards for data transfer, e.g. Application Program Interfaces (APIs), several of the networks rely on manual input. One interviewee described this procedure in detail: "Right now, centers have to type it [patient data] into their computer system. But (…) to get that information, they often times fill out a piece of paper, give it to a clerk, who then enters it into a [separate] network registry. So there's duplication of effort". This is obviously inefficient, and also leads to frustration. One avenue to avoid the double-data entry is to integrate vendors "to talk to our registry" – automating the data collection. For example, ICN has pioneered an integration with Epic, creating a standardized interface ('IBD SmartForm') for data entry, which has been cited to save roughly seven minutes per patient in data entry; which directly

saves costs for the participating practitioners (Marsolo et al., 2015). All of the network organizations therefore have an aspiration to develop such interfaces. However, according to our interviewees, developing such systems are costly, and most of the network organizations do not have sufficient budgets for system development. PCORnet has been conceived as a way to centralize data, for example through the Common Data Model (CDM). However, until present PCORI's impact has been limited. Our interviewees also stated further obstacles, such as lack of appropriate channels and resources to make adoptions at individual participating sites. One approach would be teaming up across sites to lobby for and fund changes bottom-up. However, as IT interfaces are often integrated into organizational routines, getting alignment on structures has proven a complex task. Further, our interviewees stated that even if such alignment exists, getting legacy IT vendors along will lead to further complications.

Cross-integrations. Several interviewees added how the abovementioned issues tend to multiple by joining further networks: "You're asking us to do stuff with our EHR for this network (…) some other networks coming in there, want us to do it again. And now a third network comes and talks to our information services people (…) and they're annoyed". Going forward, it is vital that future cross-integrations happen with "as close to zero burden for those organizations as possible". Several interviewees stated that such integrations would be easier if the individual networks approached the sites collectively. However, due to the lacking collaboration between the LN organizations, this has not yet happened.

Social platforms. Another key issue, highlighted by our interviewees, was the "rudimentary" nature of the technical architecture for the social intra- and inter-network collaboration. Indeed, one interviewee stated "It's not such a great collaboration site. I mean, there isn't a two-way bi-directional interaction. So, the bi-directional interaction happens either through e-mails or these community conferences [where] you have the face-to-face" (sic) interactions. This limits collaboration between stakeholders, such as patients and clinicians. Our interviewees cite that this problem is even greater when looking at interactions between networks: "We don't have as well developed, as we could, systems for teams to connect with each other", limiting interactions. Despite testing different ideas, the network organizations "still haven't found the one that just people build into their workflow - that works for them". A cited issue is the lack of obvious

templates of effective corporate social platforms, despite multiple non-corporate examples, e.g. Facebook, LinkedIn, and Pinterest. In fact, the present social platform is inspired by Pinterest.

In summary, we see how inefficient technical infrastructure is a reoccurring theme in the network organizations as well as the sites observed – with sub-optimal coordination of interactions as the consequence. In the lack of ready-made systems, the networks themselves have to agree on standards. However, the present governance processes implies that reaching the required consensus is a challenge. This topic is further explored in the following sub-section.

4.3.3 Governance of Network Processes

The distributed ownership of the network organizations is a source of confusion to some actors; "who owns this?". The collaborative nature of the networks implies that decisions need to be made in the community. This may transform trivial decisions into lengthy dialogues without a clear process for reaching decisions: "Right now we're very consensual and very collaborative, overly so, you know, in my opinion, around, you know, let's all come together and agree. And we're very, very slow to make those common decisions to standardize" (sic). At the same time, our interviewees explicitly acknowledged that the distributed ownership is a prerequisite for the networks existing at all. "If we as a [site name] asserted ownership, the whole thing would collapse". Another interviewee compared the difficulty of governing the networks to the partnership structures typically found in law and consultancy firms, where "the partners don't report to a senior partner (…) they're all owners. So they can all, kind of, do what they want a little bit. And it creates different ways of influencing, whereas in a more corporate structure, CEOs can tell everyone what to do and they all have to fall in line". The communal nature is perceived as "a hindrance, but it's also our greatest strength and an asset because, you know, we're not making widgets here".

The independent nature of different networks is also apparent at the network-of-networks level: "They all are relatively unique, and they all operate pretty independently". This creates additional governance complexity. One interviewee stated: "I think the network leaders, with the exception of a couple of people, feel more allegiance or more interest in satisfying the stakeholders of their individual networks, than of contributing to the common vision of the network-of-

networks". This leads to difficulties when trying to align individual network organizations, and their actors, to common cross-network standards. As one of our interviewees stated: "When you're optimizing the individual parts of the system, often you can sub-optimize the whole system". Hence, "getting through that standardization step is very challenging, because you have to relinquish a certain amount of control, in order to get to standardization", underlining the governance challenges observed across the network organizations.

4.3.4 Measures to Address Coordination Challenges

Several of the issues highlighted in this section (4.3) have already been recognized by the LNs, who have experimented with remedies – such as accumulation of best-practices and templates. One example is the 'LHS Launch Meeting' we attended, cf. sub-section 3.2.1, whose purpose was to simultaneously on-board four new networks to PCORnet. Notably, this was the first time multiple LNs had been on-boarded to the network-of-networks. If the program proves successful, larger inclusions of "10-20-30 sites" at a time are planned. The hypothesis is that scaling and coordination benefits may be extracted when developing LNs simultaneously. Some interviewees advocated for making this happen under the umbrella structure of a separate corporate entity: "The idea is to have this company spin-off (…) that would do the 24/7 customer service update, the software, manage the whole thing, run the trainings, have an event planning part" - in short standardizing the infrastructures and activities, allowing for increased scale and scope of interactions. What is more, such an entity could be used to force alignment among the LNs.

Indeed, achieving alignment across *existing* LNs is perceived as a challenge. The network organizations and their actors have acknowledged that they face different issues, pending on the maturity of their network, i.e. the LNs exhibit a life-cycle pattern. What is more, different maturity creates additional challenges for achieving network-of-networks integrations. This observation has spawned the idea of simultaneous on-boarding: By launching four networks simultaneously, the hypothesis is that these will be formed into a community of LNs from the onset. To align the existing networks, a framework has been developed by CCHMC and the consultancy Associates in Process Improvement (see Langley et al., 2009) called the 'Learning Network Maturity Model'. By tracking the individual LNs' progress according to six standard separate domains, across 52 components, the aim is to

align strategic decision making as well as measuring progress in a standardized manner. During the 'Learning Networks Community Conference', separate models were synthesized for each LN – as well as an average, shown in Figure 8. To facilitate a common understanding of the LNs' maturity, the model was presented and discussed during a plenary conference session. The maturity model indicates that the networks are still early in their development, being strong in QI and leadership, but relatively weaker on science and collection and utilization of data.

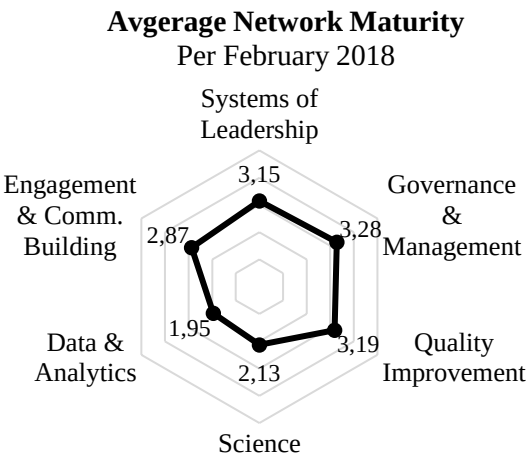

Figure 8: Network maturity model, for our case. Source: Conference presentation.

4.3.5 Aggregated Section Findings and Visual Data Structure

In conclusion, we see how the organizational system, i.e. governance and coordination mechanisms, need to operate efficiently in order to support collaborative activities. An excerpt of the main collaborative challenges related to the organizational systems are summarized in Table 3.

	Sample Quotes Regarding Collaborative Challenges
Facilitation of Interactions	"A lot of them are getting so much collaboration within their individual networks, that sometimes(…) even though you're motivated to share more, I think sometimes it's hard for them to make the leap and say: '*Oh, I still have something to learn over there*'". "We now have a lot of resources... In the electronic filing cabinet. But we haven't really done a great job of enabling or... facilitating and encouraging the network staff to… teach one another". "What we're doing is essentially training people across the country in how to improve systems of care and, to the extent that that's isolated in particular clinical arenas or clinical sites, it doesn't necessarily... We don't have a strategy about how that aligns with what the institutions are doing in their quality improvement efforts to, to actually grow that capacity".
Technical Infrastructure	"Right now, every network has their own registry. And they don't really speak to each other, and they're all being built individually". "Consolidating systems is so important to get any kind of value out of technology. Now we have a registry, someone else has a registry, someone else has a registry(…) we don't talk to the electronic health system, we are duplicating data". "Our commons right now is very poor. The infrastructure around it. Just from an IT perspective, it's not… the interface isn't user friendly. You can't really search. There's a lot of functionality that isn't good".
Governance of Processes	"Right now, we're very consensual and very collaborative, overly so... in my opinion, around… let's all come together and agree, and we're very, very slow to make those common decisions to standardize. Because people have different stakeholders, and also... finding that consensus is hard, it takes time". "Those who come in with a heavy research, we found in the past that converting a research network into an improvement network, there's challenges(…) It's different people, right? And those people have different objectives in mind, right?".

Table 3: Sample collaborative challenges interview quotes. Source: Case interviews.

Figure 9 summarizes the final data structure for this sub-section:

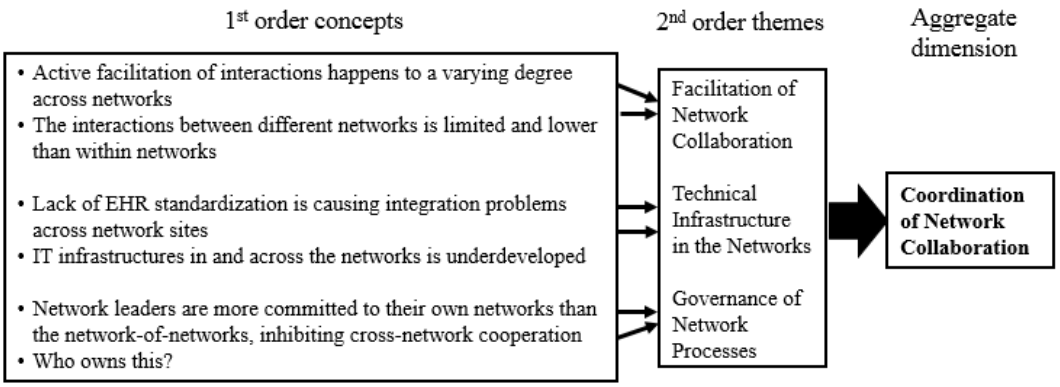

Figure 9: Visual data structure, coordination. Source: Authors' contribution.

4.4 Sustainability of Networks

This section aggregates the findings relating to issues of sustainability. Resonant of their research- and QI backgrounds, the networks have insofar been reactively *funded*, in order to sustain activities, and lacked a *revenue* model. As we will see this has always been a source of friction and concern for the network organizer, and, in turn, defined their present activity scope. However, recently the present reactive way of funding network activities has been put into jeopardy, as presented in the introductory chapter (1.2) - and in turn escalated the sustainability concerns. This has made it *the* reoccurring theme in all of our interviews, and the attended conferences. What is more, rather than approaching this reactively, the networks have sufficiently matured to view this proactively, seeing opportunities to enhance the present value creation activities. Concluding this findings chapter, we therefore aim to complement the insights on the value creation activities by the network organizations and their actors, cf. 4.2 and 4.3, with findings on how such activities may be sustained; focusing on monetary and non-monetary elements. We will present findings highlighted according to the individual stakeholder-, individual network organization and aggregate network-of-networks levels.

4.4.1 Individual Stakeholder Value

At an individual stakeholder level, there are currently, according to our interviewees, no mechanisms for individual monetary value appropriation. That is,

no stakeholder[3] derive direct financial reward from conducting network activities. Correspondingly, no individual (human) actor, i.e. patient or relatives, currently pays the network organizations for network access and participation *per se*. However, there are several non-monetary benefits accrued by individual actors: Patients, and their relatives, gain directly from improved health-outcomes and quality of life. Clinicians and caregivers receive professional recognition from "a platform that raises their visibility, and make them known in the community". Researchers are cited to benefit from enriching their investigative opportunities, creating more publishing prospects.

From our interviews, it became clear that such non-monetary benefits are significant for individual stakeholders, often even paramount: "It's absolutely not [about the] money. It has to be performance of the organization, performance of the team, and accomplishing what they have said they want to achieve". A collective sense of belonging, combined with an opportunity to be seen, engages and rewards stakeholders. These non-monetary benefits are individual, with limited or no value for other stakeholders. However, in order for the stakeholders to interact and accrue non-monetary benefits, the network organization needs to be sustained. As the network organization incurs direct and indirect costs from facilitation, e.g. having to pay direct network employees (administrative or facilitating resources) or financially support infrastructure investments, this implies the network organization requires financial value in order to sustain their activities. The following sub-sections will elaborate on the present- and potential revenue streams.

4.4.2 Network Sponsorship

The networks, and therefore also the network organization, currently contain (limited) financial flows. At the 'Learning Networks Community Conference' we attended, four main revenue streams were emphasized: (1) *Site participation fees*; (2) *Grant funding*; (3) *Philanthropy*; and, (4) *Industry revenue*. Table 4 below summarizes an excerpt of reflections regarding these revenue streams. In this sub-section, we will present streams 1-3, leaving the last, industry revenue, for the following sub-section (4.4.3).

[3] Some stakeholders, e.g. network administrators, might have their salaries tied to the networks. However, these are only supportive functions – and therefore does not alter our argument.

	Characteristics of the Current Revenue Streams
Site Fees	"The site participation fees are getting scrutinized right now, because there's a huge cost pressure through the health care system". "If we can provide that analysis that cost/benefit, I think it'd be... like they'd be prepared to pay maybe even 100k to be members, you know, but since we don't have that information I think it becomes very difficult to convince the hospitals". "One which people use, but is not consistent, is site fees. We have site fees all over the map right now(…) some charge 10.000, some charge 25.000 and some charge nothing". "The hospitals hate paying it, and the doctors can hardly find it. They don't have budgets(…) they certainly don't have an extra budgets...".
Grant Funding	"When you're writing a grant in America, it's very time consuming and heavy, and it's not a good way to manage anything, because you can't predict it". "These people live hand to mouth, they're wired to right grants, to go seek research money, and then they exist". "Certainly what they are quite adept at, as you know, academics in particular, is applying for grants, they're very good at that. Very inefficient, very expensive(…) So, [it took] six weeks to submit a grant proposal. Quite inefficient funding".
Philanthropic Gifts	"So then we have the, the public funding area. That takes the ability to go out and raise philanthropical money, it takes a lot of time". "I mean we rely on philanthropy, and we rely on, you know, peoples' time, in kind, being given". "[One of the networks] depend also a lot on gifts from(…) mostly kid's families that have money. If you can't get that, you guys are done".
Industry Revenue (Cf. 4.3.3)	"Do a feasability analysis to see if you have products that might be re-sellable in a commercial, in an industry environment." "The model is trying to understand if there is vale in the data that is inherent in the enterprise." "None of the networks really are doing much in the way of funded research, or particularly industry funded research, where there is, you know, very high value and very high revenue potential."

Table 4: Sample revenue streams interview quotes. Source: Case interviews.

From Table 4, it is clear how grant funding seem to share characteristics with philanthropy - given their time-limited and unreliable nature - making it natural to group these as one. These are not revenues *per se*, and instead awarded for a limited time period, as a one-off transaction. Grants involve a resource consuming application process, which may be hard to justify. Philanthropic gifts are unreliable, and exposed to political risks, due to tax breaks (CNBC, 2018, May 11). In turn, neither is seen as a "good way to manage anything, because you can't predict it".

The site participation fee can be regarded as an annual membership fee, for network participation. Notably, not all networks invoke a fee from their member sites. These fees are at the sites "funded by a Division Leader or Department Lead", i.e. a business unit, not organizational, level. According to our interviews, this makes the site fee funding exposed to shifting department priorities.

4.4.3 Primary Value Stream

Given our case context, LNs in the U.S., a recurring theme in our interviews was reflections relating to the fee-for-service (FFS) revenue model, which arguably defines the U.S. healthcare system. Due to our research focus, we will not elaborate

on this beyond what is strictly needed to answer our research question in a balanced manner. However, one logical gap deserves mention: Despite the lack of financial flow in network organizations, the U.S. healthcare *sector*, in aggregate, is abundant in financial flows – accounting for roughly 18 % of GDP in 2016 (CMS, n.d.). Simplified, there seems to be a mismatch between the networks' scope, focusing on research, versus the FFS's procedure-based payment structure, paying for procedures. This positions the networks outside the financial FFS flow. Network actors therefore have little financial incentives to collaborate, or invest in the networks. Some of our interviewees claimed that the only way to reliably and predictably sustain the network organizations, is by getting the LNs embedded into the present financial flow. Some interviewees even highlighted that the main value created by the networks today are captured by external parties – mainly payers, such as private insurers and public sources – who are able to translate the created value, into financial returns; mainly in the form of cost savings. As an example, ICN's primary goal is achieving remission, e.g. no need for treatment. This omitted treatment, translates directly into reduced costs for the payers, who typically reimburse per day of hospitalization. This implies the payers reap benefit from less hospitalization, without paying the networks for the insights. Another complicating factor is the actors' altruistic motivation, which makes some directly unwilling to engage with payers. As phrased by one interviewee, academicians are often "very against this commercial stuff".

Furthermore, given that the LNs typically are based on medical dimensions, e.g. diseases, a curious finding was that the geographical location was highlighted as an issue by our interviewees. Public and private payers are more enthusiastic about funding LNs that have an impact in their local community: "One of the reasons they pay us to work with the [disease specific] networks and the [disease specific] centers, is because they already know we've already saved them money". However, they "might not want to contribute to a network that isn't just focused on its own population" – conflicting the broad geographical scope of most of the LNs.

4.4.4 Industry Revenue

The fourth revenue stream in Table 4, industry revenue, stems from pharmaceutical-, biotechnology- and medical device firms – who depend on healthcare providers to conduct research and product development. Or put differently, making "money,

selling patient information, de-identified patient information". The network organizations replicate this based on current activities, but with the added promise of being more efficient: The already collected and standardized patient information would speed-up clinical trials, increasing the industrial players' willingness to pay. One of our interviewees recognized the value of this: "You want this done in 24 months. If I do it in 12, I want half of what you saved".

Due to its revenue potential, industry sources were emphasized by multiple interviewees. However, "none of the networks really are doing much in the way of funded research, or particularly industry funded research, where there is, you know, very high value and very high revenue potential". Many networks are cited to have an inward focus; optimizing internal activities rather than bargaining for industrial revenue. What is more, the altruistic views described in the previous sub-section, is seemingly conflicting with the commercial nature of industrial cooperation as well: "You know, it's the: '*Oh my God, we're in this for the kids (...) to make a difference, and if we partner with a pharmaceutical company, they're just out to make money*'" (sic), indicating a goal misalignment. Some network organizations are challenging this by including more commercially-minded actors to test the potency and assess the potential to scale this stream further. Such industry revenue would monetize the 'data exhaust' stemming from network activities, and aggregated by the network organizations, making it possible to sell the data to external actors with the interest, and ability, to pay. Our interviewees indicate how clinicians should be able to be convinced, as research trials form part of their professional responsibilities: "You have to do it anyway. I have a model, where we can do it and earn money".

4.4.5 Scaling of Revenue Streams

The network organizations we studied have mainly tried to resolve sustainability issues individually, instead of collectively. However, disease specific networks typically represent "a really small patient population". This implies that "if you're the administrator of some big hospital, and you're making decisions about spending money, your [disease specific] population is probably one of the smallest things on your mind". Further, one of our interviewees stated that the site fees network organizations are able to charge "depends on the type of specialty, the richness of that specialty and, I think, the maturity of the learning network, the value that is perceived from that learning network". Expanding the LN scope could help increase

its appeal, both for stakeholders but also for (external) parties interested in paying for access. Recognizing this, though no concrete effort to collectively approach hospital administrators have been made, one of the network organization executives indicated that "there's some early discussions going on across primarily academic pediatric centers about how might you, you know, instead of doing a small amount of money to different groups, could you share some of the infrastructure and support multiple networks for one price?". The thinking is that this would enable the network-of-networks to be relevant for larger budget pools, which then could be distributed across the individual network organizations.

