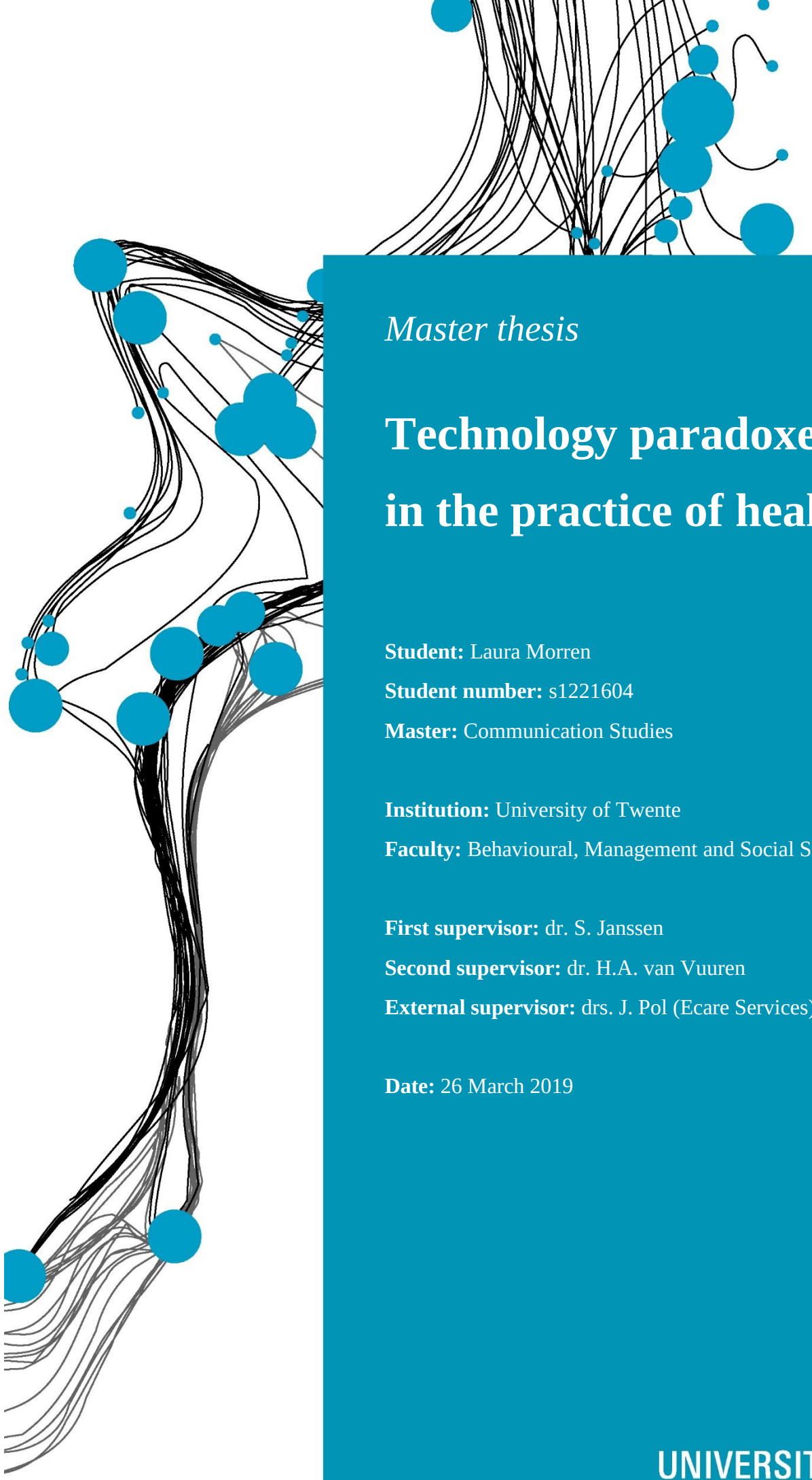

Master thesis

Technology paradoxes in the practice of healthcare

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Abstract

Background: The healthcare sector deals with increasing costs and demands. Information and communication technologies (ICT) could provide a solution, however, questions arise about how these technologies are used in daily work practices, where technology, users and institutional context interact. **Objective:** The objective of the study is to provide nuanced insights into how healthcare workers use ICT in daily work practices. The theory uses practice theory as a theoretical basis to enable a deeper understanding of how the enactment of technology-in-practice unfolds. Specifically, the study focuses on how technology facilities, institutional norms and users' interpretive schemes interact and, as a result, cause technology paradoxes that shape technology use in daily work practices. **Method:** The study's technology case was an electronic patient record for self-managed teams in extramural care. In the data collection phase, an explorative qualitative approach was used. The research methods of participant observations, semi-structured interviews and document analysis were combined to establish a rigorous qualitative research study. Nurses' use of the system was observed in daily work practices of 10 district nurses, interviews about the system use were conducted with 6 technology experts, 4 project employees and coaches and 12 district nurses, and document analysis was performed through access to team rapports and electronic dossiers. **Findings:** The findings show that nurses encounter technology paradoxes that shape their use in daily work practices. First, nurses draw on interpretive schemes that the system is important, but their norms state that it should be inferior to the care process. Second, nurses have norms of freedom to use the system in flexible ways, but they encounter team demands for uniformity. Third, based on contradicting norms, interpretive schemes and facilities, nurses balance between a workable, easy system, and a system that provides all options they need in their work. Fourth, in the system, nurses receive a norm of trust from the organization, but are confronted with demands for justification from the healthcare sector. Fifth, from their interpretive schemes, nurses feel connected to the organization, but find it difficult to preserve a healthy distance from work with a system that is always available. **Implications:** From a theoretical point of view, the study shows how technology paradoxes arise when users, technology and institutional context interact, and how these paradoxes play a role in technology use. Moreover, it shows how these interactions occur between and within facilities, norms and interpretive schemes. From a practical point of view, the study provides designers with advice on future system developments. Furthermore, it shows how designers, facilitators, organizations, governmental and educational organizations, family, friends and clients can support users in dealing with the paradoxes. **Conclusion:** The study shows that nurses establish and re-establish a structure of technology use based on technology paradoxes that they encounter. These paradoxes relate to facilities, norms and interpretive schemes that are opposed to each other within the same practices.

Keywords: ICT; healthcare; practice theory; technology paradoxes

Contents

List of Figures

List of Tables

List of abbreviations

- BIS: Buurtzorg Information System
- EPR: Electronic Patient Record
- HIT: Health Information Technology
- ICT: Information and Communication Technology
- IT: Information Technology

1. Introduction

The world's population is ageing rapidly (United Nations, 2015, 2017) and noncommunicable diseases form a great challenge (World Health Organization, 2017). As a result, the healthcare sector deals with increasing costs and demands for personnel (Kinsella & He, 2009; McPake & Mahal, 2017; While & Dewsbury, 2011). Information and communication technologies (ICT) could provide a solution to these problems. These technologies have the potential to improve the health of patients and the performance of healthcare workers, hereby enhancing quality of care and cost savings (Beeuwkes Buntin, Burke, Hoaglin, & Blumenthal, 2011; Gagnon et al., 2012). For example, efficiency of care, effectiveness of care, patient safety, and patient satisfaction could be improved with ICT (Beeuwkes Buntin et al., 2011; Boštjan, 2018; Sadoughi, Karami, Mousavi, & Karimi, 2017).

However, questions arise about the implementation and use of ICT in the daily work practices of healthcare workers (De Veer & Francke, 2009). For example, healthcare workers often do not use the technologies as intended by managers or designers, which could endanger the quality of care and safety of patients (Harrison, Koppel, & Bar-Lev, 2007; Leslie et al., 2017; Samuelsson & Berner, 2013). Several studies emphasize that the use of technology in daily work life is a complicated process that involves the technology, users and their work context (Feldman & Orlikowski, 2011; Feldman & Worline, 2016; Samuelsson & Berner, 2013). Scholars have called for more qualitative studies to gain in-depth understanding of how healthcare workers experience and use ICT in practice (Meißner & Schnepp, 2014; Stevenson, Nilsson, Petersson, & Johansson, 2010). This study responds to this call as it examines healthcare workers' use of ICT in daily work practices, and hereby considers the interplay of technology, user and institutional context.

The study uses the practice theory by Orlikowski (2000) as a theoretical basis to examine technology use. Practice theory, or practice lens, focuses on the daily practices of technology use (Feldman & Orlikowski, 2011; Nicolini, 2013). According to the theory, people's use of technology becomes structured through technology facilities, institutional norms, and users' interpretive schemes. This structure subsequently provides rules and resources that serve to structure future use as people interact with the technology in daily work practices (Orlikowski, 2000). The current study focuses on how the modalities of structure interact in daily work practices and how these interactions shape structures of technology use. Interestingly, the findings of this study show how facilities, norms and interpretive schemes can contradict and hereby cause technology paradoxes. In technology paradoxes, elements are interrelated yet contradictory (Schad, Lewis, Raisch, & Smith, 2016; Smith & Lewis, 2011). In this study, the technology paradoxes shape how technology is used in daily work practices.