One idea on how to pool the network organizations, is through the previously mentioned spin-off company. It would be natural for such an entity to manage different administrative activities, such as monetizing the data exhaust identified earlier, feeding money back to the network operation. Additionally, our interviewees argue it would be easier to approach the administration of a hospital as a larger specialized entity, as it would be relevant for a wider patient group – and therefore more important for the executives. Some of our interviewees are already engaging into discussions on how this entity should be set-up and, in turn, how the proceeds should be shared. However, it would have to "stay consistent with [the networks'] mission, that's the message". By aligning the network organizations and their internal stakeholders through a common commercial entity, the hypothesis is that they would be able to generate a larger revenue stream collectively.

4.4.6 Aggregated Section Findings and Visual Data Structure

Concluding, we observed how currently two main groups appropriate most of the value created in the LNs: Patients (non-financial) and payers (financial). Yet, neither patients nor payers contribute financially to sustain the network organization. Instead, the network organization is presently funded through philanthropy, grants and site fees; causing misalignment. Consequently, financial sustainability is a key administrative challenge, both at the organizational (network organization or site) and network-of-networks level. The visual data structure model on the following page, Figure 10, summarizes the 1st order categories and theoretical dimensions.

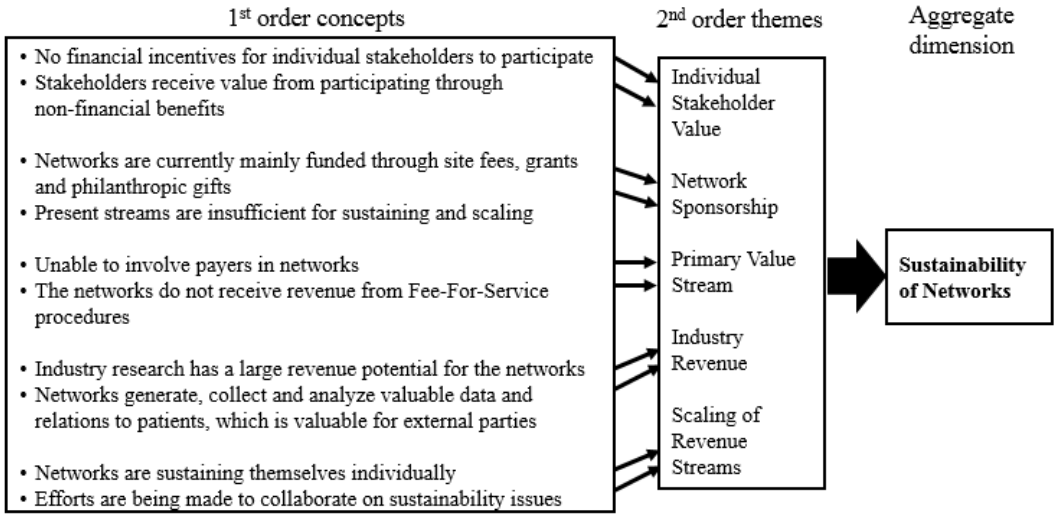

Figure 10: Visual data structure, sustainability. Source: Authors' contribution.

4.5 Final Data Structure Model

Based on the presented findings in this chapter, we present our aggregate data structure model, summarizing our findings:

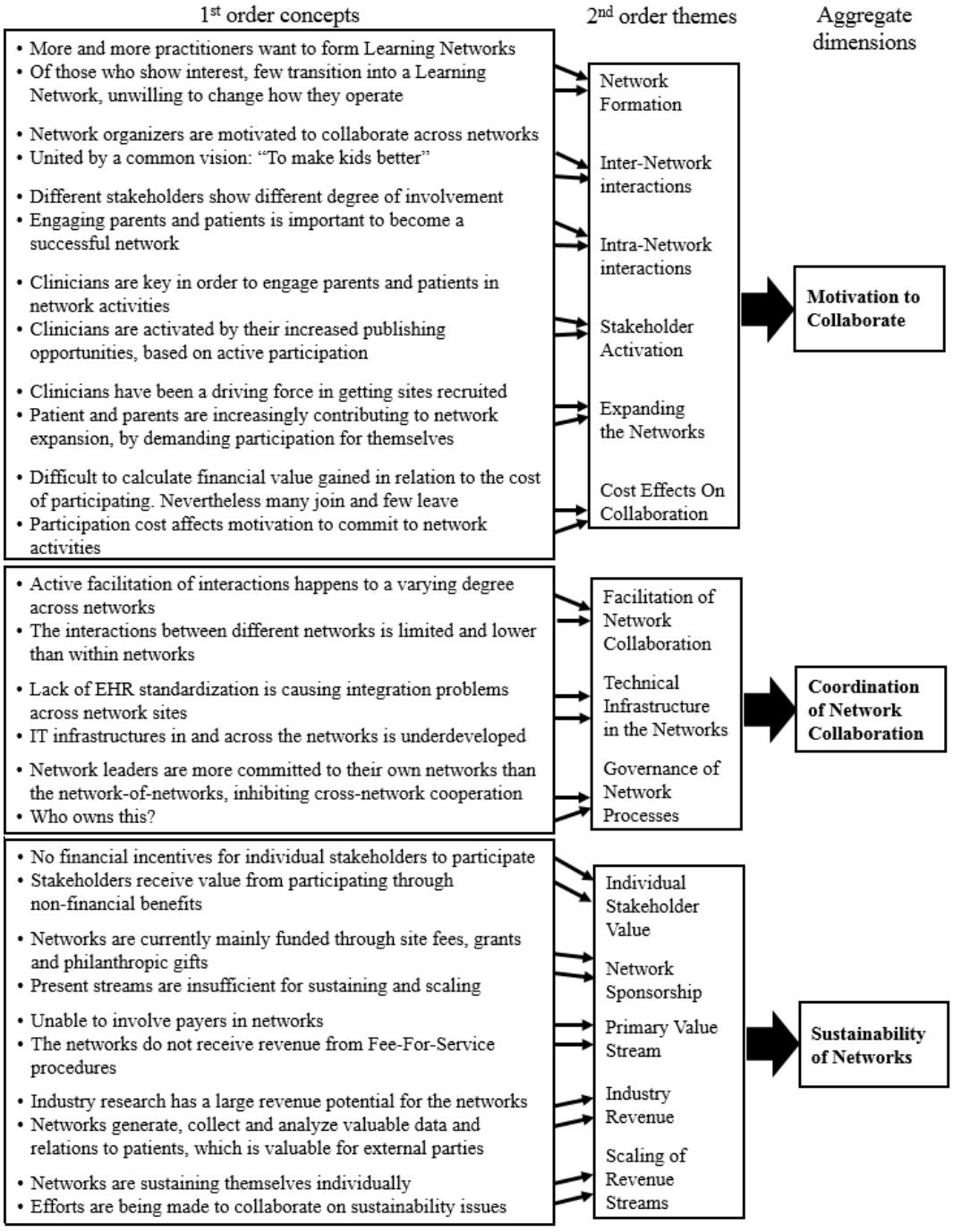

Figure 11: Final data structure model. Source: Authors' contribution.

The purpose of the data structure model is to highlight the empirical grounding of our findings (Gioia et al., 2013). However, as this data structure only gives a static picture of the investigated phenomenon, we will further outline the relationships between the captured concepts – in order to highlight the dynamic nature of value creation and value appropriation mechanisms in CNs.

4.6 Power/Interest Grid

Understanding the relations between actors is vital in order to understand relations of influence and dependence. The P/I-grid, cf. 3.2.5, depicts the relative interest and power of the main stakeholders towards the network organizations, while the actor influence map highlights the formal and informal relations between the stakeholders themselves (see arrows) - supplementing the insights in our Inductive Model. Figure 12 displays the P/I-grid for our context.

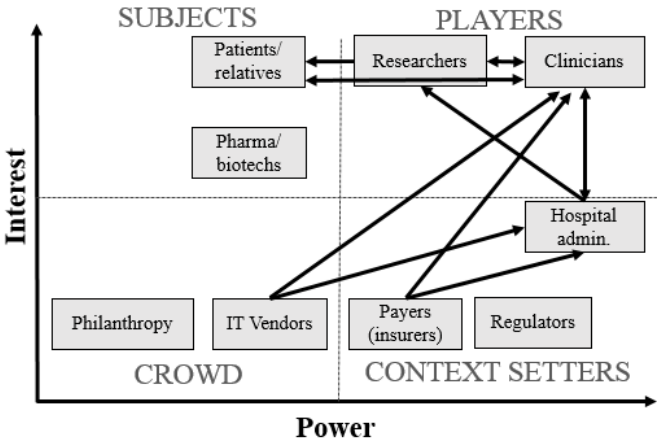

Figure 12: Network P/I-grid.
Source: Authors' contribution

We identify clinicians and researchers as *players* (top right quadrant), due to their role and engagement in and for the networks. These players are crucial to sustaining network activities, from which they benefit directly, in non-financial forms. Notably, select players are also part of the networks' administration. Hospital administration, regulators and payers are, in our setting, *context setters*. These are by Eden & Ackermann (1998) alternatively labelled as strategy context setters, reflecting their ability to define the organizational agenda, without having a strong interest in the matter. Patients/relatives and pharmaceutical/biotechnology firms represent *subjects*. Both have an interest in networks but have a limited power to significantly influence future activities. Philanthropic foundations/individuals and IT vendors represent the *crowd*, i.e. stakeholders with little interest and power in defining the networks' agenda. Lastly, the directionality of the influence map documents one-way and bi-directional influences, respectively.

We recognize that further stakeholders exist, pending on the focus and level of analysis, however, these are the most relevant for our upcoming discussions on value creation and value appropriation mechanisms.

4.7 Inductive Model

We will hereby switch focus from the theoretical themes, described so far in our findings, to the "dynamic interrelationships" between them and our Inductive Model (Gioia et al., 2013, pp. 22). Whereas our data structure model (Figure 11) only structures findings according to concepts, themes and dimensions, the Inductive Model extends this, by highlighting the interrelationships, cf. Figure 13:

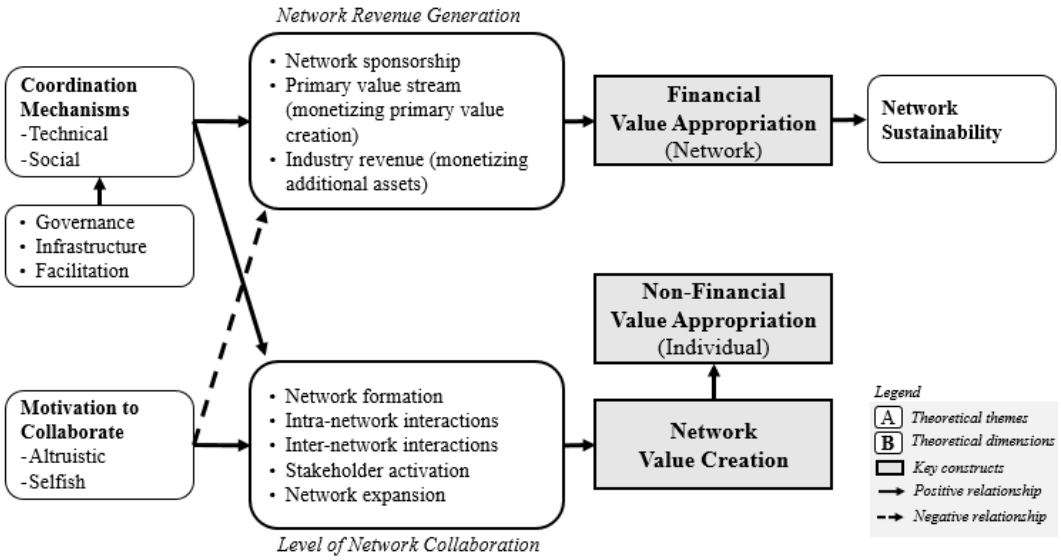

Figure 13: Inductive model. Source: Authors' contribution.

Starting with the rightmost box, we see how the sustainability of the network organizations is determined by their ability to appropriate financial value. Further, the individual value appropriation is determined by the LNs' ability to create value. These two classes are briefly described.

Financial. The observed financial value appropriation, by the network organizations, comes from the revenue sources highlighted in section 4.3, and are, at large, external to present core network activity – research and QI. On the one hand, these revenue sources are positively influenced by the existence of strong coordination mechanisms, which may be enhanced through effective governance and infrastructure. On the other hand, the potential of these revenue sources is negatively affected by actor motivation. This negative effect is driven by the altruistic motivation, which is found to be negatively tied to financial appropriation.

Non-Financial. The observed non-financial value appropriation stems directly from the value creation in the networks. Put differently, the non-financial value directly depends on the network activity. The network activity is in turn

positively affected by actor motivation, which we observed in altruistic- and selfish forms. The network collaboration was further positively affected by effective coordination mechanisms, which help to facilitate the value generating knowledge activities in the LNs. We will revisit our Inductive Model in the discussion - "infusing it with meaning" (Gioia et al., 2013, pp. 24).

5. Discussion

The following chapter discusses our findings, in light of the theory presented in the literature review. Guided by our research question, we structure our discussion into four parts: First, we interpret the findings related to value creation. Second, we analyze value appropriation. Third, we highlight the interrelations observed, building an integrative – business model – view. Finally, we conclude this chapter by taking a broader view on our case context – healthcare.

5.1 Value Creation

Our findings clearly documented that the LNs are generating value. This is confirmed by other observers of the LNs, such as Forrest et al. (2014) and Clauss et al. (2015). However, the level and form of the created value varies. What is more, we would argue that the LNs do not currently yield their full value creating potential. According to theory, mediating structures, such as the network organizations, generate value through facilitating interactions between actors (Stabell & Fjeldstad, 1998). Figure 14 outlines activities of the LN organizations. These primarily create value by facilitating knowledge creation and transfer; enabling the actors in the LNs to conduct research and QI activities collaboratively, as described in section 4.1. According to the Value Network configuration, we identify the mediation activities performed by the LN organizations as servicing provisioning activities. In the observed LNs, knowledge creation and -exchange occurs between, and is utilized by, stakeholders at both an individual- and organizational level. This value creation is a product of the network organizations' ability to recruit and activate knowledgeable actors, which they, according to our findings, so far have done successfully. The stakeholder recruitment can be understood as a network promotion and contract management activity. Lastly, we documented the presence

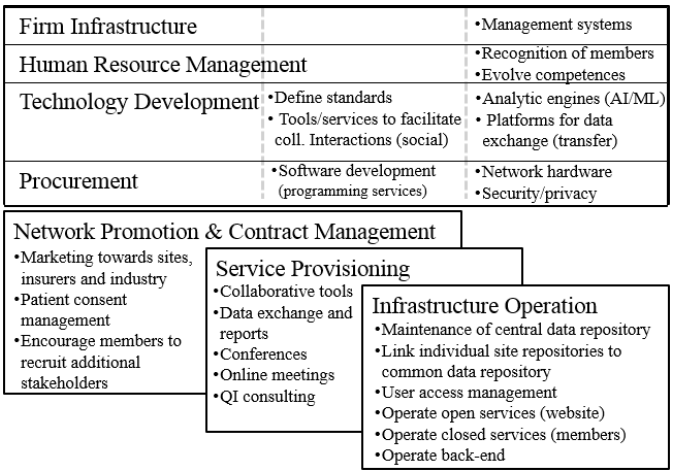

Figure 14: LN organizations' Value Network activities. Source: Authors', adopted from Stabell & Fjeldstad (1998).

of common technical- and social infrastructures. Operating these, forms the final primary value activity of the LN organizations. In addition, we observed several support activities, such as the development of tools and technical platforms, which mainly serve to improve the effectiveness of the interactions. Thereby, we see how the network organizations, are operating as Value Networks (Stabell & Fjeldstad, 1998). This makes it relevant to discuss the value creating activities of the LNs, in light of the drivers and mechanisms which define Value Networks.

Motivation and coordination emerged from our findings as the main drivers of the value creation activities in Collaborative Networks. These were observed to have a distinct influence on the different value creation and value appropriation activities in the LNs. We will therefore explore these separately. First, we look at the sources of motivation (5.1.1), explaining how these sources could be channeled towards increasing value creation (5.1.2). Second, we look at the role of the social- and technical infrastructures, provided by the network organizations, to coordinate the interactions in the LNs effectively and efficiently (5.1.3).

5.1.1 Motivations to Collaborate

CNs are fundamentally voluntary structures, relying on actors' motivation to participate in network activities. As can be derived from our Inductive Model (Figure 13), such motivations may affect both the degree of engagement and frequency of interactions. Our findings have indicated that the LN organizations have been successful at leveraging their participating actors' motivations. This gives both direct- and indirect effects on the value created in the LNs. Motivated actors actively participate in collaborative activities, while also engaging other actors – which we have observed further enhances value creation: Success stories have actively contributed to the recruitment of sites. Increasing number of participating actors in turn increase the knowledge pool, from which further successes have emerged; creating a positive reinforcing effect – an indication of the presence of scale. Presence of such network effects is important, as it yields potential for making the LN organizations more effective over time, by distributing costs over ever increasing number of actors, as well as increasing the connectivity and conductivity of the networks (Katz & Shapiro, 1985).

Further, we observed that our individual (human) actors do not receive any direct financial rewards, i.e. their motivation is non-financial. Instead the actors

came together to create value for the system, driven by *altruistic motives*, and for themselves, *selfish motives*. These motives are not mutually exclusive, and overlap. Due to their importance for the network, we will discuss these in more detail.

Altruistic. The participating actors in the LNs mainly consist of doctors, patients and their families, and researchers who work towards a common goal: Improving health outcomes. This goal serves as a strong motivation for the actors, who are aligned by their altruistic views. Although we recognize that such altruistic motivations is particularly strong in our case context, healthcare, altruism has been identified as a driver for collaborative schemes across various industries (Benkler, 2006). However, Lepak et al. (2007, pp. 191-192) point out how "it is unlikely that most sources or creators (individuals, companies, and society) are completely altruistic" (sic). Although some actors, in given settings, will have a strong altruistic motivation, we observed that such motivation varies from actor to actor, and setting to setting. What this implies for CNs in general, is that they need to understand (a) how such intrinsic motivation can be activated, sustained and tapped; and, (b) how to complement with selfish sources, when the altruistic motivation is weak, unstable or all together lacking,

Selfish. While most actors observed in our study are strongly driven by altruism, we observed additional personal non-financial incentives provided by the LNs, such as: Social recognition, research and publishing opportunities and job satisfaction. Peer-production systems, such as the LNs, have indeed been described as powerful means to harness diverse sources of motivations (Benkler, 2002, 2006). Such motivations need to fit with the core activities of the networks, which resonates with our observations of the incentives presented above. These incentives are often exclusive for the individual, implying that the risk of misappropriation is low. Given our understanding of the value concept, c.f. 2.1.4, the use value from such incentives to an individual may be high, while the opportunity costs are low. This is consistent with Boudreau and Lakhani (2009), who noted how actors are willing to contribute in communities for non-financial benefits.

5.1.2 Channeling Motivation

In addition to contributing to increased levels of interactions, we observed that motivation indirectly increases value creation of LNs in three ways: By off-setting organizational barriers, preventing free-riding and overcoming coordination issues.

Off-setting organizational barriers. One reason why motivation is relevant to study in collaborative settings, is that it has the potency to either directly off-set financial burden placed on participating organizations, or reduce the disparity between costs and income to a manageable level. Although distinct in nature and source, the altruistic and non-altruistic motivations may both be leveraged to bargain for other forms of value, which can be deployed in an organizational setting to justify use of human or financial resources. Notably, participation in the LNs yield both direct costs, e.g. site fees paid to the network organizations, as well as indirect costs, e.g. time- and resource commitment of site staff - an opportunity costs on participating organizations. If the network activities are to be sustained, these costs have to be off-set, and channeling individual motivations is the most powerful approach. However, we simultaneously recognize that different sites show different level of motivation. For example, first-moving prospector organizations clearly exhibit higher intrinsic motivation. On the flipside, this could create unintended side-effects, impeding the network organizations' focus on developing a broader fundament for motivation for participating organizations, for example by not pursuing monetization efforts or providing tools, such as financial reporting.

Preventing free-riding. Free-riding, i.e. benefits without contribution, is a concern in collaborative structures (Olson, 1965; von Hippel & von Krogh, 2003). Surprisingly, we did not observe free-riding at an individual level. We believe there are two reasons for this: Firstly Individual actors accrue benefits, i.e. the source for their motivation, if, and only if, they contribute actively – faking it is not an option. Secondly, individual health treatments are tailored; with close to no value for any other actors. This yield little room for individual free-riding. At an organizational level, we similarly observed no free-riding. This was in line with our expectations, as the LNs have paid a site fee; indicating a commitment to collaborate. Furthermore the LNs' infrastructures are currently too underdeveloped for free-riding to be a systemic problem. The lacking infrastructure inhibits knowledge theft. Ironically, this is not necessarily by design, but through system restrictions. Even if the participating sites managed to accrue information, the knowledge has no value unless it is successfully deployed to enhance organizational effectiveness. However, should the networks evolve, especially if into open structures, we acknowledge that free-riding could become an issue, if the networks do not evolve their core value proposition and complementing appropriation mechanisms.

***Overcoming coordination issues*.** Strong, individual motivations may singlehandedly subdue coordination issues between actors. In our case, we observed that interactions in the LNs seemed independent of the degree of direct, physical facilitation of network interactions by the network organizations. In the lack of formal coordination venues, the actors' activities in LNs are mainly based on spontaneous interactions. This indicates that individual motivations are a significant source of network activity on its own, although more research is needed to determine exact effects and possible relations.

5.1.3 Coordination of Actors

Although the effect of strong individual motivation is in itself found to positively affect collaboration, the more relevant insight, given our organizational perspective, is how this motivation at large is left up to chance – and not systematically exploited by the network organizations. Fundamentally, we identify how the network structure induces learning opportunities through the interaction of actors. This contrasts the traditional way of organizing such knowledge activities in healthcare services, i.e. the Value Shop configuration cf. Appendix A.2. (Stabell & Fjeldstad, 1998; Christensen et al., 2009), which emphasized learning at an individual level, with problem solving competence and reputation as key drivers. Indeed, Value Shops have traditionally represented the best way of approaching problem solving. Curiously, the activities observed in the LNs are imitating the learning processes introduced in section 2.2, i.e. the combination of information for enabling new activities. The observed individual network activities represent such learning. As such we realized how the LNs, and indeed the Value Network, can be seen as nested Value Shop – at scale.

To release value, learning is not enough: Clinicians need to absorb and deploy the knowledge created. However, rather than single-loop learning, the networks should aim to organize for more complex double-loop learning (Argyris & Schön, 1978), which entails the questioning and ultimately adjustments of activities. We would argue that such a vision is difficult to achieve, as the LNs under our study are primarily set-up to manage learning – not incorporating the value creating activity and thereby institutionalizing double-loop learning. One cited reason was ineffective sharing of tools to help improve processes.

In general, our findings suggest that implementing infrastructure standards, aligning and improving processes and coordinating actors is in itself a major challenge for the LN organizations. These challenges inhibit effective coordination of activities within the LNs, and thus their ability to collaborate and improve at scale. This is a highly relevant finding, given that a fundamental objective of CNs is to coordinate collaborative interactions more effectively than hierarchical coordination mechanisms (Fjeldstad et al., 2012). Our observations indicate that the challenges related to the network organizations' infrastructure operations affects the coordination of the collaborative activities in the LNs (Stabell & Fjeldstad, 1998). We do not find that the coordination is directly inhibited, but rather that the infrastructure is not strengthening the interactions. Our findings indicated two ways to strengthen coordination: Technical infrastructure and governance.

Developing technical infrastructure. The network organizations currently have limited technical infrastructure available, with the majority of virtual interaction within their LNs happening through e-mail or virtual learning sessions. This is a key insight, as the LNs span across multiple organizations and geographies (city, state and even countries) and therefore require such collaborative tools for effective functioning. There are some early initiatives for collaborative infrastructures, such as social platforms for interactions, and a common data repository, the Common Data Model (CDM). However, our interviewees stated how the present social platforms are ineffective at facilitating and strengthening interactions, especially in-between episodes of care. The CDM, is an additional data source residing outside the network organizations' and sites', e.g. hospitals, data systems, implying it duplicates other databases – and requires specific efforts to integrate. Notably, non-healthcare network members, such as patients, relatives, commercial industry players and researchers, do not have open access to LNs' data (Marsolo et al., 2015). Instead, the involvement is instance based. As an example, patients are included into the coordination activities based on the sites' processes and needs, e.g. through the pre-visit planning procedure, cf. sub-section 4.1. Another related problem, is that the data presently collected is only a minute part of the overall information available, and mainly serves to answer pre-defined questions. Although different degree of sophistications of CDMs exist – for example, ICN provides tailored interfaces and reports (Marsolo et al., 2015) - these still represent duplicate systems. This implies that while these systems facilitate

knowledge creation and exchange, i.e. value, they currently increase complexity, i.e. costs - instead of reducing it. At first this is confounding. After all, our theory proclaimed how networks emerge due to their ability for efficient mediation. The paradox seems to be that even our 'inefficient' LNs are indeed more effective at enabling the knowledge creation and deployment, than traditional organizations.

The network organizations have recognized their challenges. However, their problem, and another key insight, is that they so far have been unable to (a) agree on and share workable solutions, or even when agreeing, (b) unable to sufficiently align on common development. The first issue is rooted in organizational legacy: Sharing infrastructure is a driver of inter-network collaboration, and could be justified in terms of individual platforms often having high fixed costs, difficult to bear for the individual LN organizations. Having actors (LN organizations and the participating sites) aligned to a common platform makes sharing these costs possible. However, most sites, and even network organizations, already have, and are heavily dependent upon, legacy IT systems. This creates path dependency, as the organizations are holding on to these; unwilling to write off previous system investments as sunk costs. These are typically customized systems, tailored to, and reflecting, the given organizations' processes, which creates misalignments between organizations, and frictions in the LNs. Logically, the technical gap could be resolved in either of two ways: (1) Adopting to vendors, i.e. tailoring, or; (2) creating a vendor-agnostic model, i.e. standardizing across sites. The insights from our interviewees indicate that the network organizations today primarily pursue individual customized interfaces (i.e. 1). This is unlikely to be advisable long-term: Too much customization adds platform complexity, which only serves a static number of users, given each site is unique, with limited financial strength. In contrast, building a standardized platform (i.e. 2), and adopting organizational activities around that platform could lead to an ever increasing user base. This leads to a decreasing per-user cost of that platform, through benefits of scale. We argue that having an initial focus on standards could be advantageous. Indeed, numerous examples of successful platforms, e.g. Amazon, start with limited scope, before expanding scope and thus increase value and volume of interactions once critical mass is reached (Van Alstyne, Parker & Choudary, 2016). There are some early attempts on standardization, however, these are focused on common interfaces to existing platforms rather than commonality in platforms.

Further, some systems do not compete with existing infrastructure, as they fulfill new network-specific needs. An example is the social platforms. The network alignment has been higher on such non-competing platforms, but the network organizations have yet to create a platform with high usage, i.e. a universal success among their actors. The network organizations do not seem to be configured to innovate such solutions.

Overall, the lacking coordination makes it difficult to increase both the quality and quantity of the interactions, implying the LNs are currently operating at a lower intensity and, likely, with lower output than their full collaborative potential. Indeed, the coordination mechanisms are not sufficiently bridging structural holes, and observed ties are not strengthened by the infrastructure. What is more, the current additive nature of system development, coupled with manual routines, implies that network participation is often adding to costs of participating sites, instead of enabling efficiencies. This is a hindrance to making the LNs and its members, effective. However, despite these inefficiencies, LNs proliferate. This is clear evidence that the networks generate value – through learning and knowledge exchange – in ways the traditional forms of organizing are unable to facilitate. Still, this could be facilitated more effectively. To create common systems, the actors within, and facilitators of, the LNs either need to: (a) reach consensus, implying modifications to legacy systems and organizational routines toward a common LN system; (b) force through changes, or; (c) create duplicate functionality. Our interviewees cited how they so far have been struggling to reach consensus, despite being, at large, aligned on the networks' goals. Similarly, the network organizations lack leverage, and hence the declarative authority to pursue the second route, presently leaving the LNs with the final option of duplicate systems.

Proposition 1: Effective coordination increases value creation in CNs.

Governance. The central insight of the discussion above, as already identified in our Inductive Model, is that the technical issues are rooted in administrative matters; namely the lack of appropriate governance of the LNs' activities. On the one hand, the collaborative nature of LNs yields benefits, such as increased flexibility and actor involvement. On the other hand, the LNs rely on self-organizing actors. For this to be effective, in terms of speed of adaptation and flexibility, Fjeldstad et al. (2012) proclaim that CNs require common protocols,

processes and infrastructures. In our study, we have identified the existence of these elements, curiously both in the LNs that actively deploy the Actor-Oriented Architecture, e.g. ICN, and in the LNs that do not. However, similarly to the observations of collaborative communities by Kolbjørnsrud (2017), we observed how the attempts to build a large community with common protocols and processes, and standardized infrastructures, were challenging. Although the network organizations provide technical infrastructure to facilitate knowledge creation and exchange, most of the IT systems are not designed to develop a joint understanding of problems and priorities of the LNs. Such a joint understanding is essential for effective self-organizing (Fjeldstad et al., 2012). According to our findings, establishing protocols was a challenge due to a lack of appropriate governance, especially across networks. Until present, the networks have developed their infrastructure, processes and protocols individually, not having to adhere to a common standard from the onset and optimized according to their own network goals. This has created very different networks, even within the PCORnet umbrella, which makes it challenging to integrate in the future. As a consequence, several existing LNs see the standardization debate as sub-optimal for their own LNs, and are thus reluctant to engage, contributing to the governance inertia. To overcome these issues, we recognize that a greater degree of hierarchical control, with sufficient declarative authority, is needed. The LN organizations have the ability to steer their own activity, but not necessarily the activities and priorities of participating organizational actors, e.g. sites, or the other LN organizations. This leads to misalignments, inertia and duplications of efforts. In sum we believe this blocks the emergence of truly common and effective collaborative infrastructures. Without a clear governing agent, it is difficult to gain sufficient momentum in the LNs' co-development, limiting scale. This impedes collaborative efforts and reduce their potential value creation.

Proposition 2: Declarative authority is required to effectively create coordination mechanisms in CNs.

Instead of the network organizations attempting to optimize their own infrastructures and coordination mechanisms, an interesting avenue is grouping the individual network organizations into a separate organizational entity – a spin-off enterprise – as highlighted in our findings. Such an entity could be tailored to resolve the intricacies highlighted above, with a deeper focus on the issues which

currently gain less administrative attention in the network organizations, e.g. the inefficient IT infrastructure. Further, it could become an effective inducer of change in collaborative settings - designed to out-innovate existing infrastructure models. The spin-off's problem would be more limited: Getting existing organizations to adopt its standardized infrastructure. Through the scale benefits, the spin-off should be positioned to offer better insights, enabled by better coordination, at lower costs.

***Network Maturity Life Cycle*.** An important observation is that the LNs differ in their activities, according to their life cycle, as seen in sub-section 4.3.4. New LNs typically have unaligned protocols and processes for multi-actor collaboration and their network organizations provide limited common infrastructure, if any. This contrasts more mature networks, where these factors are more developed. This matters, as lacking maturity and frictions of today's infrastructure inhibits effective coordination of actors. Consequently, there exists different basis for collaborating, and hence, differing value creation. Notably, some of these protocols, infrastructures and processes are not organization specific, and may be embedded into best-practices. For example, PCORI is, in collaboration with the Anderson Center, co-launching multiple sites. Having followed-up these networks through our study, such best-practices seem to induce maturity at an earlier stage. Indeed, co-evolving LNs synchronize the organizational problem scope, making it easier to reach alignment. This indicates that such coordination could be institutionalized, through network protocols.

Proposition 3: Coordination mechanisms in CNs may be institutionalized.

In summary, the value creation observed in the network organizations we studied is mainly a product of their ability to align and harness individual collaborative motivations of their actors. Such created value is easy for individuals to appropriate, i.e. they exhibit a tight appropriability regime (Teece, 1986). As this implies coordinating multiple actors of divergent interests, the central focus becomes coordination. Such coordination can be complex, leading to direct- and indirect costs. The direct costs result from frictions in interactions and exchange, i.e. transactional costs. The indirect costs are mainly opportunity costs. Indeed, if effectively mediated, Fjeldstad et al., (2012) argues how collaborative communities may be more effective at coordinating their activities; decreasing opportunity costs.

Although the majority of network organizations are operating as non-profit entities, they still need to offset these organizational costs. Several of the network organizations have remained in operation over a number of years, hence it is clear that they have so far been able to offset these costs. The present revenue streams presented in sub-section 4.4.2, however, are not likely to financially sustain the network organizations – for reasons highlighted in our introduction. What is more, the current revenue sources are not sufficient to fund the necessary coordinative transformation needed to fully exploit the value creating capability of the LNs. We will therefore explore the revenue sources in more detail, before suggesting alternative approaches to sustain the network organizations going forward.

5.2 Value Appropriation

As can be derived from our Inductive Model, Figure 13, we divide value appropriation into two broad categories: Financial, mainly occurring at the network organization level, and non-financial, occurring at the individual actor level. We start this section by briefly discussing the latter. Thereafter, we take a holistic look at the current and potential revenue streams posed by our interviewees, existing literature and our own insight.

5.2.1 Individual Value Appropriation

A key objective of the CN organizations is to initiate and sustain the engagement of their participating actors. For individuals, we observed that the value appropriated is (a) non-financial, and (b) tied to participation in value creation activities. Whereas in hierarchical structures, actor motivation is largely extrinsic (financial), CNs, in general, engage their actors by providing collective intrinsic benefits; which actors accrue individually, and which therefore can be regarded as exclusive. Appropriation of such value is easy, once created. Furthermore, when these incentives are aligned with the goals of the networks, individuals will both contribute to value creation and appropriate value by collaborating. As the incentives provided by the networks are predominantly non-financial, engaging actors to participate in collaborative activities is not a major cost driver for the LN organizations in our study. Notably, the actors do not require immediate appropriation to sustain their activity, hence the LNs may offset value appropriation in time, from the value creating activity.

However, while financial incentives are not considered to be key in order to engage and motivate individual (human) actors, our study clearly shows that, at an organizational level, financial value is required for sustainability. Indeed, many of the previously noted coordination problems are recognized by actors, but remain unresolved in part due to lacking financial flexibility. Increasing the financial value appropriation at a network organization level has been highlighted as one of the main challenges of sustaining network activities long-term. We therefore dedicate the rest of this section to discuss the current and potential revenue sources of the network organizations.

5.2.2 Existing Revenue Sources

According to our interviewees, three main revenue streams are currently utilized by the network organizations: Grant funding, site fees and philanthropy.

Grant Funding. Individual network organizations, such as ICN, mainly fund their activities through grants. For example, PCORI has been a major source of funding for multiple LN organizations. Rather than merely being a source of funding, we deem that this yields valuable insights into the traditional thinking on funding: Grants are typically the *de facto* way to fund research, in settings such as academic hospitals where most of the network organizations' leaders are recruited from. Although vital for enabling research, it is ultimately a side activity, i.e. a supporting activity, to the primary organizational goal – improving care. Put differently, the goal of obtaining grants, is mainly pursued in reaction to a research need, and not as the goal of the activity itself, i.e. a business. However, we argue that the LNs have a broader applicability. As highlighted in the findings, grants are an unreliable revenue source, which do not yield coordinating signals to the collaborative communities. In summary, whereas grants are well suited for finite research activities, it is not a prescription for sustained long-term operation.

Site Fees. The site fees, introduced and described in our findings chapter, represent a form of membership fee - paid to the network organizations, by participating sites, for network access. The fees are mainly covering the overhead administrative network organizational costs, and not sufficient to further develop or sustain the network organizations on their own. Despite representing only a small part of a site's total budget, the fee signals commitment from paying organizations. Indirectly, non-organizational site actors, e.g. patients, also gain value through the

sites, but are not explicitly charged for those benefits. As highlighted in sub-section 4.2.6, the financial value of LN participation for sites is at best unclear. Instead, it is their individual actors, e.g. clinicians and patients, who mainly gain individual non-financial value from participating, e.g. status, recognition and improved health outcomes. Since individuals do not pay, they also do not expect to be paid. However, hospitals do, and therefore expect revenue. Thereby, we see how, under the current model, LNs create value through and to its participating individuals, while not appropriating sufficient financial value, at a network organization level. Given the unclear nature of the value for sites, there is limited ability to increase these fees to sustain the network organizations.

More alarmingly, sites not only lack financial incentives, they even face disincentives to participate: Outcome improvements may lead to less treatment and less hospitalization, which directly translates to a direct loss of revenue per patient to hospitals. This could conflict different stakeholders in a network, as exemplified by the feedback one of our interviewees received upon presenting strong medical results from a LN: "Thank you, you just cost us two million dollars a year!". Furthermore, hospitals may incur indirect losses, in the form of opportunity costs, from staff engaging in non-revenue making LN activities. Indeed, our interviewees indicated how even the present fees were difficult for sites to fund, impeding some sites to participate at all. Thus, the network organizations are relying on their actors, e.g. patients and clinicians, to have sufficient motivation and power to secure site payments, to allow their own participation - cf. P/I grid Figure 12. As highlighted in our findings, this dependency is a long-term concern, and could be affected by exogenous factors, such as shifting administrative priorities or budgets – exposing this revenue stream to risk.

Philanthropy. Based on the characteristics given in 4.4.2, we do not regard philanthropy as a sustainable source of revenue for the network organizations. What is more, such funding yields limited incentives or opportunities to scale.

In summary, we regard that the current revenue streams, separately and combined, will be insufficient for enhancing the network organizations' activities, let alone sustain them long-term.

5.2.3 Potential Revenue Sources

Based on our interviews and observations, we see two broad groups of promising revenue sources: Firstly, they could attempt to monetize their primary value creation, i.e. improved outcomes, which could entail widening the present activity scope administered by the organizations. Secondly, they could monetize additional assets, e.g. the aggregated patient data which the network organizations possess.

Monetizing the Primary Value Creation. Presently, the LN organizations do not monetize the activities they enable or the value created by those activities directly, i.e. neither the knowledge created and shared, nor the enhanced patient outcomes that this knowledge enables. A key reason for this is that the network organizations are mainly configured as facilitators of research- and QI activities, and not as providers of healthcare services. At the same time, significant payments accrue to the sites for patient procedures, as illustrated by the almost one-fifth the healthcare sector contributes to the U.S. GDP (CMS, n.d.). The U.S. Fee-For-Service (FFS) model, in simplistic terms, implies that money is awarded for the quantity - not the quality - of service delivered (Christensen et al., 2009). Fundamentally, the activities occurring in the LNs are not aligned with the FFS model and therefore do not take part in this stream. We would argue that there is a disconnection between the focus of the LNs and the process improvements that they enable – improved outcomes – which implies that value is appropriated by external actors. Indeed, there are challenges related to aligning the payment models of the networks with the one of the insurers, due to lacking ability to provide incentives for insurers to pay for the value they appropriate. Or, using the terminology established earlier, the LN organizations incur value slippage (Lepak et al., 2007), where the core value of their mediating activity, enabling knowledge creation and dissemination, is accrued financially by external players, such as insurers in the U.S. FFS system.

> **Proposition 4:** Unappropriated value in CNs dissipates from network organizers, and the stakeholders they facilitate, to external actors, in the form of value slippage.

In addition to having a direct financial implication, this disconnect ensures that the overlap in activities is low between the LNs and the patients' care process, which lowers learning opportunities and also has effects on potentials for

coordination - as will be elaborated later. Furthermore, we recognize that there could be a potential conflict in the LNs' purpose - improving health outcomes and enhancing efficiency - with the insurers' long-term financial goals, i.e. growth in profits. This creates a tension between the LNs' goals of improving the system, and the insurers' goals of beating their competition. We also acknowledge how better industry-wide treatment could weaken the insurers' role as a mediator, e.g. by losing steering power of patients, which in itself is a valuable position to hold - a side-topic we will not explore in more detail. The take-away for our argument is that this represents misalignments between the business interests of the payers and the LNs. Drawing on our theory, we recognize how the network organizations could actively implement bottlenecks, in order to reduce value slippage, by charging payers for access to the value they receive (Baldwin, 2015).

Proposition 5: Value slippage may be reduced through bottlenecks.

However, our findings indicate how such bottlenecks could impact the LNs' value creative capacity and even actor orientation: Almost by definition, bottlenecks constrain current activities, limiting the scope of value creation. In addition, implementing bottlenecks for the purpose of accruing financial value, even when used to support the network organizations' sustainability, conflicts with the altruistic nature of the activities – creating conflicts between the network organizations' need for revenue, and actors' motivations to participate.