Thus, the study aims to provide nuanced insights into how healthcare workers use ICT in daily work practices. Using practice theory as a theoretical basis enables a deeper understanding of how healthcare workers establish and re-establish a structure of their technology use. Specifically, the study focuses on how technology's facilities, norms and interpretive schemes interact and cause technology paradoxes that shape technology use. The research question is as follows: *how do healthcare workers use ICT in daily work practices?*

The healthcare software program Buurtzorg Information System (BIS) from software company Ecare is the technology case in this study. This software program is an electronic patient record that aims to support healthcare workers in providing client-focused care (Ecare, 2018). The study focuses on the use of BIS in Buurtzorg Nederland, a healthcare institution that provides extramural care through self-managed teams (De Blok & Pool, 2010). Technology use in extramural care provides an interesting context for the study. Extramural healthcare workers increasingly use technology in their work as new

developed technologies have become portable and mobile networks are able to support data transfers (Chodosh et al., 2005; Stoop, Heathfield, De Mul, & Berg, 2004). Even though the use of ICT in extramural care seems promising (Boštjan, 2018), there are many uncertainties about experiences and use in practice (Courtney-Pratt et al., 2012; Vilstrup, Madsen, Hansen, & Wind, 2017).

In the data collection phase, an explorative qualitative approach is used. The research methods of participant observations, semi-structured interviews and document analysis are combined to establish a rigorous qualitative research study (Yilmaz, 2013). Three groups of participants are involved, that represent the technology's designers, facilitators and users: 1) technology experts of Ecare, 2) project employees and coaches of Buurtzorg, and 3) district nurses of Buurtzorg who use BIS in their daily work. Nurses' use of the system is observed in daily work practices of district nurses, interviews about the system use are conducted with technology experts, project employees and coaches and district nurses, and document analysis is performed through access to team rapports and electronic dossiers.

The study has several implications for theory. First, the study shows how users establish and re-establish a structure of technology use based on technology paradoxes that they encounter when technology's facilities, norms and interpretive schemes interact. Most studies tend to overlook the complex interplay of technology, users and institutional context (Samuelsson & Berner, 2013). Second, the study shows that these paradoxes arise from interactions between and within these modalities of structure. Hereby, the findings show that the direction of separate modalities of structure on technology use is not always straightforward, as, for example, there may be opposing norms that co-exist. Last, the findings show that designers and facilitators play an active role in how users deal with the paradoxes.

The study also has implications for practice and policy. First, the study provides designers with more insight into nurses' experience and use of the system. Hereby, it could help them to anticipate otherwise unknown consequences of the implementation of new developments in the system (Harrison et al., 2007). For example, the findings show them that, even though new features make the system more complete, they could endanger the system's perceived usability and stability. Second, the study provides advice to organizations, governmental and educational institutions and nurses' family and friends on how they can provide support to the nurses in dealing with the paradoxes.

This thesis consists of five chapters. Chapter 2 describes the theoretical framework. The theoretical framework focuses on technology in healthcare, and practice theory. Chapter 3 provides the research design. In this chapter, the research approach, case study, participants, research methods, data collection and analysis are discussed. Chapter 4 provides an overview of the findings. Chapter 5 presents the study's implications, limitations and suggestions for future research, and conclusion.

2. Theoretical framework

This theoretical framework provides an overview of theory to establish a coherent understanding of the practice of ICT in healthcare. First, technology in healthcare is discussed. Second, technology use is explained through the basics of practice theory, and through technology use in healthcare practices.

2.1 Technology in healthcare

The World Health Organization (2000) defines the healthcare sector as "all organizations, people and institutions producing actions whose primary intent is to promote, restore or maintain health" (as cited in McKee, Figueras, & Saltman, 2012, p. 21). In the Netherlands, the core of the healthcare sector is formed by the healthcare providers of recovery and long-term or medical care (CBS, 2018). The sector encompasses healthcare equipment, supplies, providers and services, pharmaceuticals, and biotechnology and medical research (Thomson Reuters, 1999). Technological developments are of great importance for the healthcare sector, as "technology drives healthcare more than any other force" (Thimbleby, 2013, p. 160).