In summary, we see that the LN organizations are not able to monetize their primary value creation, due to; (1) the patients cannot be charged, as the system is built upon medical insurance covering patient costs; (2) raising site fees is difficult, as there is a lack of financial reporting, and even existence, of financial reward from participation; and, (3) lack of ability to provide incentives to engage payers (e.g. insurers) to pay network organizations for the value creation they enable. Hence, the LN organizations are forced to look at other revenue streams, by finding alternative assets in their networks, which can be monetized.

Monetizing Additional Assets. In addition to accruing payments for the core value activity, the network organizations could gain revenue from monetizing additional assets inherent in the networks, e.g. data. Such monetization efforts would mean exploiting the 'exhaust' of the activity system. As we have discussed, monetizing the primary value creation is difficult in the present context of the LNs.

As a response we argue for monetizing value through other sources, for example following Teece's (1986) idea of complementary assets. In our case context, the platform mediating the exchange represents a natural candidate for a complementary asset. Although possible to envision different forms, the platform would be most effective if co-specialized, e.g. designed to strengthen the collaborative value creation in the network, which then would enhance the attractiveness of the platform. Such a platform would have multiple potential clients, both inside and outside the LNs present actor pool. For example. outside players, such as pharmaceutical companies and medical device firms, currently invest significant sums into R&D activities, e.g. clinical trials. Clinical trials are costly to set-up, time consuming to conduct and fundamentally have unpredictable outcomes - resulting in the less than appealing business prospect of high cost coupled with high risk. Recognizing that LNs are really data aggregators, containing comprehensive longitudinal data and even privacy consents, from a large number of relevant patient groups. This positions the network organizations to act as knowledge brokers, distributing analytic data sets or running queries, and selling the resulting data to industrial players. Indeed, both interviewees and academics in the field have pointed towards industry as a source of revenue for LN organizations (Fleurence et al., 2014). Despite room for improvement, the LN organizations are already today able to deliver unique value for R&D purposes by selling this data exhaust. Although some trials on selling data have been conducted, with promising results, such efforts are limited. This is in part due to lack of extensive data marts and transfer infrastructure, as already pointed out in sub-section 5.1.3. Indeed, the infrastructures of the network organizations are currently underdeveloped, decreasing the value for potential industrial players with the interest in paying for access to their patient data. Another limitation, as mentioned in our findings, is the LN actors' altruistic views, which may put an ethical constraint on distributing such patient data outside the community. This necessitates active management of the LN organizations, to persuade their actors to maintain their commitment despite the ethical conflicts this revenue stream may induce.

In summary, we acknowledge that the main obstacle for sustainability is the lack of financial flow to the network organizations, leaving close to no monetary value up for distribution among their actors. At a more generic level, we see how the organizations, nevertheless, are able to sustain individual actor participation due

to the easily appropriable non-financial intrinsic incentives, cf. 5.2.1. Through our study, we see how these motivations could be channeled towards attracting revenue streams for the network organizations. What is more, the LN organizations facilitate activities which yield assets that external actors could have interest in, for example the aforementioned data exhaust. If such revenue is appropriated back to the network organizations, this could be invested to enhance current activities and infrastructure, in order to generate more value. Thereby, we recognize how there exists an interrelation between value appropriation and value creation. Furthermore, we now acknowledge that value appropriation is not only a passive redistributive activity, following value creation, but requires active management.

Proposition 6: Value creation and value appropriation in CNs is interconnected.

In the upcoming section, we will integrate our findings and discussions regarding value creation and value appropriation in CNs, to develop an integrative perspective of sustainability in such organizational systems.

5.3 Towards an Integrative Understanding of Sustainability in Collaborative Networks

So far, our discussion has analyzed characteristics of value creation and value appropriation in our studied LNs, separately. However, the previous sections have clearly indicated that these are not separate issues – but interrelated. We therefore dedicate this section to discussing such interrelations affects the business model logic of the LNs. We will structure this argument in three parts: First, we establish the key interrelations between value creation and value appropriation, presenting an aggregated model, emphasizing the integrated aspects of these business model constructs. Second, we discuss the underlying drivers of this interrelation. Lastly, we exemplify the applicability of this integrative view, linking back to the challenges and successes of the LNs on which our study has been based.

5.3.1 Integrating Value Creation and Value Appropriation

Collaborative communities are fundamentally propagated as a more effective approach to organize knowledge-intensive value creation (Fjeldstad et al., 2012). However, the sustainability of the network organizations, and thus such communities, remains an issue, mainly due to the implications this form of organizing yield on traditional value appropriation logics. In the preceding sections

of this chapter, we have highlighted the characteristics of value creation and value appropriation. This allows us to simplify the Inductive Model, Figure 13, which summarized our findings for LNs, into a generic model for CNs on the following page, Figure 15.

We will now outline the logic of the model: Sustainability in CN organizations is secured by appropriating sufficient financial value. This financial value, is deduced from value creation of the CNs', which is driven by actor motivation and effective network coordination. As the value accrues, CN organizations get an opportunity to redistribute some of the created value. Notably, our findings indicate that the LN organizations we studied could affect the distribution, by actively managing their activities – as well as organizational scope. Value appropriated in non-financial forms, mainly goes to strengthening individual actor motivation, which has been identified as a strong driver for collaborative value creation in the communities. Similarly, value appropriated in financial form by the network organizations may either be used to sustain present network activity or used to sustain and improve present coordination mechanisms. Through improving the connectivity and conductivity of the infrastructure, the network organizations improve the coordination mechanisms, which again increases the value creation by enhancing the activities of the community (Stabell & Fjeldstad, 1998). Lastly, we recognize how some value creation is left unappropriated by CN organizations and their actors, i.e. value slippage.

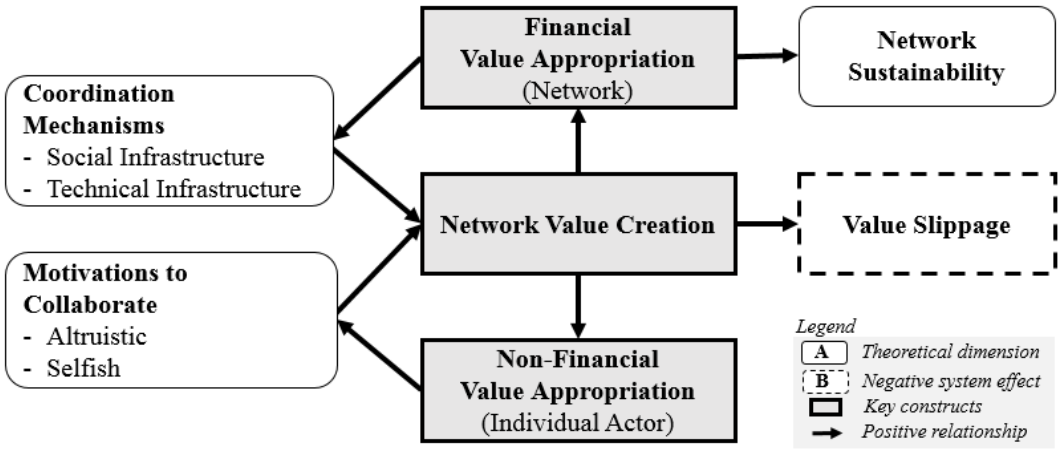

Figure 15: CN sustainability mechanisms. Source: Authors' contribution.

5.3.2 Underlying Drivers

We will hereby elaborate on the drivers of the introduced model, cf. Figure 15: Actor motivation and coordination mechanisms.

Actor Motivation. As highlighted in sub-section 5.1.1, individual actor motivation can be grouped into two broad categories: Altruistic and selfish. The most powerful driver for value creating activities in the LNs is altruistic motivation, which is complemented by selfish motivations. While altruistic motivation is defined by the context, in our case helping sick patients, the selfish motivations are to a larger degree social constructs - which the LN organizations purposely create and moderate. One example, is elevating actors' roles in the LNs, e.g. using select patients and parents as teachers, rather than just ordinary members. In the words of one of our interviewees "this can turn something inherently negative, into something positive". Such selfish motivations are most powerful when aligned with altruistic persuasions. Hence, if individual incentives are appropriately designed by the network organizations, participating actors will contribute to the collaborative activities, in order to accrue the benefits from said incentives. Put differently, increased value creation increases non-financial value appropriation. Through appropriating individual value, actor motivation is sustained, which in turn drives further value creation. The central insight is, that the LNs must holistically align the financial- and non-financial appropriation with value creation. In order to be sustained, such strategy must be aligned with both the LNs activities, its actors' activities outside the LN, and the environment in which the LNs are embedded. In summary, we see how the LN activities are mainly driven by individual actor motivation, which the network organizations, through active management can enhance and sustain. Both forms of actor motivations are important, as they contribute to overall value creation.

Proposition 7a: Increasing levels of individual motivations increase value creation and non-financial value appropriation in CNs.

This value creation also gives basis for financial value appropriation. However, a central realization was how different levels and forms of value appropriation could trigger negative reactions. In particular, we observed how actors with extensive levels of altruistic motivation were negatively inclined towards financial value appropriation by the LN organizations. This mechanism

could harm their future commitment to participate in collaborative activities, and thereby reduce the value creation of the LNs – highlighting the existence of an interrelation between value creation and value appropriation in CNs. Further, the altruistic view such actors have regarding the networks' value creation negatively affect their willingness to implement bottlenecks, i.e. impeding the financial appropriation potential of the network organizations.

Proposition 7b: Increasing levels of altruistic motivations negatively moderates the potential for financial value appropriation activities by the CN organizations**.**

Coordination Mechanisms. Scholars have noted how efficient infrastructure is key for effective CNs (Fjeldstad et al., 2012). Indeed, operating infrastructures form part of the primary activities of Value Networks (Stabell & Fjeldstad, 1998), such as the LN organizations we studied. As effective and efficient coordination mechanisms should be used to increase conductivity and connectivity in the network, they can function as a vehicle to enhance actor efforts, if configured to strengthen the value creation activities.

Further, the CN organizations are characterized by network effects, with distinct economics of scale and scope (Katz & Shapiro, 1985; Stabell & Fjeldstad, 1998). In our studied context, we observed how increasing the scale and scope of the LN organizations, and their actors, individually was a challenge, due to a lack of resources. The network organizations also struggle to standardize their infrastructures to share costs, due to insufficient alignment in the networks. However, if the LNs are able to standardize and integrate deeper, the infrastructure should improve coordination and thus increase value creation. Furthermore, by joining forces, the network organizations may increase their collective bargaining power, which yields larger portions of value appropriation from all current and potential sources. Such a platform would pool larger and broader amounts of patient data, and could by itself serve as a co-specialized complementary asset (Teece, 1986), to increase the level of financial value appropriated by the networks.

Proposition 8: Network infrastructure can be actively used as a scaling and scoping mechanism for value appropriation in CN organizations.

Recognizing that effective coordination directly improves value creation (Proposition 1), we see how active modification of infrastructure may not only affect value appropriation (Proposition 8) but also, in tandem, value creation.

Proposition 9: Enhancing infrastructures in CN organizations improves actor coordination, increasing both value creation and value appropriation.

Based on this we identify how the complementary asset could be an interesting avenue to develop further. We recognize how such a complementary asset could be formed into a common coordination platform for the LNs' value creation and value appropriation activities (Gawer, 2014). If sufficiently funded by external partners, we see how this could allow the networks to remove their present site fees; enabling further sites to join. We do, however, note that this necessitates the network organizations to secure commitment by other means, as several of our interviewees pointed out that the site fees are a signal of commitment while free-riding could be an issue for such open platforms. In contrast to today's network platform, which complements present system capabilities, we call for a more comprehensive approach by suggesting a platform which is able to serve the focal activity provision of its actors. This should both yield better data and greater revenue generation potential. Such an entity should be appropriately governed, with the purpose of maximizing potential for *joint* value creation *and* –appropriation, out-innovating incumbent systems. Pending on the organizational form, this could imply that the asset is organized into a separate entity (spin-off), which could conduct the mediating activities more efficiently, and thus work as a more effective Value Network than the current network organizations. An obstacle is getting the core activities under the network's control – as these currently reside outside LNs' scope. The spin-off company could be better positioned to deploy bottlenecks, in order to force activities under their control.

In summary, we note how organizational actors, or indeed the LN organizations themselves, incur costs from participating or facilitating network activities, which require financial value, in order to be sustained over time. Funding individual actors' activities or common infrastructure is difficult, when the ownership is distributed and activities self-organized. Recognizing that the value creation and value appropriation is indeed interrelated, we have discussed potential avenues to sustain the networks, with the most promising being the creation of a spin-off entity, based on a platform for LN mediation.

5.4 Healthcare: A Value Configuration Perspective

Until this section, the focus of our discussion has been on characterizing the business model aspects of CNs– as informed by our LN case study. However, as indicated already in the introduction, we would argue that our thesis has wider ramifications for the healthcare industry. Specifically, we believe that the CNs have a potency to transform healthcare, fitting to its present challenges. Although such a complex issue cannot be resolved within a Master Thesis, we will in this section outline three issues which we believe CNs could transform.

IT. A reoccurring theme in both the healthcare debate and our thesis is IT. Healthcare IT remains fragmented, difficult to use and, arguably, outdated (Adler-Milstein et al., 2017). The present healthcare system suffers, with considerable organizational resources, both clinical and administrative, spent on technical issues; rather than care delivery - contributing to higher costs. Despite broad recognition of the potency of IT in healthcare, the industry has yet to be disrupted (Christensen et al., 2009). Echoing our preceding discussion, we would argue that the technical issues are really rooted in organizational misalignments. Indeed, an executive report to the then U.S. President, concludes how it is "difficult to separate health IT issues from broader economic issues relating to the healthcare system" (PCAST, 2010, pp. 58-59). Or as argued by one of our interviewees: "The IT is not that hard. The social aspect is harder". We would advocate for viewing the LNs in a broader dimension than merely research and QI, and instead, armed with our business model understanding, a novel approach to organize select activities in healthcare. We will exemplify this for one potential use-case, highly related to our case.

Chronic care management. An interesting side-observation of our study is how the majority of the LNs are focusing on rare- or chronic diseases (cf. Appendix C; Fleurence et al., 2014). Chronic illnesses are central to healthcare, 86% of healthcare spending in the U.S. is spent on chronic care; whose costs increase directly with multiple illnesses (Gerteis et al., 2014). Some of these are not acute diseases, but instead accumulate over time. This implies that these, typically, have a poor fit to the present acute-based episode-of-care system. Yet, ironically, much of the required interventions are standardized, given the right knowledge, and could even be co-produced, reducing the costly support of over-qualitied clinicians. The healthcare system is clearly in need to organize for efficient chronic care

management. Offering a platform for care, we believe the LNs in our study represent a particularly potent platform for managing chronic care - both effectively and efficiently. Such care management requires a fitting payment model.

New payment models. The most characterizing trait of the U.S. care system, is the FFS payment model. Vastly simplified, the present system incentivizes activity volume, both in scale and scope. Based on the lenses deployed in this thesis and discussion above, it is clear that not all activities fit this incentive structure; the FFS "does not provide much incentive to streamline care" (PCAST, 2010, pp. 59). Although the U.S. healthcare system is distinct, misalignment of incentives, plagues most of the western healthcare systems. In the face of growing life expectancies and spiraling costs, this is unsustainable – necessitating novel approaches. A fee-for-*outcome* model has been advocated by our interviewees, which could, to a greater extent, incentivize care quality, and, equally important, penalize ineffective activities and providers. However, how to deploy or organize around such a model is an ongoing debate.

Towards a Learning Health System. Our extended insight, in light of the discussion in this chapter, is therefore that the present-day LNs ought to be more than a research arm. Instead of having one system for practice and one for research, we would propagate having one system for both – a Learning Health System (LHS). The LNs should aim at institutionalizing learning and knowledge dissemination and, to strengthen this activity, become the orchestrator of care giving itself, based on their underlying Value Network-based configuration. We thereby echo the Institute of Medicine's (2007) LHS-vision, enabling it through an organizing model. In brevity this is best exemplified for the chronic patient population highlighted above: Acknowledging that the key characterizing trait of this patient population is persistent sickness, i.e. always representing a costs, we would argue, that these patients should be treated as such - for their own interest. One could argue how the LNs could compete with the FFS model, based on a novel payment structure, e.g. a fixed-fee outcome based system. The goal of such a scheme would be to support the entire chronic caregiving process under the LNs supervision, while creating an incentive mechanism in which any cost reductions are accrued by the LNs. In turn, such a data-driven system could help issue a system that supports the idea of personalized medicine, as President Obama called for in his 2015 speech - enabling a more effective healthcare system.

6. Conclusion

The aim of this Master Thesis is to contribute to the understanding of how Collaborative Networks can be sustained. These collaborative communities form to create, aggregate and exchange knowledge. Since organizations are involved, this requires financial streams to be sustained. Our investigation has found that collaborative value creation, in the form of knowledge creation and deployment, is the driving force of the Learning Networks' activities, with appropriable altruistic and selfish benefits to participating stakeholders. Despite this, the networks organizations are struggling for survival. Our diagnosis highlights two main issues: Firstly, the Learning Networks have focused on facilitating value creation, and are not yet realizing the potential to direct some of the value created, into financial forms – in part based on current capabilities, and, ironically, in part due to the very altruistic beliefs which makes these networks such strong engines for collaboration in the first place. Secondly, a significant portion of the value lies latent within the knowledge, and is only released once embedded into organizational activities – which happens outside the scope of the networks. The Learning Networks are therefore unable to appropriate this value, experiencing value slippage.

In order to be sustained, we therefore call for an integrative perspective: The Collaborative Networks have to combine their value creation and value appropriation activities, by putting more emphasis on financial value appropriation – generating revenue. Through active management of their value appropriation, the value creation will increase, through improvement of coordination and motivations over time. What is more, by reconsidering the organizational scope, we see opportunities for reducing value slippage and appropriating significantly larger portions of the value, attributable to network activity.

Through ensuring the organizational commitment, the Learning Networks organizations will be able to sustain their communities – creating value to its actors.

> "I think that people like being part of something bigger than themselves that helps them do better every day in their work. I've had several people, very well regarded, esteemed researchers, clinicians, parents saying: '*This is some of the best work I've done, and you've transformed our work*'. That, for me, keeps me… You know, even though we haven't figured out the financial sustainability model, that sort of spirit keeps me coming back!"

6.1 Theoretical Implications

The conclusion yields several implications for research: Our thesis enhances the understanding of value creation and value appropriation in Collaborative Networks. We argue that these structures call for separate theorizing, distinct from the firm-specific literature on Business Models. We document an interrelation between value creation and value appropriation, implying these have to be considered in tandem. Our observations with regards to value slippage, gives further implications for how organizational boundaries and business models are to be considered.

6.2 Managerial Implications

Our thesis yields concrete implications for practitioners, both for Collaborative Networks in general and in healthcare settings.

6.2.1 Implications for Collaborative Networks

Despite being open and voluntary structures, CN organizations require financial flows in order to sustain the commitment of its organizational actors. What is more, such financial value appropriation may be channeled in order to improve coordination, which enhances value creation. The identified interrelation between value creation and value appropriation calls for managerial attention. Despite relying on self-organizing, some degree of control and coordination mechanisms are required for effective functioning – especially around inception; In order to become effective and efficient self-organizing entities, a minimum of standardization is required. CN organizations need to consider how they can manage activities in the members' organizations, through adjusting scope. Furthermore, the network organizers' and Collaborative Networks' business model, needs to be aligned with their actors' - and differentiate between these levels

6.2.2 Implications for Healthcare

There is an urgent need to standardize infrastructure for knowledge exchange. Next, we strongly believe the industry could benefit from an active consideration of the three value configuration models, managing based on fit. Interestingly, the models proposed in this paper yields room for further thinking on payment models, for example outcome-based payment models. We find strong theoretical and practical benefits of arranging activities into a separate spin-off entity.

6.3 Limitations

The chosen context of this thesis implies certain limitations, the main one being issues with generalizability. First of all, our case study is based on interviews of actors in existing networks, thereby focusing on successful examples. Second, we study Collaborative Networks in a distinct context, healthcare. In particular, our findings on motivations and coordination are interesting as, arguably, these are also well-known characteristics of the industry: Healthcare is altruistic, and the industry is similarly known for its many administrative- and technical challenges across the world. Third, healthcare organizing differ across countries, especially with regards to payment models, with obvious consequences to our research. Lastly, in our final discussion section, we extended our scope, all while being aware of the complexity of the industry – which is beyond the scope of any Master Thesis to solve.