In recent years, great progress has been made in the development of healthcare technologies. These new technologies are expected to improve the quality of care and lower costs (Beeuwkes Buntin et al., 2011; Ross, Stevenson, Lau, & Murray, 2016). Examples of recently developed technologies are intelligent devices (Ahmed, Banaee, Rafael-Palou, & Loutfi, 2014), home diagnostics (Vashist, Schneider, & Luong, 2014), health 2.0 and telemedicine (Buccoliero, Bellio, Mazzola, & Solinas, 2017), and imaging (Correas et al., 2016; Duchatteau & Vink, 2011). The most promising and influential technological developments in healthcare relate to the use of ICT (Duchatteau & Vink, 2011; Hemmat, Ayatollahi, Maleki, & Saghafi, 2017). ICT includes all digital technologies that enable the electronic capture, processing, storage, and exchange of information (Gagnon et al., 2012). Some studies refer to ICT in healthcare as health information technology (HIT) and use these two terms interchangeably (Gentles, Lokker, & McKibbon, 2010). ICT can be used for a variety of functions, for example, "data gathering and analyses, monitoring and alerting (e.g., breathing monitors in premature infants), diagnosis and treatment at distances (e.g., teledermatology, telesurgery, or telepsychiatry), or communication" (Gentles et al., 2010, p. 85). The use of ICT in healthcare can reduce medical errors, lower costs and paperwork, increase efficiency and quality of healthcare, and empower healthcare workers and patients (Ehrenfeld & Cannesson, 2014). Hence, it is no surprise that information and communication technologies play an important role in the Dutch healthcare system (Schäfer et al., 2010).

In the meta-analysis of Beeuwkes Buntin et al. (2011), 92 percent of recent studies reached positive conclusions about the implementation of ICT in the healthcare sector. These studies were most positive about improved efficiency of care, effectiveness of care, patient safety and patient satisfaction. For example, mortality rates declined (Pollak & Lorch, 2007), fewer complications were involved (Amarasingham, Plantinga, Diener-West, Gaskin, & Powe, 2009) and costs decreased (Pérez, Winters, & Gajic, 2007). However, the implementation of ICT also involves negative consequences. For example, in some cases, ICT was associated with an increase in patient care errors (Spetz & Keane, 2009), difficulties in the workflow (Georgiou et al., 2007) and poor usability (Viitanen et al., 2011). Furthermore, the implementation of ICT in healthcare is considered to be complex as it deals with a diversity of healthcare providers (with different professional roles, knowledge, and experience), patients (with different personal characteristics, circumstances, and medications) and medical procedures and treatments (Fichman, Kohli, & Krishnan, 2011).

Healthcare workers and their institutions are suggested to play a great role in the implementation and use of ICT (Gagnon et al., 2012). For example, Spetz and Keane (2009) show that skepticism from healthcare workers could hinder a successful ICT implementation and endanger patient safety.

According to Koller, Adlassnig, Rappelsberger, and Blacky (2014, p. 403), user skepticism "can render even powerful ICT tools useless". However, most theories overlook this important interaction between technology and the people that use them in practice (Feldman & Orlikowski, 2011; Orlikowski, 2000).

Therefore, scholars have called for more studies on how nurses experience ICT at work, as they play a pivotal role in use (Meißner & Schnepp, 2014; Stevenson et al., 2010). Furthermore, nurses' organizational context could also contribute to technology use (Samuelsson & Berner, 2013). Next to human factors and institutional context, the practice itself is often ignored, even though the alignment of an ICT system with the nurses' workflow is essential for effective use of the technology (Choi, Choi, Bae, & Lee, 2011; Piscotty & Kalisch, 2014; Piscotty, Kalisch, & Gracey-Thomas, 2015). Therefore, this study uses the practice lens as a theoretical basis. This theory provides the opportunity to emphasize the practices in which technology, users and institutional context interact and together impact how technology is implemented and used (Orlikowski, 2000).

2.2 Technology use in practice

2.2.1 The theory of practice

"There's nothing so practical as a good theory" (Lewin, 1951, p. 169). The practice theory, or practice lens, emphasizes the importance of daily practices in the ongoing operations of organizations (Feldman & Orlikowski, 2011; Nicolini, 2013). Practices are often defined as organized patterns of different people's activities (Feldman & Worline, 2016; Schatzki, 2012). The theory focuses on how "everyday actions are consequential in producing the structural contours of social life" (Feldman & Orlikowski, 2011, p. 1241). Hereby, it is able to describe important features of the world as something that is routinely established and re-established in practice (Nicolini, 2013). The theory offers a new way of understanding and explaining social phenomena, as practicality is able to display novel or unexpected connections that provide a new set of implications for action (Feldman & Worline, 2016). Furthermore, as the focus of practice theory is on dynamics and relations, it forms an appropriate lens for examining the practice of healthcare workers (Bender & Feldman, 2015; Petrakaki, Cornford, & Klecun, 2010).