6.4 Future Research

Our study highlights several interesting findings related to Collaborative Networks, which still is a growing area of research. Given that the value creating activities are, at large, well-recognized, we would direct researchers towards studying appropriation, as well as integrative perspectives – as highlighted by our thesis. We see six immediate topics: First of all, our research is exploratory – and hence our research should be replicated across contexts and industries, to verify our insights. Second, our thesis is clear on acknowledging that networked business models is a multilevel concept, in fact it is what defines it. As our thesis took an aggregate view, based on the Learning Networks' perspective, this yields room for further research into richer perspectives. Third, in a similar vein, we see opportunity for dissecting the activities on the same level, for example by investigating how different forms of collaboration, i.e. co-creation and co-production, affect our findings. Fourth, our thesis highlights motivation and coordination as focal drivers of both value creation and –appropriation, yet leaving room to elaborate on these conceptualizations. Fifth, our thesis concludes that there is an opportunity to reduce value slippage by moderating organizational scope. However, how established firms, often of conflicting value configurations, can or should reconfigure their scope is still not well understood. Lastly, we see some potential in further extending the value notions, both in healthcare, but also in Strategic Management.

“Knowing is not enough; we must apply.
Willing is not enough; we must do.”

- Johann Wolfgang von Goethe (1749-1832)

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Appendices

Appendix A: Value Configuration Models

The following appendix serves to complement our discussion in section 2.1, specifying the two remaining value configuration models of Stabell and Fjeldstad (1998) and present a summarized overview of all three value configurations.

A.1 The Value Chain

Value Chains generate value by transforming input into output, through a sequential, interdependent process (Porter, 1985; Stabell & Fjeldstad, 1998). According to Thompson's (1967) framework, Value Chains rely on the *long-linked technology* (Stabell & Fjeldstad, 1998). The Value Chain can be understood as a predefined process, where the input, process and output is largely known, and value gradually added (Stabell & Fjeldstad, 1998). The administrative challenge can be summarized as managing processes. Chains are best exemplified by manufacturing firms such as automotive producers, but the logic has also increasingly been deployed within healthcare, especially in hospitals, where any standardized procedure following diagnosis is an example of a Value Chain activity (Christensen et al., 2009). As Value Chains imply value is embedded into standardized processes, the organization may charge for outcome, and even give guarantees to its customers.

Value Creation Logic. As illustrated in Figure 16 below, Porter (1985) prescribes nine generic activity categories. These are grouped across two levels: *Primary activities*, directly creating value to customers through transformation of input to output, and; *supporting activities*, which enable and enhance primary activities, thus creating value indirectly. Total value consists of the value activities and the firm's margin. The nine generic activities are regarded as universal across industries, however, differing economies of the categories implies these have industry-specific importance. The focus is creating the right

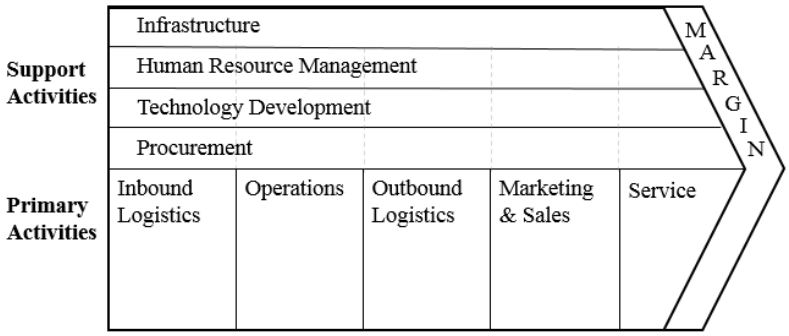


Figure 16: The Value Chain diagram. Source: Porter (1985).

quality at the lowest possible cost; thereby emphasizing cost drivers (Porter, 1991). Cost reductions are primarily achieved through realization of economies of scale, supported by efficiency improvements – often entailing standardization or vertical integration. Porter (1985, pp. 34) recognizes that firms are operating, and often cooperating, with external business partners through arms-length transactions in interlinked Value Chains, e.g. chains-of-chains, so-called *value systems*.

A.2 The Value Shop

Whereas the Value Chain can be understood as a (sequential) process of known issues, the Value Shop solves (unique) problems, with 'problem' being defined as the difference between existing and desired state (Simon, 1977; Stabell & Fjeldstad, 1998). In contrast to the Value Chain, the activities of the Value Shop are not sequential, and instead interruptible and potentially reoccurring. This requires flexibility in the organization, and need for coordination. Following Thompson's (1967) framework, the Value Shop utilizes an *intensive technology*. Typical examples of Value Shops are law firms, consulting and educational institutions.

Value Creation Logic. Since either the input, process or output is unknown, a key administrative task is to manage complexity (Stabell & Fjeldstad, 1998). In contrast to the Value Chain's focus on cost, the Value Shop will typically have no direct relation between value and cost – the focus is on solving customer problems. Value Shops offer a wide range of services that range from merely offering problem-finding and diagnostic services, to the "end-to-end" problem solving process – emphasizing *value drivers*.

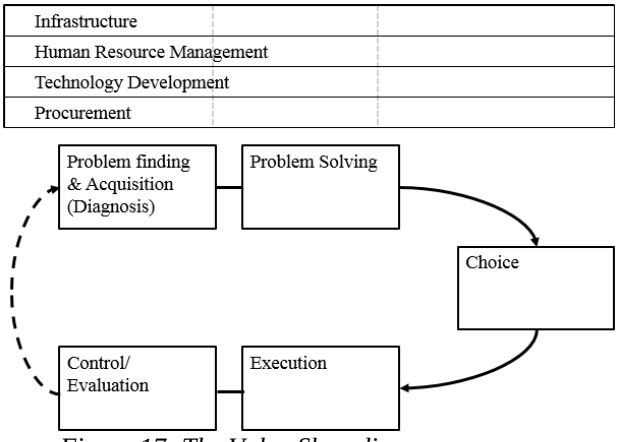


Figure 17: The Value Shop diagram. Source: Stabell & Fjeldstad (1998).

Knowledge and competence. Knowledge plays a central role in Value Shops, as it is the source of problem solving competence. Since a problem typically can only be solved once, value is driven by *reputation* - which serves as a signal of past success, affecting access to talent and future projects. Access to good projects is vital, as it over time contributes to a stronger competence base and enhances reputation further (Stabell & Fjeldstad, 1998). Value shops can also benefit through

repeated problem solving, resulting in learning at the shop-level. In fact, informational asymmetry between the shop and the client is cited as "the single most important attribute of an intensive technology" (Stabell & Fjeldstad, 1998, pp. 421). The information asymmetry makes it difficult for clients to assess the value and quality of solutions in advance (Akerlof, 1970), so-called *experience goods*, or even post-consumption, *credence goods* (Nelson, 1970; Darby & Edi, 1973). As such, Value Shops exhibit scale advantages in knowledge management and reputation. However, as this knowledge typically will remain tacit (Polanyi, 1966), it implies coordination is needed – resulting in economies of small scale, due to cost of coordination. This gives rise to a specialization trade-off: On the one hand, the shop benefits from a large knowledge resource, whereas, on the other hand, efficiency is achieved by operating with the smallest team of specialists possible. Another realization, is that shops primarily generate value through diagnosis, and can employ third-parties to resolve the issues (as chains). Lastly, shops benefit from incorporating the problem, e.g. hospitalizing patients (Thompson, 1967, pp. 43).

A.3 Overview of Value Configurations

Below follows a comparison of the Value Chain, -Shop and -Network.

	Chain	**Shop**	**Network**
Value Creation Logic	Transformation of input into goods	(Re-)solving customer problems	Linking customers
Primary Technology (Thompson 1967)	Long-linked	Intensive	Mediating
Primary Activity Categories	• Inbound logistics • Operations • Outbound logistics • Marketing • Service	• Problem-finding and acquisition • Problem-solving • Choice • Execution • Control/evolution	• Network promotion and contract management • Service provisioning • Infrastructure operation
Main Interactivity Relation Logic	Sequential	Cyclical, spiraling	Synchronous, parallel
Primary Activity Interdependence	• Pooled • Sequential	• Pooled • Sequential • Reciprocal	• Pooled • Reciprocal
Key Cost Drivers	• Scale • Capacity utilization		• Scale • Capacity utilization
Key Value Drivers		• Reputation	• Scale • Capacity utilization
Business Value System Structure	• Interlinked chains	• Referred shops	• Layered and interconnected networks

Table 5: Overview of the introduced value configurations. Source: Stabell & Fjeldstad (1998).

Appendix B: ImproveCareNow Medical Results

The following appendix presents up-to-date statistics and infographics in the ICN-network, which we have used as an archetype for the LNs As such it yields a good illustration of the LNs potency.

Figure 18: ICN's successes infographic. Source: ICN (n.d.).

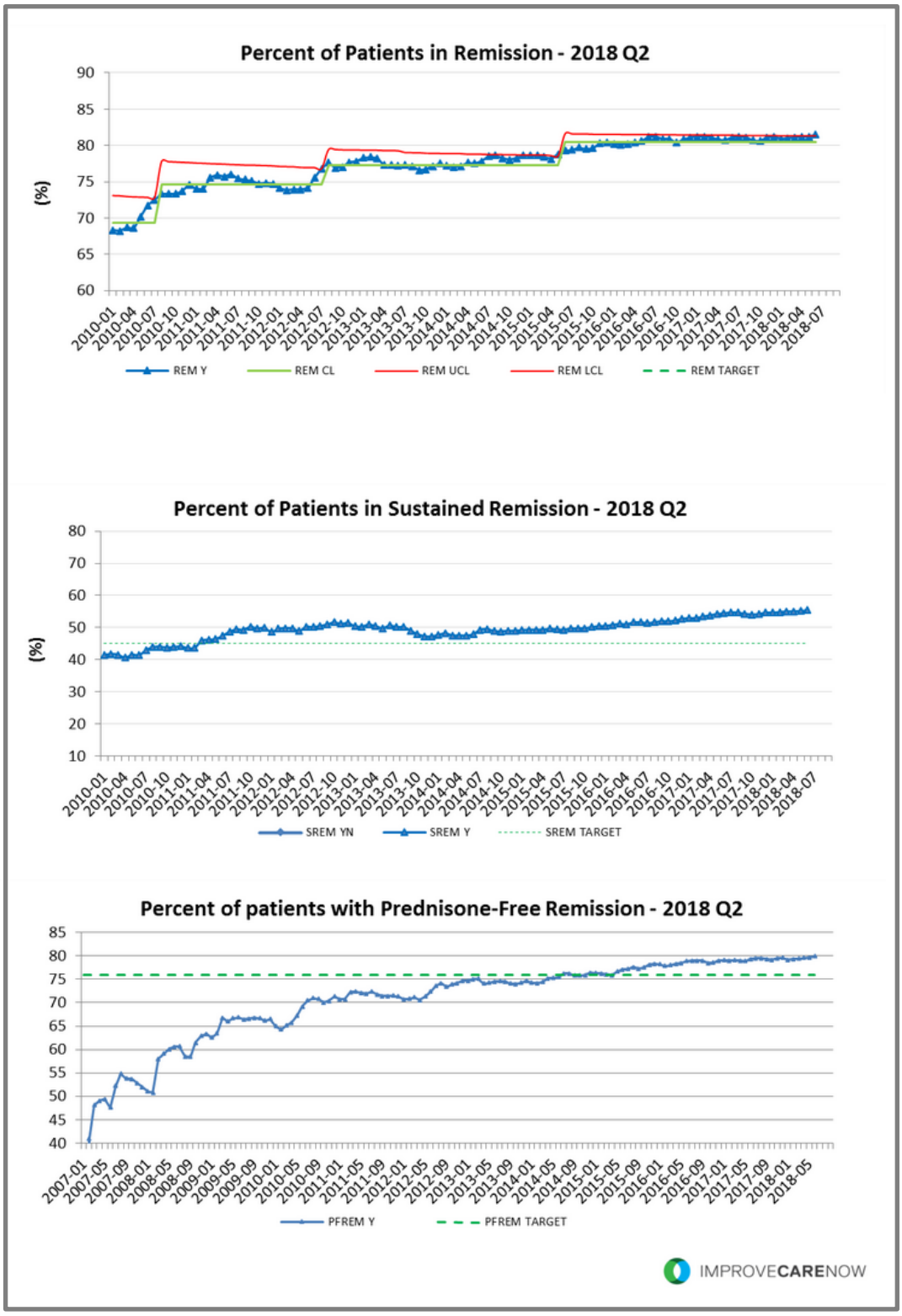


Figure 19: ICN's control charts. Source: ICN (n.d.)

Appendix C: Overview of Learning Networks

The following appendix contains an overview over PCORnet network and networks related to the James M. Anderson Center for Health System Excellence ('The Anderson Center'), at Cincinnati Children Hospital Medical Center's (CCHMC) *Learning Networks Program*.

PCORnet CDRNs

The green table below, outlines PCORnet's current 13 Clinical Data Research Networks (CDRNs).

CDRN name	Affiliation(s)	Main Focus
Accelerating Data Value Across a National Community Health Center Network (ADVANCE)	OCHIN, inc., Health Choice Network (HCN), Fenway Health	Build and maintain a "community laboratory" of Federally Qualified Health Centers (FQHCs).
Accessible Research Commons for Health (ARCH)	Harvard University	Engage patients and clinicians as collaborators with researchers, to prioritize research, design studies, and interpret results.
Chicago Area Patient Centered Outcomes Research Network (CAPriCORN)	Northwestern University	Develop, test, and implement strategies to impact healthcare quality, health outcomes, and health equity for diverse residents in the metropolitan Chicago region and the nation.
Greater Plains Collaborative (GPC)	University of Kansas Medical Center	Improving healthcare delivery through learning, adoption of evidence-based practices.
Kaiser Permanente & Strategic Partners Patient Outcomes Research To Advance Learning (PORTAL) Network	Kaiser Foundation Research Institute	Advance the infrastructure necessary to conduct comparative effectiveness research.
Mid-South CDRN	Vanderbilt University	To robustly support projects in comparative effectiveness research, pragmatic clinical trials, and other key research areas.

New York City Clinical Data Research Network (NYC-CDRN)	Weill Cornell Medicine	Offers researchers and other users access to large sets of research-ready, high-quality patient health and social data.
OneFlorida Clinical Data Research Network	University of Florida	Provide an enduring infrastructure for interventional and observational studies within all over Florida.
Patient-Centered Network of Learning Health Systems (LHSNet)	Mayo Clinic	Support research to improve healthcare in ways meaningful to patients, their families, and providers.
Patient-centered SCAlable National Network for Effectiveness Research (pSCANNER)	University of California, San Diego (UCSD)	Make health data more accessible and usable for the generation of scientific evidence that patients, clinicians, and other stakeholders together use to make more informed health decisions.
PaTH: Towards a Learning Health System in the Mid-Atlantic Region	University of Pittsburgh	Utilize patient-empowered research to address questions and concerns that matter most to the communities we serve in order to make more informed decisions.
PEDSnet: A Pediatric Learning Health System	The Children's Hospital of Philadelphia	Identify the most important research questions that can reduce children's suffering and support their healthy development.
Research Action for Health Network (REACHnet)	Louisiana Public Health Institute (LPHI)	Improve the efficiency of and capacity for patient-centered comparative effective research (CER) by establishing an innovative, health informatics-driven data collection, patient engagement, patient recruitment, and trial management infrastructure to serve as a foundation for pragmatic research.

Table 6: PCORnet PPRNs. Sources: PCORnet (n.d.) and Anderson Center (n.d.).

PCORnet HPRNs

The red table below, outlines PCORnet's current 2 Health Plan Research Networks (HPRNs). PCORI's primary aim with the HPRNs is to enable longitudinal data capture, by including healthcare plans which cover major parts of PCORnet's population. PCORI funds the HPRNs directly.

HPRN name	Affiliation(s)	Main Focus
HealthCore-Anthem Research Network (HCARN)	Anthem Inc. and HealthCore.	Cross national health plan database, 60 million individuals, primarily within 14 states although population stretches all 50 states.
HUMnet: Humana	Humana Comprehensive Health Insights Inc.	One of the largest health plan providers, with significant population of elderly chronic population in Florida, Texas & the Midwest.

Table 7: PCORnet HPRNs. Source: PCORnet (n.d.).

PCORnet PPRNs

The blue table below outlines PCORnet's 20 Patient Powered Research Networks (PPRNs). The networks that are enrolled in both PCORnet and the Anderson Center's program are highlighted in **bold**.

PPRN name	Affiliation(s)	Main Focus
ABOUT Patient-Powered Research Network (ABOUT Network)	University of South Florida Morsani College of Medicine	Hereditary Breast and Ovarian Cancer
ARthritis patient Partnership with comparative Effectiveness Researchers (AR-PoWER PPRN)	Global Healthy Living Foundation, CreakyJoints	Arthritis, Musculoskeletal Disorders, and Inflammatory Conditions
Collaborative Patient-Centered Rare Epilepsy Network (REN)	**REN includes over 25 rare epilepsy organizations**	**Rare Epilepsies/Epileptic Encephalopathy**

Community and Patient Partnered Research Network (CPPRN)	UCLA Center of Health Services and Society, Louisiana State University, and Tulane University	Behavioral health in under-resourced communities
Community-Engaged Network for All (CENA)	Genetic Alliance	A large number of different diseases
COPD Patient Powered Research Network	COPD Foundation	Chronic Obstructive Pulmonary Disease, Bronchiectasis, Chronic Bronchitis, Emphysema, refractory (non-reversible) asthma
DuchenneConnect Patient-Report Registry Infrastructure Project	Parent Project Muscular Dystrophy	Duchenne and Becker Muscular Dystrophy
Health eHeart Alliance	University of California, San Francisco	Cardiovascular Health, mHealth technology, Patient Centric Research Processes
IBD Partners Patient Powered Research Network	University of North Carolina, Chapel Hill	Inflammatory Bowel Diseases (Crohn's Disease and Ulcerative Colitis)
ImproveCareNow	**Cincinnati Children's Hospital Medical Center**	**Children and youth with Crohn's Disease and Ulcerative Colitis**
Interactive Autism Network (IAN)	**Kennedy Krieger Institute**	**Autism Spectrum Disorder (ASD)**
Mood Patient-Powered Research Network	Massachusetts General Hospital	Major Depressive Disorder, Bipolar Disorder and Mood Disorders
Multiple Sclerosis Patient-Powered Research Network (MS-PPRN), iConquerMS	Accelerated Cure Project for Multiple Sclerosis	Accelerated Cure Project for Multiple Sclerosis

National Alzheimer's & Dementia Patient & Caregiver-Powered Research Network (AD-PCPRN)	Mayo Clinic	Alzheimer's Disease & Dementia
NephCure Kidney Network for Patients with Nephrotic Syndrome	**Arbor Research Collaborative for Health**	**Primary Nephrotic Syndrome**
Patients, Advocates and Rheumatology Teams Network for Research and Service (PARTNERS) Consortium	**Duke University**	**Pediatric Rheumatic Disease**
Pediatric Rheumatic Disease	Phelan-McDermid Syndrome Foundation	Phelan-McDermid Syndrome
PI Patient Research Connection: PI CONNECT	PI Patient Research Connection: PI CONNECT	Primary Immunodeficiency Diseases
Population Research in Identity and Disparities for Equality Patient-Powered Research Network (PRIDEnet)	University of California San Francisco	Sexual and gender minorities
Sleep Apnea Patient Centered Outcomes Network (SAPCON)[4]	Brigham and Women's Hospital	Sleep Apnea
Vasculitis Patient Powered Research Network (V-PPRN)	University of Pennsylvania	Large number of different forms of Vasculitis

Table 8: PCORnet PPRN's. Sources: PCORnet (n.d.) and Anderson Center (n.d.).

[4] Affiliate PPRN in PCORnet

Networks enrolled into the Learning Networks Program

The purple table below outlines the networks participating at the Anderson Center's Learning Network Program.