Orlikowski (2000) focuses on the study of technology as a practice. In her own words, she "extend(s) the structurational perspective on technology by proposing a practice-oriented understanding of the recursive interaction between people, technologies, and social action" (Orlikowski, 2000, p. 405). Prior structurational models claim that technology is developed through a social-political process that establishes structures (rules and resources) within the technology (see Orlikowski, 1992). However, Orlikowski (2000) has identified two main difficulties with these prior models. First, technologies do not become "stabilized" as people can redefine and adjust the meaning, properties and use of technology after its development (see also Feldman & Orlikowski, 2011; Samuelsson & Berner, 2013). Second, these prior structurational models assume that technologies "embody" structures. However, technology as an artefact does not constitute rules or resources, and therefore cannot embody structure itself (Orlikowski, 2000).

In the study of technology as a practice, Orlikowski (2000) endeavors to overcome these two difficulties by considering emerging rather than embodied structures. Instead of focusing on the technology and how people allocate its embodied structures, the main focus is on how human action create emergent structures through repeated interaction with the technology (see also Bender & Feldman, 2015; Feldman & Worline, 2016; Nicolini, 2013). As structures are established and re-established in repeating social practices, users can use technologies as intended by the designers or managers, but they can also circumvent these ways and use technologies differently, for example by ignoring certain properties of the technology, working around them or inventing new properties (Feldman & Orlikowski, 2011; Orlikowski, 2000; Samuelsson & Berner, 2013).

As people can use a technology in different ways, two aspects of technology are distinguished in practice theory: the technology as an artefact and the use of technology. The technology as an artefact refers to the material and symbolic properties that are combined in some socially recognizable form (e.g., hardware, software, or techniques). The use of technology, or technologies-in-practice, however, refers to what people actually do with technological artefacts in their practices (Orlikowski, 2000). How the use of technology unfolds in practice, is based on the structuration theory of Giddens (1984).

According to Giddens (1984), people recurrently establish and re-establish the rules and resources that structure their social action through the use of three modalities: facilities, norms and interpretive schemes. Orlikowski (2000) applies the same recurrent process to the practice of technology, as can be seen in Figure 1. When people use a technology, they use several facilities of the technological artefact (e.g., the hardware, software or techniques). These facilities may be provided by the technology's constituent materiality, by designers or by users through previous interactions with the technology. Next to facilities, people draw on norms as they use their knowledge and experiences of (prior) technology use within institutional contexts (e.g., work environment), and build on the socio-cultural protocols and etiquettes that are associated with these contexts (Orlikowski, 2000). Last, people draw on their interpretive schemes in their technology use. They use their skills, power, knowledge, assumptions, and expectations about the technology and how it is used, which is often based on their education, communication, and previous experiences (Larsson, 2012; Orlikowski & Gash, 1994).