Network Name	Affiliation(s)	Main Focus
All Children Thrive Network	Cincinnati Children's Hospital Medical Center	Improving the quality, effectiveness and availability of services provided to all children and families in Cincinnati.
Solutions for Patient Safety	Cincinnati Children's Hospital Medical Center	Eliminate serious harm across all children's hospitals.
Cystic Fibrosis (CF)	Cincinnati Children's Hospital Medical Center, CF Foundation	Ensure all people involved with CF care have access to the information, resources and treatments they need to enable individuals with CF to live full, productive lives.
Improving Renal Outcomes Collaborative (IROC)	Cincinnati Children's Hospital Medical Center	Achieve health, longevity and quality of life equivalent to the general population.
The National Pediatric Cardiology QI Collaborative (NPCQIC)	Cincinnati Children's Hospital Medical Center	Care for children with complex congenital heart disease.
Ohio Perinatal Quality Collaborative (OPQC)	Cincinnati Children's Hospital Medical Center	Reduce preterm births and improve perinatal and preterm newborn outcomes in Ohio as quickly as possible.
The Pediatric Rheumatology Care and Outcomes Improvement Network (PR-COIN)	Cincinnati Children's Hospital Medical Center	Improving care and outcomes for children with juvenile idiopathic arthritis

Table 9: Anderson Center Learning Networks Program networks. Source: Anderson Center (n.d.).

Appendix D: Interview Guide

General Introduction and Retrieval of Consent

<First of all thank you for your time, and your readiness to contribute to our Master Thesis. We are business graduate students from BI Norwegian Business School, located in Oslo, Norway. The purpose of this interview is to gain insights into the network business model – with an emphasis on underlying strategic drivers.

If you approve, we would like to record and transcribe the interview. In our recordings we will replace your name and identity with a code. Only we will have access to the code/name list and full transcript. Do you approve of us recording and transcribing the interview?>.

Name	
Title, position	
Network affiliation, and network role	
Date, place	
Signature	
By signing this form, I approve the recording, transcription and use of information, retrieved by the students <STUDENT NAME 1> and <STUDENT NAME 2> for purpose of their Master Thesis. ☐ Yes, I would like to receive a copy of the final thesis (after summer). e-mail: _____	

<Signing of consent>

<Start the recording if the terms above are agreed upon>

I) Interviewee Introduction

- Could you please tell us a bit about your background and your role in the <network>?

II) Network Participation

- <Facilitators>*:* Could you please tell us what you perceive the main motivation(s) for participating in the <network> to be? *<Actors>: Could you please tell us what your main motivation(s) for participating in the <network> is?*
    - <Facilitators>: Could you please elaborate on to what extent you think participants accrue any benefits in non-network related activities?

      <Actors>: Could you please elaborate on to what extent you accrue any benefits in non-network related activities?
    - <Facilitators>: Also, could you please elaborate on how participants contribute to the network? Does the contribution vary much between the actors from your perspective? If so, is this reflected in what they get out of being a part of the network?

      <Actors>: Also, could you please elaborate on how you contribute to the network? Does the contribution vary much between the actors from your perspective? If so, do you think this reflected in what they get out of being a part of the network?
- <Facilitators>: Could you please tell us how you perceive network participants making use of the <network> in their daily operations? *<Actors>: Could you please tell us how you and your colleagues make use of the <network> in your daily operation?*
    - <Facilitators>: Could you please elaborate on what activities organizations benefit the most from to your knowledge?

      <Actors>: Could you please elaborate on what activities your organization benefit the most from?
    - <Facilitators>: Also, could you please name any activities you perceive that participants can perform <u>more</u> of by being involved in the network, than otherwise?

      <Actors>: Also, could you please name any activities you can perform <u>more</u> of by being involved in the network, than otherwise?

- <Facilitators>: Could you please tell us your impression with regards to what priority <management/managers> place on participation in <network>?

  <Actors>: Could you please tell us what priority <the management/ your manager> place on participation in <network>?

  - <Facilitators>: Could you please elaborate on what conditions you perceive to be needed to be in place in order to increase participant involvement in the network?

    <Actors>: Could you please elaborate on what conditions you perceive to be needed to be in place in order to increase your organization's involvement in the network?
  - <Facilitators> Also, could you please elaborate on to what degree the commitment of the organizations aligned with the value participants get from participating in the network?

    <Actors>: Also, could you please elaborate on to what degree the commitment of the organizations aligned with the value participants get from participating in the network?
- <Facilitators>: Could you please tell us what the top three barriers to increase organizations' commitment towards network activities, to your understanding?

  <Actors>: Could you please tell us what the top three barriers to increase your commitment towards network activities is?
- <Both> To your knowledge, could you please tell us whether there are differences in how much or what type of value participating organizations get out of being a part of the network?
  - <Both> If so, could you please elaborate on whether there is any particular reason for this?
- <Both>: Could you please tell us your view on the network's development?
  - <Both>: Specifically, could you please elaborate on what is good, and what is less good? Why?

III) Network Cost

- <Facilitators>: Could you please tell us how much it directly costs an organization to participate in the <network>?

<Actors>: Could you please tell us how much it directly costs your organization to participate in the <network>?

- <Facilitators>: Could you please elaborate on what degree the financial cost of participating reflects the true resource commitment participating organizations contributes with, to your understanding?
  <Actors>: Could you please elaborate on what degree the financial cost of participating reflects the true resource commitment your organization contributes with?

- <Facilitators>: Could you please tell us what level of resource commitment the activities imply for the participating organizations in general, in your impression?
  <Actors>: Could you please tell us what level of resource commitment the activities imply for your organization?
- <Facilitators>: Could you please tell us to what degree the cost of participating is a relevant factor when organizations consider to continue participating in the network?
  <Actors>: Could you please tell us to what degree the cost of participating a relevant factor when organizations consider to continue participating in the network?
- <Both>: Could you please tell us whether costs are proportional to the value different members get, to your understanding?
  - <Both>: In your view, should different members pay different fees? Why?
- <Facilitators>: Could you please tell us how large amount of the total costs are covered through membership fees paid by actors participating in the network? How are the rest of the costs funded?

IV) Joining the Network

- <Both>: Could you please tell us what are generally the reasons for actors deciding to join the network, in your opinion?
  - Does the presence of *other* actors impact their decision to join?
  - Is the value proposition for new members clear?
  - Is cost and/or finding the budget an issue?
- <Both>: Could you please share what advice you would give future potential actors that considers to join the <network>?

V) Network Facilitation <only for facilitators>

- Could you please tell us whether actors interact directly with each other within the network? If so, how? Through which platforms?
    - Could you please elaborate on what are the advantages/disadvantages of interacting in this way?
    - Further, could you elaborate on the level of contact with other participants within the network linked? Is it linked to individual commitment to the network?
- Could you please tell us whether you directly facilitate the connection between members?
- Could you please tell us whether you're generally pleased with the level of direct collaboration within the <network>?
- Could you please tell us to what extent the sub-networks *<mention the sub networks related to the network we interview>* are self-driven in terms of collaboration and interaction between participants?

VI) Wrap-up

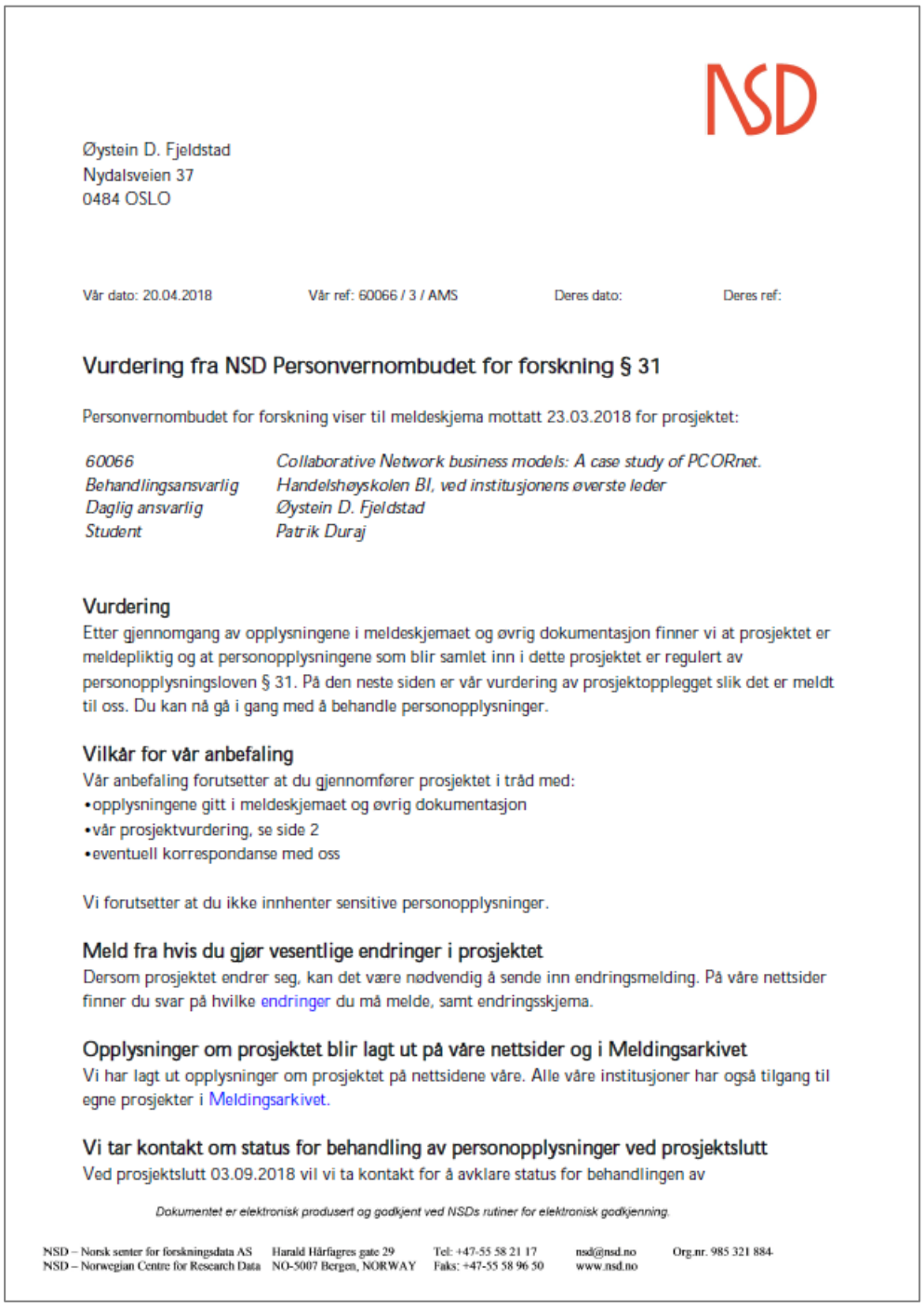
- <Both>: Based on our discussion, are there any other aspects or points you would like to highlight?

<Thank you for your time and cooperation. We will end the recording and supply you with the final transcript once finalized.>

<END>

Appendix E: Norwegian Centre for Research Data Approval

As our project records and processes personal data, our Master Thesis has had to be notified to the Norwegian Centre for Research Data (NSD), in accordance with the Norwegian Personal Data Act (‘*Personopplysingsloven’)* §31. The three page approval from NSD (in Norwegian) is included below.



NSD

Øystein D. Fjeldstad
Nydalsveien 37
0484 OSLO

Vår dato: 20.04.2018 Vår ref: 60066 / 3 / AMS Deres dato: Deres ref:

Vurdering fra NSD Personvernombudet for forskning § 31

Personvernombudet for forskning viser til meldeskjema mottatt 23.03.2018 for prosjektet:

60066	*Collaborative Network business models: A case study of PCORnet.*
Behandlingsansvarlig	*Handelshøyskolen BI, ved institusjonens øverste leder*
Daglig ansvarlig	*Øystein D. Fjeldstad*
Student	*Patrik Duraj*

Vurdering

Etter gjennomgang av opplysningene i meldeskjemaet og øvrig dokumentasjon finner vi at prosjektet er meldepliktig og at personopplysningene som blir samlet inn i dette prosjektet er regulert av personopplysningsloven § 31. På den neste siden er vår vurdering av prosjektopplegget slik det er meldt til oss. Du kan nå gå i gang med å behandle personopplysninger.

Vilkår for vår anbefaling

Vår anbefaling forutsetter at du gjennomfører prosjektet i tråd med:
- opplysningene gitt i meldeskjemaet og øvrig dokumentasjon
- vår prosjektvurdering, se side 2
- eventuell korrespondanse med oss

Vi forutsetter at du ikke innhenter sensitive personopplysninger.

Meld fra hvis du gjør vesentlige endringer i prosjektet

Dersom prosjektet endrer seg, kan det være nødvendig å sende inn endringsmelding. På våre nettsider finner du svar på hvilke endringer du må melde, samt endringsskjema.

Opplysninger om prosjektet blir lagt ut på våre nettsider og i Meldingsarkivet

Vi har lagt ut opplysninger om prosjektet på nettsidene våre. Alle våre institusjoner har også tilgang til egne prosjekter i Meldingsarkivet.

Vi tar kontakt om status for behandling av personopplysninger ved prosjektslutt

Ved prosjektslutt 03.09.2018 vil vi ta kontakt for å avklare status for behandlingen av

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

NSD – Norsk senter for forskningsdata AS / NSD – Norwegian Centre for Research Data | Harald Hårfagres gate 29 / NO-5007 Bergen, NORWAY | Tel: +47-55 58 21 17 / Faks: +47-55 58 96 50 | nsd@nsd.no / www.nsd.no | Org.nr. 985 321 884

personopplysninger.

Se våre nettsider eller ta kontakt dersom du har spørsmål. Vi ønsker lykke til med prosjektet!

Marianne Høgetveit Myhren

Anne-Mette Somby

Kontaktperson: Anne-Mette Somby tlf: 55 58 24 10 / anne-mette.somby@nsd.no

Vedlegg: Prosjektvurdering
Kopi: Patrik Duraj, patrik.duraj@student.bi.no

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 60066

Ifølge prosjektmeldingen skal utvalget informeres muntlig om prosjektet og samtykke til deltakelse. For å tilfredsstille kravet om et informert samtykke etter loven, må utvalget informeres om følgende:

- hvilken institusjon som er ansvarlig
- prosjektets formål / problemstilling
- hvilke metoder som skal benyttes for datainnsamling
- hvilke typer opplysninger som samles inn
- at opplysningene behandles konfidensielt og hvem som vil ha tilgang
- at det er frivillig å delta og at man kan trekke seg når som helst uten begrunnelse
- dato for forventet prosjektslutt
- at data anonymiseres ved prosjektslutt
- hvorvidt enkeltpersoner vil kunne gjenkjennes i den ferdige oppgaven
- kontaktopplysninger til forsker, eller student/veileder.

Informasjonen og samtykket bør dokumenteres på opptaket.

Personvernombudet legger til grunn at forsker etterfølger Handelshøyskolen BI sine interne rutiner for datasikkerhet. Dersom personopplysninger skal lagres på privat pc, bør opplysningene krypteres tilstrekkelig.

Forventet prosjektslutt er 03.09.2018. Ifølge prosjektmeldingen skal innsamlede opplysninger da anonymiseres. Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan gjenkjennes. Det gjøres ved å:

- slette direkte personopplysninger (som navn/koblingsnøkkel)
- slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som f.eks. bosted/arbeidssted, alder og kjønn)
- slette digitale lydopptak

Appendix F: Preliminary Thesis Report

On the following pages, the Preliminary Thesis Report, submitted 15/1-2018, has been appended. Note that when the preliminary report was authored, we had just established contact with the Learning Networks. Changes in descriptions and perspectives reflect the multi-level perspective of our case subject, especially when synthesizing core issues and arguments with brevity.

BI Norwegian Business School – Preliminary Thesis Report

Collaborative Network business models: A case study of PCORnet

Hand-in date:
15.01.2018

Campus:
BI Oslo

Examination code and name:
GRA 19502 Master Thesis

Supervisor:
Professor Chair Øystein D. Fjeldstad

Programme:
Master of Science in Business, Strategy

Abbreviations

IBD	Inflammatory Bowel Disease
EHR	Electronic Health Network
ICN	The ImproveCareNow network
LHN	Learning Health Network
LHS	Learning Health System
PEDSnet	National Paediatric Health care network
PCORI	Patient-Centered Outcomes Research Institute
PCORnet	The National Patient-Centered Clinical Research Network (network of networks)

Executive Summary

This preliminary thesis report constitutes the first deliverable of our Master Thesis at BI Norwegian Business School. The purpose of this thesis report is to advance our initial thesis proposal, starting the planning and research process for the topic under research. Through this process, numerous additional nuances have come up – culminating in adjustments compared to our initial thesis outline.

As we are students of Strategic Management, our thesis aims to shed light on an ongoing theoretical discussion within the field. Specifically, we have exposed a potential to enhance the understanding of business models within so-called Value Networks; alternative network forms of actor coordination outside the traditional organizational structures. By studying novel deployment of one such network architecture, the Actor-Oriented Architecture (Fjeldstad, Snow, Miles & Lettl, 2012), this thesis aims to document, dissect and diagnose the focal network's development, as a response to our research question: "What characterizes the value creation and value appropriation system used to implement and sustain co-production within Collaborative Networks?*"*

Our Master Thesis will be conducted as a case study of the National Patient-Centered Clinical Research Network *PCORnet*, a Learning Health Network. Correlated with the writing of the final thesis will be several distinguishing network events, namely its bi-annual conference and an expansion of the network, which yields additional research potential. These events have influenced the writing process of this proposal, as the aforementioned events are happening within one month after submission of this thesis, demanding extra planning and preparation – which we have included in this thesis proposal.

Table of Contents

1. Introduction

This thesis aims to address a perceived gap in the current academic literature on the business models of networked organizations. Through our first-stage investigation, which this preliminary thesis serves to document, our attention has been drawn to a sub-set of such organizations, with a richer and more complex way of approaching value. As this serves as an important nuance for our research question we will hereby introduce the background for our research topic, from a practical point of view, highlighting the research issues, before presenting the research question and presenting our aims of our research.

1.1. Background: Learning Health Networks

The health care industry is arguably one of the largest forgotten industries. We use the term 'forgotten industry' intentionally, as health provision is arguably seldom approached from an industrial narrative; often being referenced in an altruistic light. However, the health system is not immune against economic forces – in fact the care one receives is at large defined by it (Hwang & Christensen, 2008; Christensen, Grossman & Hwang, 2009). For example, although the same umbrella structure of hospitals and private clinics is largely used world wide, the deployment within this structure will vary greatly between different health care systems, and even within individual (countries) systems. The actual care received will tend to vary even more (Christensen et al., 2009; Lorenzoni & Marino, 2017). Factors such as increasing longevity, demands for social welfare and strained (governmental) financing has made health care a major global topic for the 21st century (Marino, Morgan, Lorenzoni & James, 2017). Simplified, these discussions tend to be either approached from a medical- (e.g. focusing on process and/or patient outcome considerations; a patient level perspective), or political angle (e.g. focusing on efficiency and/or financial considerations; a system level perspective). At the same time, new technology is rapidly advancing the medical field – improving diagnosis and procedures, and the accuracy of these processes (OECD, n.d.; Christensen et al., 2009). This has sparked a revival in innovation efforts within health care (Hwang & Christensen, 2008; Christensen et al., 2009).

In particular, two major topics seem to be driving the current discussion, namely *standardization* and *personalization* of healthcare (Christensen et al., 2009). These two ideas are in the traditional economic logic often conflicting, due to an assumed trade-off between resource deployment (cost efficiency) and activity

scope (differentiated product or service) (Porter, 1996). However, Christensen et al. (2009) argue that with the help of innovation these two concepts can be *combined* in health care. With technological development currently outpacing the present day business models Christensen et al. (2009) emphasize the need for *business model innovation*, adopting Stabell & Fjeldstad's (1998) generic value configuration models for their analysis.

Others are echoing this vision, and continuous innovations in ways of organizing, contrasting and extending the traditional hierarchical and traditional collaborative ways, are emerging. One such form of organizing is the concept of Collaborative Networks (Fjeldstad et al., 2012). Collaborative Networks may be formed both in intra- and interorganizational ways, in order to improve and simplify coordination, enhance adaptability to environmental changes and co-creation of knowledge (Fjeldstad et al., 2012). An example of such are Learning Health Networks (LHN), where data is gathered for purposes of quality and improved effectiveness (Institute of Medicine, 2007). These networks consist of practitioners, hospitals, patients, researchers and administration, who co-create and utilize knowledge and best practices to enhance medical treatment of patients with long lasting or permanent (chronical) diseases. These LHN's have indicated both positive medical effects for patients and that they can create value in the form of greater cost efficiency, as well as more tailored care, by co-producing and sharing knowledge within the networks (Forrest et al., 2014). However, in order to extend the reach of these networks and ensure their sustainability, the understanding of their business model(s) needs to be further advanced.