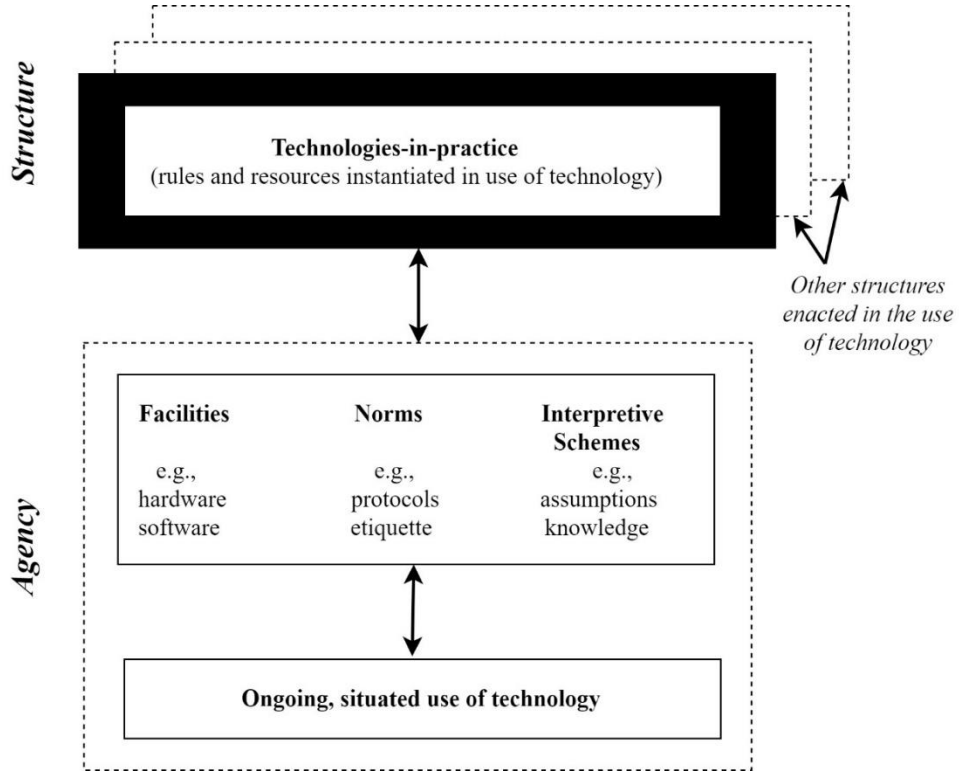

Figure 1. Enactment of technologies-in-practice (Orlikowski, 2000, p. 410)

Thus, according to Orlikowski (2000), people's use of technology becomes structured through the facilities, norms, and interpretive schemes. This structure subsequently provides rules and resources that serve to structure future use as people interact with the technology in their practices. Hence, by using the technology, the people themselves establish and re-establish a structure of technology use: the enactment of "technologies-in-practice" (Orlikowski, 2000, p. 410).

While facilities, norms and interpretive schemes together shape technology use, they have complex interactions that are often ignored. As a result, many studies "fail to capture how users negotiate, reframe, and localize the technologies-in-practice" (Samuelsson & Berner, 2013, p. 725).

Prior studies have shown that facilities, norms and interpretive schemes can mediate or reinforce each other (McPhee & Canary, 2014; Olesen & Myers, 1999; Orlikowski, 1992). For example, when users values norms of collaboration, they may add technology facilities to collaborate more extensively (Orlikowski, 2000). This could be explained by how the three elements are intrinsically interlinked or interwoven (Halperin & Backhouse, 2007; Whittington, 2015). However, interestingly, there may also be contradictions in the interplay between these modalities (see Jian, 2007; Olufowote, 2008). For example, when norms of decision quality and decision speed clash with each other (McPhee & Canary, 2014). Such contradictions or tensions could lead to unintended consequences (Jian, 2007). This study focuses on how technology facilities, norms and interpretive schemes interact, and how these interactions influence how structures of technology use are established and re-established.

2.2.2 Technology use in practice of healthcare

The enactment of technologies-in-practice is relevant in the context of healthcare. Governments and healthcare institutions have invested greatly in the implementation of healthcare ICT (see European Commission, 2014; Marschollek et al., 2007; Rijksoverheid, 2018; Zaman, Hossain, Ahammed, & Ahmed, 2017), but how these technologies are used in practice depends on a complex interaction between user, technology and institutional context (Samuelsson & Berner, 2013).

For instance, norms seem to play a great role in technology use in the healthcare sector. Normative expectations and rules from the social environment affect how and when nurses use ICT at work (Bautista, Rosenthal, Lin, & Theng, 2018; Sergeeva, Huysman, Soekijad, & van den Hooff, 2017). Furthermore, over time, nurses develop their own norms regarding the use of technological devices on the work floor. These norms relate to how, when and how long the device is used. For example, in the study of Sergeeva et al. (2017, pp. 1162-1163), mobile devices were mainly used during "the stable moments of operations, when nurses were done with preparing, supplying, and administering, when the surgery went smoothly, and when they could sit down and relax for some period of time". Norms or rules are not always followed in practice, however. Healthcare workers may deviate when they have previous experience or social circumstances that justify a different technology use (Samuelsson & Berner, 2013). For example, in the study of Samuelsson and Berner (2013, p. 731), ambulance crew would not use ICT in a scene of an emergency, because it felt "strange and inappropriate".

Hence, nurses also involve their interpretive schemes, such as their previous experiences, in how they use a technology. Prior studies have shown that when nurses have a limited knowledge or experience with the systems' functionality, they develop workarounds in the technology use (Boudreau & Robey, 2005; Debono et al., 2013). For example, nurses may use old technology instead of the prescribed technology, they may use the prescribed technology in a non-prescribed matter, or they may create another personal information system (Alter, 2014). As nurses daily have to respond to the complexity of care with systems that demand standardization, they are often referred to as "masters of workaround" (Debono et al., 2013, p. 176). Next to workarounds, a lack of technology experience or knowledge could also lead to limited use or even non-use of a technology (Hart, 2008; Nkosi, Asah, & Pillay, 2011). These studies show that nurses have often found their own way to use a technology.

Interestingly, technology facilities are not always the same in practice. Healthcare workers are sometimes able to change technology's facilities to prevent or overcome problems in technology use. For example, in the study of Barrett, Oborn, Orlikowski, and Yates (2012), pharmacists and technicians made adjustments to the facilities of their technology at work: a pharmaceutical-dispensing robot. They

made sure that the robot could “talk back” to them and give an indication of the availability of items. The adjustments changed their own use of the technology, and it also influenced the technology use of other healthcare workers who were not involved in these adjustments (Barrett et al., 2012).

It appears that groups of healthcare specialists deal with technology in different ways, as their practices differ. To illustrate, Oborn, Barrett, and Davidson (2011) show that surgeons, oncologists, pathologists, radiologists, and nurse specialists adapt the use of a new electronic patient record (EPR) to their diverse specialist practices. In the study, each group of specialists adapted the EPR use with other elements of their practices, such as the institutional histories, tools and knowledge. For example, the radiologists, who were already used to incorporating technology into their patient assessments, enacted more extensive use of the system than other specialists (Oborn et al., 2011). Comparable, in the study of Barrett et al. (2012), specialists within a pharmacy used the same technology in different ways. Pharmacists, technicians, and assistants “tuned” the use of the new pharmaceutical-dispensing robot to their own plans and practices at work (Barrett et al., 2012). Hence, these studies show that practices, where technology, user and context come together, play an important role in technology use.

3. Research design and methods

This chapter describes the study's research design and methods. It focuses on the study's research approach, case study and participants, research methods, procedures and analysis.

3.1 Research approach

The research goal is to provide nuanced insights into healthcare workers' use of ICT in their daily work practices, and to hereby consider the interactions of facilities, norms and interpretive schemes. An explorative qualitative approach fit the research goal, as this approach provides the opportunity to go into depth about technology use in the healthcare sector (Polit & Beck, 2010; Vaismoradi, Turunen, & Bondas, 2013). Studies that use a qualitative approach are able to explore micro dynamics that are of great relevance for the understanding of practice (De Souza Bispo, 2015; Feldman & Orlikowski, 2011). Quantitative measures, in contrast, may not be adequate to explore the practice of ICT in the healthcare sector (Meißner & Schnepp, 2014; Urquhart, Currell, Grant, & Hardiker, 2009).

A rigorous qualitative research study could be established with a triangulation of observations, interviews and document analysis (Yilmaz, 2013). Therefore, this study combined these three research methods in its explorative qualitative approach.

3.2 Case study and participants

The study focused on the healthcare software program from Ecare. Ecare is a middle-sized software company from Enschede that develops innovative software for the healthcare sector. Their software program BIS is a form of EPR that aims to support healthcare workers in providing client-focused care (Ecare, 2018). The program helps healthcare workers to determine the need for care, prepare a care plan, organize an intervention planning, register delivered care and evaluate care (Ecare, 2017). Within Ecare, BIS is also referred to as Puur or Clientcompas. BIS formed the technology case in this study.

3.2.1 Case study: Ecare and Buurtzorg

Software company Ecare was established in 2007 by the founders of Buurtzorg Nederland. Buurtzorg is a healthcare institution that focuses on extramural care, created as "an alternative to existing home care" (Nandram, 2015, p. 12). In the Netherlands, from 1990, the quality of care had become fragmented and ineffective due to reorganizations and changes of approach in healthcare. Nurses' work roles changed over the years as their autonomy reduced and economic principles were considered more important than high-quality care (Nandram, 2015; Nandram & Koster, 2014). In 2006, Jos de Blok and colleagues founded a new homecare institution, Buurtzorg, to refocus on the primary process where "the main objective was serving the patient in the best possible way" (Nandram, 2015, p. 13). They aimed to reorganize healthcare practices by increasing healthcare workers' autonomy through self-managed teams. Healthcare workers were given back the freedom to be craftsmen and provide high-quality care. In contrast, overheads and back office functions were kept small to prevent unnecessary costs. Bureaucracy was reduced to ensure that healthcare workers would be able to spend most of their time on client care (Kreitzer, Monsen, Nandram, & De Blok, 2015; Nandram & Koster, 2014).