1.2. Network Business Models

The topic of business models has received increased interest from both academics and practitioners during the last two decades, sparked by the advent of the Internet (Amit & Zott, 2001; Porter, 2001). By establishing a rich network of ties, new divisions between actors (e.g. consumer, firms) has emerged, challenging established commercial approaches – and calling for new business models. However, despite increased attention, a unified definition of business model as a concept is yet to emerge (Porter, 2001; Teece, 2010; Zott, Amit & Massa, 2011; Fjeldstad & Snow, 2017). Nevertheless, the literature shows a convergence among scholars on the high-level classification of business models as a dyadic construct: Value creation and value appropriation (Chesbrough and Rosenbloom, 2002; Zott,

et al., 2011). How this value is distributed in a network organization of actors, for example in a Collaborative Network, is less understood and remains a gap in the current literature. The current research has focused on how networks has able to co-create and appropriate value, with the unit of analysis generally being the network itself, not the individual actors within the network (e.g. Pisano, 2006; Fjeldstad et al., 2012; Fjeldstad & Snow, 2017).

1.3. Research Question

Based on the highlighted gap this paper aims to contribute to an enhanced understanding of the business model concept for networks, by investigating the following research question:

"**What characterizes the value creation and value appropriation system used to implement and sustain co-production within Collaborative Networks?"**

Through this we aim to enhance the understanding on how value is created and appropriated within the network, and divided in order to motivate activity and commitment by current network members as well as attracting favorable stakeholders. Our thesis will approach this research question through a qualitative case study of PCORnet, a consortium of several Learning Health Care Networks ("network of networks"). The context for our case study will be presented in detail in section 3.1.1. For now two issues are worth highlighting to the reader: Firstly, we would like to emphasize the role of the studied networks as *Learning* Health Networks, as this affects how we approach the topic. Secondly, the writing of this thesis coincides with a planned extension of PCORnet of an additional four members (networks), which allows us to document and analyze the extension real-time.

This preliminary paper is structured into three parts: First, in order to frame the research issues above, we present insights from the academic field of Strategic Management. Second, we outline the research methodology, which includes a brief introduction of our case study. Lastly, we outline the project management, including timings and deliverables going forward.

2. Theoretical Framework

This section outlines our theoretical framework for our thesis, rooted in the academic field of Strategic Management. We start by exploring the concept of value

itself, based on the Activity-Based View, and the direct implications this has for the business model of the firm. Second, we elaborate on the relevant conception of value for our chosen research subject, a Learning Health Network, by exploring knowledge and organizational learning. Third, we present how these concepts are combined under a collaborative structure. In the Analysis part of the final paper we will use these three parts as core constituents of a business model for a Collaborative Network.

2.1. The Activity-Based View

The Activity-Based View (ABV) is one of the dominant theories within strategic management, with *activities* as the unit of analysis. Sparked by Porter's (1985) seminal work *Competitive Advantage*, ABV has links to the industrial organization (IO), operational research and business strategy – as well as management consultant practice. (Gluck, 1980; Buaron, 1981; Porter, 1985; Sheenan & Foss 2009).

Porter's core proposition was that the competitive advantage was derived from the firm's ability to create and appropriate *value* (Porter, 1985). Porter defined value as "the amount buyers are willing to pay" (1985, p.38). The aim of this analysis was gaining competitive advantage, which could be achieved either through cost leadership or differentiation (Porter, 1980). The level of analysis was maintained at the (aggregate) firm level, with important implications for his analysis – due to the potential linkages that may exist between the activities. Porter (1996) later elaborates on the effects of such linkages, highlighting the need for fit between activities and presence of trade-offs at an aggregated level. In order to structure this analysis, Porter proposes a general activity template – the Value Chain – as the driver of value (Porter, 1985). Porter's Value Chain quickly became a widely applied model among business professionals, even becoming the second most cited source in the prominent *Strategic Management Journal* during 1987-2000 (Ramos-Rodriguez & Ruiz-Navarro, 2004). Over time, however, scholars and practitioners started questioning the universality of the framework (Armistead & Clark, 1993; Normann & Ramirez, 1993; Stabell & Fjeldstad, 1998; Ramirez, 1999; Fjeldstad & Ketels, 2003). Stabell & Fjeldstad (1998) proposed that the Value Chain was not relevant to all firms, due to differences in linkages between the activities. Based on Thompson's (1967) typology of long-linked, intensive and mediating technologies, Stabell & Fjeldstad (1998) show how activities can be distinguished into three generic value configuration models, based on the main driver of value: *Value*

Chain, *Value Shop* and *Value Network*. The configurations help decipher what Stabell & Fjeldstad (1998) refers to as the value creation logic and technology of the firm, which is seen as the source of competitive advantage. Notably, hybrid configurations are possible as a "*single firm may employ more than one technology and hence have more than one configuration*" (Stabell & Fjeldstad, 1998, p. 434). Building on Christensen et al. (2009) we will use these three value generation models as generic templates for business models. The three configurations will hereby be presented, with Porter's Value Chain as the point of departure.

2.1.1. The Value Chain

Value Chains create value by transforming input into output, through a sequential process wherein value is added throughout the Value Chain (Porter, 1985; Fjeldstad & Haanæs, 2001). According to Thompson's (1967) framework Value Chains rely on *long-linked* technologies. The Value Chain can be seen as a predefined process where the input, process and output is largely known (Stabell & Fjeldstad, 1998). The Value Chain is embodied by manufacturing firms, such as producers of automobiles, computers or consumer goods

The product captures the value, which Porter sees as a function of the buyer purchasing criteria (Porter, 1985). In the model, Porter distinguishes between the primary activities associated with transforming input to outputs, and the supporting activities, which are needed to enable the primary activities and enhance them. The generic activities are regarded as universal across all industries, however, differing economies of the categories implies these have industry-specific importance. The focus is creating the right quality at the lowest possible cost (Porter, 1985). Cost reductions are primarily achieved through economies of scale, supported by efficiency improvements – which can be generated through specialization and experience curves (Henderson, 1973).

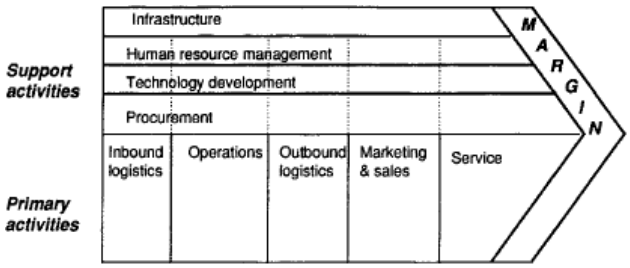


Figure 1: Value Chain diagram.
Source: Stabell & Fjeldstad (1998), from Porter (1985).

2.1.2. The Value Shop

Where the Value Chain can be modelled as a (sequential) process of known issues, the Value Shop solve (unique) *problems*, e.g. where either the input, process and/or output is unknown (Stabell & Fjeldstad, 1998). In contrast to the Value Chain, the activities of the Value Shop are not sequential, and instead interruptible and potentially recurring, with 'problem' being defined as the difference between existing and desired state (Simon, 1977; Stabell & Fjeldstad, 1998). According to Thompson's (1967) framework the Value Shop utilizes an *intensive* technology. Typical examples of Value Shops are hospitals, professional service firms and educational institutions.

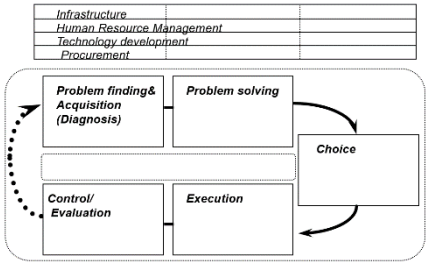


Figure 2: Value Shop diagram. Source: Stabell & Fjeldstad (1998).

In contrast to the Value Chain's focus on cost, the Value Shop will typically have no direct relation between value and cost. Since the problem usually only can be (optimally) solved once, value is driven by reputation, which serves as a signal of past success. Reputation also gives access to talent and projects. Access to good projects is vital, as it over times contributes to a stronger competence base and enhances reputation further, making project selection a core activity (Stabell & Fjeldstad, 1998). Value shops can also benefit through repeated solution of problems, resulting in learning at the shop-level – creating an informational asymmetry between the firm and its client. In fact, informational asymmetry is cited as "*the single most important attribute of an intensive technology*" (Stabell & Fjeldstad, 1998, p.421). As such Value Shops exhibit scale advantages in knowledge management and reputation. However, as this knowledge typically will be tacit, it implies coordination is needed – resulting in economies of small scale due to cost of coordination. This gives rise to a specialization trade-off: On one hand, the shop benefits from a large knowledge resource, whereas, on the other hand, efficiency is achieved by operating with the smallest team of specialists possible.

2.1.3. The Value Network

Value Networks derive value by enabling exchanges, through the mediation between actors (Stabell & Fjeldstad, 1998). Inspired by Thompson's (1967) *mediating* technologies, capturing rents from positive networks effects (Katz &

Shapiro, 1985). Nodes within the network can be people, firms or location. The role of the focal firm is not to be the network, but support the network service through provision of infrastructure (Normann & Ramírez, 1993; Stabell & Fjeldstad, 1998; Ramírez, 1999; Vanhaverbeke & Cloodt, 2006). Typical examples include telephone operators, internet firms and financial intuitions such as banks and insurance companies.

Costs within Value Networks are mainly driven by membership acquisition and infrastructure operation, typically distinguished by a large fixed cost base and close-to-zero marginal costs. The value generation of Value Networks is often less obvious, compared to the Value Chain- or Value Shop models. Value Networks generate value from connectivity and conductivity: Connectivity stems from network composition and scale, e.g. who can be reached. Conductivity are properties of the network, e.g. what can be exchanged, and at what quality (Fjeldstad & Haanæs, 2001). This interpretation implies that the value generation occurs between participators of the network, in fact the members serve as a core part of the network's value (Stabell & Fjeldstad, 1998). Central to the exchange is the networks infrastructure, which typically becomes more complex as the network grows in reach. In contrast to the previous two activity systems, scale thus potentially acts as a driver of both value *and* cost in Value Networks. A tradeoff will therefore often result between scale of the network (membership) versus the range of services (richness). Fjeldstad & Haanæs (2001) show how Value Networks tradeoffs go between the size of the community served and range of services that are exchanged, while knowledge firms make tradeoffs between specialization and breadth of problems. Although new members increase the value for all members, scale is not enough and composition matters (Fjeldstad & Ketels, 2006). This has direct implications for analysis of such networks, with member identification, attraction and retention becoming core elements of the Value Network's activities. Stabell & Fjeldstad (1998) propose that Value Networks have three distinct primary activities: 1) Network promotion and contract management. 2) Service provisioning and 3) infrastructure operations. Network facilitators in particular play a significant role, by measuring and rewarding the activity. As illustrated by the figure, and in

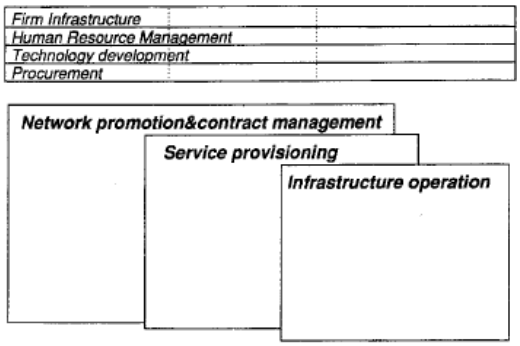


Figure 3: Value Network diagram. Source: Stabell & Fjeldstad (1998).

contrast to the activities in the Value Chain, the activities are layered and *not* sequential. In contrast to activities in the Value Shop the activities are typically executed in parallel.

2.1.4. A wider conception of 'value'

So far our description has presented the Value Chain, the Value Shop and the Value Network (Stabell & Fjeldstad, 1998), as three generic value configuration models, with Porter assigning a classical economic willingness-to-pay interpretation to 'value', rooted in the academic tradition of industrial economics (Porter, 1985, p.38). According to standard economic theory such exchanges are assumed to lead to efficient solutions in the absence of transactional costs (Coase, 1937; Williamson, 1975). However, the current fast-changing, globalized and hypercompetitive environment has led scholars to revisit the economic definition of value (Norman & Ramírez, 1993; D'Aveni, 1997). In particular, the informational revolution of the last two decades has made companies redefine how they deliver value, shifting from analogue (physical) products to connected (virtual) services (Rayport & Sviokola, 1995; Amit & Zott, 2001; Porter, 2001; Porter & Heppelmann, 2014). Ramírez (1999, p.50) argues that instead of "*linear and transitive*", value generation becomes "*synchronic and interactive*". Under this new paradigm, knowledge and interconnections are highlighted as critical assets (Normann & Ramírez, 1993; Nonaka, 1994). These are both at play in networked forms of organizing, where different actors typically will come together to *co-produce value* (Normann & Ramírez, 1993). This value creation occurs "in the network rather in the firm" (Amit & Zott, 2001, p. 513). As value forms a central construct of our analysis, this is a vital realization: "*If the key to creating value is to co-produce offerings (…) then the only true source of competitive advantage is the ability to conceive the entire value-creating system and make it work*" (Normann & Ramírez, 1993, p.69). Crucially, network forms of organizing call for different theoretical lenses (Vanhaverbeke & Cloodt, 2006). In the following section we will extend the foundation for the treatment of our research question, by introducing knowledge and co-production of knowledge, through collaboration, with organizational learning as the source of departure.

2.2. Knowledge in organizations

In today's knowledge-based society knowledge has been heralded as a key source of generating value for a firm. Grant (1996) highlight that a firm can employ

knowledge to create value in two ways: Through *production*, transferring inputs to higher valued outputs, or *arbitrage*, where inputs are moved in either time or space to generate value. Traditionally the field therefore has held a strong *intra*-organizational perspective, rooted in the field of organizational learning. Gradually the increased importance of knowledge coproduction has shifted the focus towards *inter*-organizational perspectives (Argote & Miron-Spektor, 2011). According to our research question, we are mainly interested in understanding how knowledge is generated, through organizational learning, and how this compares to the scenario in which value is co-produced in interorganizational networks. We will start by investigating organizational learning, before exploring co-production of knowledge.

2.2.1. Intra-organizational knowledge

Despite high interest among scholars, the literature on organizational learning is fragmented - lacking alignment and cumulative work (Huber, 1991; Crossan, Lane & White, 1999; Lam, 2000). According to Crossan et al. (1999) this is caused by concepts and terminology of organizational learning being deployed within different domains, hindering the development of a consistent view.

Drawing on work by Winter (1971), Levinthal & March (1981) and Levitt & March (1988), March (1991) explores the trade-offs between exploring new possibilities and exploiting and refining existing knowledge in the light of organizational learning. Finding an appropriate balance between the exploration and exploitation is essential for value creation over time, as exploration without exploiting the current (already explored) knowledge is detrimental on short term, while exploiting without simultaneously exploring new possibilities is detrimental in the long run (March, 1991). An important implication of the latter is path dependency, as refinement of the knowledge exploited may lead to larger dependence on the said knowledge, leading to further refinement in order to exploit it more efficiently. In dynamic markets, the underlying assumption is that eventually a disruptive innovation will render the given knowledge useless (Christensen, 1997). Levinthal & March (1993) calls this the *success trap*, where the knowledge yields high and increasing return, until it suddenly becomes irrelevant. Oppositely, they claim that failure in the exploration processes without sufficient attention to the exploitation of existing knowledge, may lead to *failure traps*, as failure leads to further exploration, leading to more failure, both since new

ideas usually are bad and because the innovation does not get the time necessary to mature (lack of exploitation).

March's (1991) work has inspired a stream of literature, which elaborates on how knowledge can be utilized to generate value by addressing this trade-off. Examples include highlights the role of human resource configuration (Kang, Morris & Snell, 2007), causes and consequences of misbalance in the trade-off between exploration and exploitation (Levinthal & March, 1993), efficiency of internal knowledge transfer (e.g. Argote & Ingram, 2000; Szulanski, 2000) and the ability to organize for absorbing and leveraging knowledge (dynamic capabilities) (e.g. Van den Bosch, Volberda & de Boer, 1999; Zahra & George, 2002).

2.2.2. Inter-organizational knowledge

Another interesting angle is the use of interorganizational networks as a platform for co-creation of learning and value in general (Ramírez, 1999). Powell, Koput & Smith-Doerr (1996 p. 119) argue that in complex, knowledge heavy industries, "*(...) when knowledge is broadly distributed and brings a competitive advantage, the locus of innovation is found in a network of interorganizational relationships*". Similar conclusions are drawn by Mason & Watts (2011 p. 764), who found evidence supporting the claim that "networked groups generally outperform equal-sized collections of independent problem solvers". Furthermore, it is also argued that organizations should pursue to be involved in the innovation process, as they claim that receiving knowledge passively leads to less appreciation of its value and slower response to the knowledge obtained (Powell, Koput & Smith-Doerr, 1996). Nelson (1990) underlines the need for sound internal capabilities in order to be able to absorb the knowledge that must be captured collaboratively in the network, thereby linking learning in networks to the previous singular view of firm absorptive capacity.

A concept particularly interesting in the interorganizational context is the concept of tacit knowledge. Based on the reintroduction of Polanyi's (1962, 1966) theory of tacit knowing by Nelson and Winter (1982), tacit knowledge has received a wide recognition for being essential for the learning economy, innovation and value creation (Gertler, 2003). Tacit knowledge is the knowledge that is not explicit or explainable, often seen as *know-how* (Nelson & Winter, 1982; Kogut & Zander, 1992; Szulanski, 2000). Put differently, "*organizations know more than what their contracts can say*" (Kogut & Zander, 1992, p.383). This rephrasing of Polanyi's

original formulation implies that much of the organizational knowledge is embedded in the people within the organization, in the form of their collective know-how. In the context of networks, the transfer of tacit knowledge within networks has received significant attention since Grant (1996) requested further observation of this phenomenon. Most notably, Dyer & Nobeoka (2000) pointed out some challenges with the sharing of tacit knowledge, namely motivating firms to participate in a knowledge network, preventing free-riding and costs related to finding and sharing knowledge within the network. Dyer & Nobeoka (2000, p.365) argue that Toyota's network of suppliers', which was the context of their study, has solved these challenges by "*creating a highly interconnected, strong tie network – a network where members strongly identify with the core firm/network and where there are clear rules for participation in the network's knowledge-sharing activities. Perhaps most importantly, production knowledge is viewed as the property of the network rather than the individual firm*". Given the centrality of coproduction for knowledge, especially in networks, we will separately elaborate on the organizational literature addressing collaborative relationships.

2.3. Collaborative relations

Collaboration between firms, is not a new phenomenon, and extensive literature has used different theories to access the various types of interorganizational strategies (Gulati, 1998). Traditionally, collaboration was mainly studied as dyadic relationships, in the form of, amongst others, joint ventures (e.g. Kogut, 1988; Lane, Salk & Lyles, 2001; Hennart, 1988) and strategic alliances of various scopes and levels of integration between two firms (e.g. Hamel, 1991; Mowery, Oxley & Silverman, 1996; Das & Teng, 2000). The traditional ways of organizing collaboration are often, though not exclusively, explored through the lenses of hierarchy and market, explained by transactional costs (Coase, 1937; Willamson, 1975, 1985). However, Powell (1990) proposed that networks can be considered as a third way of coordination, differing distinctively from the traditional market and hierarchical way of coordinating. This sparked extensive research into the role of networks during the last decades, for example revisiting strategic alliances (Gulati, 1998, 1999) and stakeholder influences (Rowley, 1997) from the lenses of network theory, in contrast to the traditional dyadic way of analyzing these alliances and network governance (Jones, Hesterly & Borgatti, 1997). Gulati, Nohria & Zaheer (2000) highlights that the key advantage of organizing as networks is the reduction of transactional costs. Through the closer ties found between firms within a

network, enhanced trust relations and larger reputational risks related to opportunism, the costs of writing, monitoring and enforcing contracts are significantly lowered. This in turn allows networks to perform many of the beneficial activities from outside the firm boundaries, at lower cost (Gulati et al., 2000; Gulati, Dialdin, & Wang, 2002).

2.3.1. The Actor-Oriented Architecture

Based on a network logic of organizing, Fjeldstad et al. (2012) propose the Actor-Oriented Architecture as a novel way of coordinating and controlling organizational activities, and to make decisions about distribution of resources and efforts. The design represents a common organizational framework, consisting of three main elements: "*(1) actors who have the capabilities and values to self-organize; (2) commons where the actors accumulate and share resources; and (3) protocols, processes, and infrastructures that enable multi-actor collaboration."* (Fjeldstad et al., 2012, p. 739). Actors are the people, organizations, databases and registries that are part of the network. In particular the common platform the architecture enables is seen as essential to stimulate an association between the actors (Trist, 1973; Fjeldstad et al., 2012). Notably, an actor-oriented scheme can be distinguished from more traditional forms of organizing, such as market, matrices or hierarchies, similar to the network theory, as covered in the previous sections. In contrast to these, the actor-oriented scheme represents a more flexible and adaptable structure, allowing large groups of actors to self-organize to solve complex problems that are important to them, in a beneficial, collaborative way (Powell et al., 1996).

However, it is also argued that the Actor-Oriented Architecture differs from prior ways of organizing as networks. In contrast to the Toyota suppliers' network introduced earlier, which was centered around one (main) focal firm, making it per definition a (weak) form of coordination hierarchy, the Actor-Oriented Architecture suggests that "*control and coordination are accomplished primarily via direct interaction among the actors themselves rather than by hierarchical sub-ordination*." (Fjeldstad et al., 2012, p. 739). Fjeldstad et al. (2012) stresses that hierarchy is still needed in many forms of Collaborative Networks, however, the need for hierarchy is limited to the *control* of the network, not the *coordination*. Gulati et al. (2012) refers to this absence of a traditional hierarchical coordination as stratification, meaning that there is a differentiation of hierarchical roles, so called tiers within the network. It is suggested that the higher-tier actors in the

network coordinates the activities of lower-tier actors, without direct intervention, rather indirectly channeling the network activity towards important issues. The argument is that this form of indirect hierarchical relation both reduces the complexity of coordination and enhances the motivation to participate in the network.

3. Research Methodology

The following section outlines our methodological approach. First, we present our chosen – qualitative – approach, elaborating on the method, structure and execution of the research. Second, we evaluate potential limitations of our design, highlighting compensating measures.

3.1. Research design

This thesis aims to explore business models for Collaborative Networks, structured as actor-oriented architectures. Put differently, we are studying how individual actors are coordinated. As we study behavior, this entails capturing the experiences, feelings, sensations and options of these individuals. This makes a qualitative research design the most fitting approach to our problem statement (Bryman & Bell, 2015). What is more, we will be studying *learning* networks, e.g. involving exchange and/or generation of knowledge which has been highlighted by scholars as being difficult to codify – supporting the qualitative method (Kogut & Zander, 1992).

As indicated in the literature review the research topic entails certain novelty, both from a theoretical and applied perspective. This justifies an inductive approach, which aims to draw "*generalizable inferences out of observations*" (Eisenhardt, 1989; Bryman & Bell, 2015, p.13). Different qualitative techniques exist in order to capture information and data, such as observations, interviews, archives, focus groups and surveys (Bryman & Bell, 2015; Yin, 2009). As presented in the introduction, there are existing networks specifically employing the organizational schemes we aim to study, even grappling with challenges directly relating to our problem statement – enabling us to deploy a case study approach (Eisenhardt, 1989). Although the focus of our thesis is on the network, our research questions calls for a dual level of analysis – both on the network, but also on the participating actors (Eisenhardt, 1989).

Yin (2009) highlights that the review of existing literature is an essential part of performing a case study. Once data has been collected, it should be thoroughly analyzed, through within-case and cross-case methodology with the aim of uncovering the 'why' behind relationships (Eisenhardt, 1989). In order to broaden our database we will supplement the primary data collection with secondary sources where feasible. In this preliminary master thesis, we have strictly focused on the primary data collection – however, with an understanding that this may be altered before submission of our final thesis. In the following sections, we will introduce the case and sources we will utilize in our research, elaborating on the interview design and highlighting relevant considerations for the chosen method.

3.1.1. Case study context: PCORnet

<Note: At the time of writing of this preliminary thesis report our primary contacts are linked to PCORnet through one of the (sub-)networks, ImproveCareNow. As ImproveCareNow will serve as a point of departure for our analysis, and also functions as a pedagogical tool to present and explain the underlying logic of PCORnet, we will start this section by introducing ImproveCareNow, before introducing PCORnet. In the final thesis, parts of the description below will be split and moved to more suitable sections, which are not part of this preliminary thesis, and this section will serve as a brief(er) contextualization.>

ImproveCareNow (ICN) is a collaborative care network focusing on children with Crohn's disease and ulcerative colitis (Forrest et al., 2014). Commonly referred to as inflammatory bowel disease (IBD), these diseases cause long term injury to the intestines. Simplified, IBD patients experience two main states, periods of severe symptoms, also known as flare ups, and periods without fewer or no symptoms, called remission. Although no cure currently exists, there are numerous treatment options. Without going into further details on the medical aspects, the reader should take note that these are distinct diagnoses that leads to a chronic, lifelong condition, with significant variation from person to person. The primary goal of ICN is therefore to improve patient outcomes, with the remission rate of enrolled patients as the main performance metric. Building on the National Academies Institute of Medicine's concept of the Learning Health System (LHS), the main mechanism for increasing remission rates is the network, wherein standardized data is collected, monitored, studied and shared – in order to encourage new ideas and development

of practices. In the decade since the launch in 2007, the network has grown from 8 to 106 care centers and served as a template for scaling up the national health care for children's diseases – PEDSnet (Forrest et al., 2014; ImproveCareNow, n.d.; PEDSnet, n.d.).

PEDSnet was founded by combining three disease-specific networks, the aforementioned ICN network, the National Pediatric Cardiology Quality Improvement Collaborative for complex congenital heart disease and the Healthy Weight network, focused on childhood obesity. PEDSnet is part of the national patient-centered clinical research network PCORnet, which is made up of 13 other Clinical Data Research Networks (CDRN's, where PEDSnet is one of the 13) – as well as 20 patient powered research networks (PPRN's, wherein ICN is one of the 20) and 2 health plan research networks. PCORnet is an initiative of the Patient-Centered Outcomes Research Institute (PCORI). In total PCORnet includes 135 health systems, with data on over 110 million patients (PCORnet, n.d.).

The case was chosen for four main reasons: First of all, PCORnet has been a driving force within the National Academies Institute of medicine's "Learning Health System" (Institute of Medicine, 2007). A vital point for our research is having a broad enough base of interviews in order to gain a diversified overview of the question researched. We redeem the scope, scale and maturity of PCORnet to be a benefit to our study. Second, PCORnet is in search of a long-term network business model – which it lists as one of the five prerequisites of achieving a 'Learning healthcare system' (PCORnet, 2017). Third, at the time of writing of this thesis, PCORnet stood in front of a distinctive event, an expansion of the network, which potentially could have effect on the wider evolution of both PCORnet, as well as the newly admitted networks. The timing of our thesis implied we could witness and document this evolution first hand. Lastly, we found ICN particularly relevant to explore, as they have adopted the Fjeldstad et al. (2012) organizational architecture for their network. The network therefore serves as a natural context to expand the theory within this realm. In summary we redeem the case as being highly relevant, offering both a very interesting gap and a unique opportunity to document and study the dynamic evolution in our focused research dimension. This should yield relevant theoretical and practical insights. We will hereby describe the process of how we aim to capture primary data from the case, utilizing interviews.

3.1.1. Interview process

Cook and Reichardt (1979) argue that qualitative studies are explorative in nature, and that the focus should be on understanding the respondents' point of view. In order to get as authentic and detailed replies as possible, we will therefore employ a semi-structured interview approach (Bryman & Bell, 2015). Through the semi-structured interview process one can, on the one hand ensure that key topics are covered, avoiding disturbances that can occur from excessive information, while, on the other hand allowing flexibility to capture supplementing information that might prove relevant for the project (Eisenhardt, 1989; Yin 1994). In order to foster a fluent dialogue, we will delegate the task of interviewing to one of us, while the other is responsible for transcribing the interview. The design, planning and execution of the semi-structured interviews is addressed in section *3.2*.

3.1.2. Interview sources

<This section will outline the sources that will be used in our final thesis. For now, this section mainly serves as a placeholder, as the specific interviews have not yet been scheduled or conducted.>

A vital point for our research is having a broad enough base of interviews in order to gain a diversified overview of the question researched. This implies we will have to think about how the information is structured in the final thesis. As for now, we are considering using tables, in a similar format to what is outlines below.

3.1.3. Secondary sources

A potential benefit of studying a LHS such as ICN and PCORnet is that 'commons', as explained in Fjeldstad et al. (2012), classifies as a possible further source of case documentation. Examples include the ICN2-database, community conference and webinar material, studies and even an online forum where patients, caretakers and doctors exchange information. At the time of writing this preliminary thesis report, these sources have not been identified as a central source for our select research question – however this may change during the course of our research.

3.2. Interview Design

As we aim to interview a broad array of stakeholders during an intensive period, we need to predefine an interview guide, which is presented in Appendix A. For the sake of consistency, it is important that all areas of the interview guide are covered in the interview. Also for the sake of consistency, it is key that this guide remains

the same during our research process, calling for pre-screening. Luckily, we are already in contact with several key actors of the network, and will therefore ask for pre-validation of this guide, due around submission of this preliminary thesis report.

As this thesis is to be written by BI Norwegian Business School students, from Oslo, Norway, while our interview objects predominantly are located in Ohio, USA, this sets extra practical demands on the execution of our study. Despite advances in conferencing technology, we deem it necessary to at least conduct the initial interviews in-person, preferably on-site in the interviewees ordinary environment. This serves mainly two main purposes: Firstly, we believe this will smoothen the interview dialogue – allowing for full attention and response from the participants. Secondly, we hope to be able to better tailor our responses by catching up on non-verbal queues, using these to further tailor each individual interview. In order to support the structure of the interviews, we aim to record the interviews and utilize a professional qualitative research software package available through our university, NVivo. This implies that clarifications to questions or answers, replies to questions outside the questionnaire or answers to questions not asked will also be noted in our data collection. The interviews will be conducted in English, which, to our current understanding, will represent the first langue of all our interviewees.

Planning is needed in order to be successful. Although we will ensure to have flexibility in our schedule, we cannot rely on the same from our interviewees. Hence, we have to rely to a great extent to the network of our key contacts towards the PCORI project, Professors Margolis and Professor Seid, in order to secure a relevant panel of central actors. Scheduling interviews will be an ongoing process as the project evolves, more thoroughly explained in the Project Management-section of this preliminary thesis. Due to the expected longitudinal development in the network during the writing of our thesis, we reserve the option of supplementing the interviews with follow-ups (either off- or on-site).

Anonymity might make actors speak more freely. However, a consideration with regards to our research question is that the roles of the differing participants could potentially prove an interesting research dimension, as was highlighted in the sources-section above. At the current time of writing of this preliminary report, we have not concluded this balance. Please also confer with our comment regarding patient anonymity in section 3.3.3.

3.3. Methodological considerations

Qualitative case research has some shortcomings that should be addressed. Our chosen interview-based case study approach yields further considerations that we will hereby discuss.

3.3.1. Lack of generalizability

Case studies are often cited to have varying applicability to the broader population (Eisenhardt, 1989). Although we recognize this argument - which perhaps in our case even is exuberated by the specificity of our industry (healthcare), and the context under which the case is moderated (the US health care system, which differs to many other countries) - we would argue that our case is not meant to reflect the population (e.g. health care/health care networks/US health care). Instead of generalizing for a population, our intent and clear focus is generalizing for theory (Mitchell, 1983). What is more, as business students, without any undisclosed relations to any parties in the organizations of this study we do not deem to have any predominance for subjectivity in the analysis.

3.3.2. Interview biases

The interview process exposes any qualitative study to biases. We prepare to make the greatest efforts to ensure the viewpoints of interviewed individuals will be accurately captured and reflected in our study, but ultimately the interview approach leads the interpretation of the interviews themselves exposed to issues of validity and reliability (Bryman & Bell 2015). Biases in the interview process may occur on the account of both the interviewer and the interviewee. For the former, Bryman & Bell (2015) argues that biases may occur if researchers are having prejudices towards what they think is correct. By transcribing the interviews, and thereby being able to analyze whether the interviewees are being lead towards certain answers by the researchers (in terms of follow up questions and expression of assumptions), one is able to reduce the risk of this bias affecting the research. Furthermore, Bryman & Bell (2015) highlight social desirability bias as a common interview bias, occurring when interviewees alter they responds based on what is socially accepted. We will therefore thoroughly analyze the responses, and try to prevent the interviewees from altering their answers to be perceived in the mentioned desirable way. What is more, one should also not neglect how our direct access to the managers of the network can have affected the responses – either elevating or demoting our role towards the interview objects.

3.3.3. Ethical Considerations

Qualitative research, in particular whenever involving interviews of individuals, triggers natural ethical considerations. Ethical boundaries in this regard are not clear cut, yet as researchers it is important to maintain respect towards the issues covered, and how the research may affect the subjects under research (Bryman & Bell, 2015). What is more, our study focuses on a sensitive area, medicine, and arguably even a very sensitive subfield – pediatrics (children medicine). However, the input of patients and their parents/relatives is not the primary focus of this study and hence we see little/no value added from not providing these with full anonymity. We will do so for all potential patient interviews.

4. Project Management

Bellow follows a brief outline of the intended project plan for the writing of the final thesis. *<To avoid confusion this section is only included in the preliminary thesis report, and will not be part of the final thesis>*

4.1. Present status

After the initial outline in June 2017, we have narrowed in on our thesis theme and received approval from our case study partners during the autumn. As both authors spent the autumn on exchange we have spent the time during Christmas and New Years to consolidate past investigations, and the initial draft of the 1) Introduction, 2) Literature Review and 3) Research methods sections respectively. Perhaps unsurprisingly, the major insight so far has been how time consuming the literature review has been, motivating us to provide our readers with clarity.

According to our outlined structure, the ensuing months will focus on conducting the interviews, as well as refining the literature review. A major catalyst into our thesis work is a central conference arranged February 14-15 2018 in Cincinnati, Ohio, USA - described in further detail below.

The event has put extra demands on the deliverables early on, and has implied us spending considerable time getting a firm view of the literature, as well as preparing for the conference and interviews. This also puts clear prioritization on our initial phase of the project, ensuring we are up to date and are able to hit the ground running with senior professionals in the network already by February. The conference also puts some further practical demands, with regards to travel, coordination with work and not least funding.

4.2. PCORnet bi-annual conference and new member kickoff

During February 14-15th 2018 PCORI and PCORnet will host the PCORnet Learning Healthcare Systems Network Community, in Cincinnati, Ohio, USA. The agenda for February 14th is a kick-off for four new PPRN's, where as the semi-annual Learning Network Community Conference, with all 13 learning networks present, is scheduled for February 15th.

As stated on the conference website the objectives of the conference is to

- "*Begin to create a cohesive community of engaged and activated team members across new Learning Networks*
- *Describe and launch the infrastructure that will support new Learning Networks*
- *Identify concrete next steps for new Learning Networks with a focus on their activities over the next 90-days (following the launch) and a grounding in the Network Maturity Model*." (PCORnet LHS event, n.d.).

Participators will include existing PPRN's, new PPRN's and applicants interested in becoming Learning Health Networks. (PCORnet LHS event, n.d.). As such this event represent a milestone in the network's evolution, not only as its bi-annual forum but also by enriching the network further with additional members. Our role in the conference will mainly be acting as observers, but also leveraging the opportunity to conduct interviews. What is more, we will use the opportunity to network with the PPRN's representative for later opportunities.

4.3. Consolidation of material and finalization of thesis

Once back at BI Norwegian Business School the focus will turn to data structuring and analysis. If needed, we will schedule follow up or new interviews via Skype. The main part of the data collection will finish in early March, while the additional data collection will depend on the completeness of the first.

Once we have enough data to satisfy the scope of our thesis, we will analyse the data according to the theoretical framework we have based the paper on. Our data will provide us with information that expands the theory of Collaborative Networks and how to organize these. After finalizing the discussion and implication part, we will review the paper, improve details and hand it in during August. The timing is outlined in greater detail below.

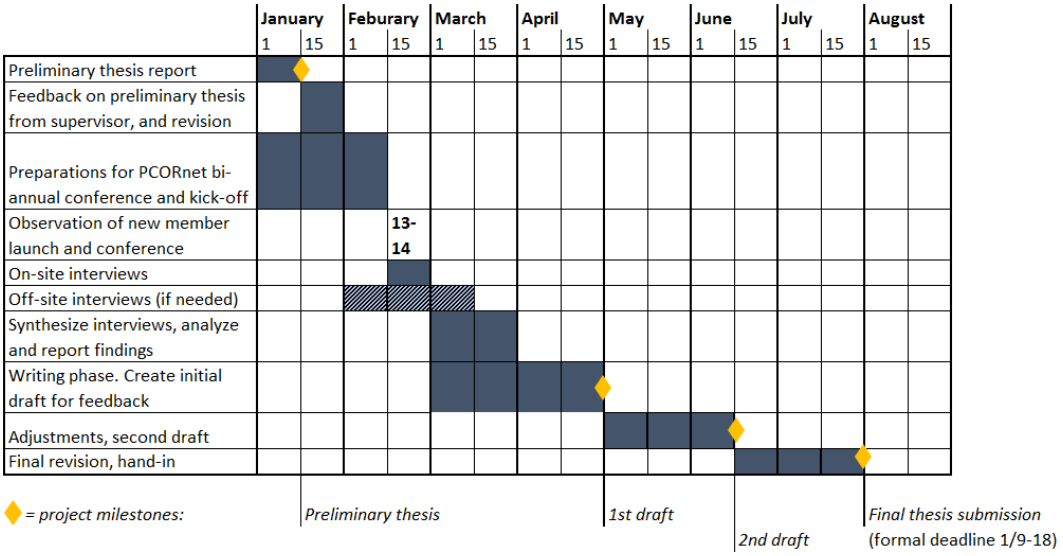


Figure 4: Project Management Plan, as of 15/1-2018

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Appendices

Appendix A: Interview Guide

The following appendix is our template for the interview process. The template may be further adjusted after submission of this preliminary thesis, but will be frozen before start of the interview process.

I) General introduction and retrieval of consent

<General brief introduction to our Master Thesis project, including our relation to the network.>

We would like to record and transcribe the interview if you approve. In the final transcript, which we will send to you when ready, your name and identity will be replaced by a code. Only we will have access to the code/name list. The recording will be deleted before the end of the project. We aim to use the professional interview software package NiVo for transcribing and structuring our data access.

<Start the recording if the terms above are agreed upon>

II) Interviewee introduction

- Could you tell us a bit about your background and your role is in [PCORInet/<*affiliated network*>]?
- Have you participated in other Collaborative Networks, similar to [PCORInet/<*affiliated network*>]?
    - If yes, could you please name these? Briefly, what are the main similarities and differences?

<Further follow up questions, if necessary, would mainly concern elaborations, as the questions are straightforward to answer, where the interviewee will tell freely about his or her role in the network for us to understand the interviewees profile.>

III) General about the network: Perception of roles and structure

- Could you tell us about the structure of the network – which parties does it consist of, and what are the role of each of these parties?
    - Were they all added at the same time, or is it a continuously ongoing process? <If yes:> How was this process.
- Do you see any difference in involvement based on when they joined the network?
    - Are there any other reasons for difference in involvement, if any? (E.g. resources, capacity, size or role)

- Who are in charge of facilitating the network, and what platforms are used in facilitating it?
    - <If not clarified through the answer> Is it mainly one party/actor facilitating, or is the responsibility of this divided among the network participants? If the latter, how is this responsibility distributed?
    - What are your main interfaces?
- Are you aware of why you are participating in [PCORInet/<*affiliated network*>]?
    - What are the challenges? What are the opportunities?
    - In your view, how do these affect the motivation/commitment to the network?
- How is the smoothness of interaction within the network?

IV) Network participation and activities

- What are the three main activities you participate in with relation to [PCORInet/<*affiliated network*>]?
    - What level of resource commitment does this imply (for your team, for your department)?
- What would you like to see more of? What would you like to see less of?
- Overall, are you satisfied with participating in the network?

V) Business model aspects

- Do you know how the value is distributed in the network?
- Do you know how the costs of running the network divided internally?
- Are there, to your knowledge, parties that would be beneficial to include in the network, but which are not available due to cost/value related issues?
- How compatible is the business model of the network with your primary institution/employer/hospital/firm?
- What is the main incentive to be a part of the network?

VI) Wrap-up

- Based on our discussion, are there any other aspects or points you would like to highlight?

<Thank you for your time and cooperation. We will hereby end the recording and supply you with the final transcript once finalized.>

<END>