The use of ICT has always been considered to be an important part of Buurtzorg's model (Gray, Sarnak, & Burgers, 2015; Monsen, 2013; Nandram & Koster, 2014). However, in the start-up phase of Buurtzorg, there was no software available that fit the Buurtzorg vision as all healthcare software programs were designed to increase bureaucracy. Therefore, the founders started a new ICT company that was focused on and capable of working according to their organizing principle: Ecare (Hulsebos, 2017; Nandram, 2015). Nowadays, Ecare is still responsible for the design, implementation and maintenance of Buurtzorg's ICT. The software's most important values are as follows:

- The system should put the relationship between the client and the professional central;

- Control mechanisms should be limited and should be used for monitoring and benchmarking rather than control;
- Excessive bureaucracy must be avoided, as it could threaten healthcare workers' freedom and eliminate unnecessary tasks;
- Healthcare workers must be able to share experiences and information easily with their team, among teams, and with the back-office (Nandram & Koster, 2014).

These values have translated into an EPR called BIS, that supports Buurtzorg's nurses in their daily work practices and in their coordination with colleagues (Kreitzer et al., 2015). The system is able to support nurses' self-management, networking and communication (Monsen, 2013). To illustrate, BIS enables "online scheduling, documentation of nursing assessments and services, and billing, as well as the sharing of information within and across teams" (Gray et al., 2015, p. 3). During this study, an estimated 9.960 Buurtzorg nurses worked with the system, divided over 900 teams in the Netherlands, providing extramural care to 30.500 clients.

Ecare's software BIS formed an interesting case for this study, because it is used in nurses' daily work practices and the company has a clear vision regarding the use. In this study, the use of the system was analyzed across six Buurtzorg teams in the eastern region of the Netherlands.

3.2.2 Participant selection

Participants were selected through the homogenous convenience sampling method. The homogenous convenience sampling method refers to selecting participants based on their qualities or criteria (Etikan, Musa, & Alkassim, 2016; Palinkas et al., 2015) and based on their availability or accessibility (Bornstein, Jager, & Putnick, 2013; Jager, Putnick, & Bornstein, 2017). Convenience sampling fits the research, because the researcher had only limited resources, time and workforce (Etikan et al., 2016). Homogenous convenience sampling is considered to be a positive alternative to other forms of convenience sampling, because it provides clearer and narrower generalizations (Jager et al., 2017).

The study selected participants from the three main groups involved in the use of BIS: 1) technology experts of Ecare, 2) project employees and coaches of Buurtzorg, and 3) district nurses of Buurtzorg. These groups represent the three parties that are usually involved in the implementation of ICT in healthcare: designers, managers and users (see Harrison et al., 2007; Leslie et al., 2017; Samuelsson & Berner, 2013). Because Buurtzorg does not employ managers, but instead hires project employees and coaches to facilitate and support the self-managed teams (Kreitzer et al., 2015), this study involves facilitators instead of managers. Participants had to fulfill several selection criteria to be invited.

Designers (technology experts) – Technology experts from Ecare represent the group of designers. In this study, technology experts had to be involved in the development, design and implementation of software program BIS. They had to be Dutch, in the age of 18-65 years old and work at least part-time at Ecare. To assure that they would have in-depth knowledge about the technology, they had to have at least 1-year work experience at Ecare.

Facilitators (project employees and coaches) - Project employees and coaches of Buurtzorg represent the group of facilitators. They support and advise the self-managed teams, also regarding the use of BIS (De Blok & Pool, 2010). Project employees and coaches in this study had to be (partly) involved in the implementation and use of BIS across teams. For example, they could be involved in trainings events or give advice to teams regarding the use of BIS. Like the designers, they had to be Dutch and in the age of 18-65 years old. They had to work at least part-time at Buurtzorg and be located in the eastern region of the Netherlands. Another demand was that they had to have at least 1-year work experience at Buurtzorg, to assure that they would have in-depth knowledge of the practices within the organization.

Users (district nurses) – District nurses represent the group of users. There are different types of district nurses based on the health education programs they have followed: nursing aides, licensed vocational nurses and registered nurses. Nursing aides and licensed vocational nurses have followed separate healthcare studies at a secondary vocational education and registered nurses have finished their healthcare degree at a higher professional education. Their tasks in the daily job are comparable as Buurtzorg makes no strict distinction between them, even though in other healthcare institutions registered nurses are granted more autonomy and complicated tasks compared to other nurses (De Blok & Pool, 2010). In this study, all three types of nurses were to be involved as they all worked with the system. Furthermore, they also had to be Dutch, in the age of 18-65 years old and work at least part-time at a Buurtzorg team located in the eastern region of the Netherlands. Another demand is that they had to have at least 1-year work experience at Buurtzorg, to assure that they would have in-depth knowledge of the practices within the organization. They had to have at least 1-year work experience with BIS, to assure they would have in-depth knowledge about the technology and its use.

An overview of all three groups can be found in Figure 2.

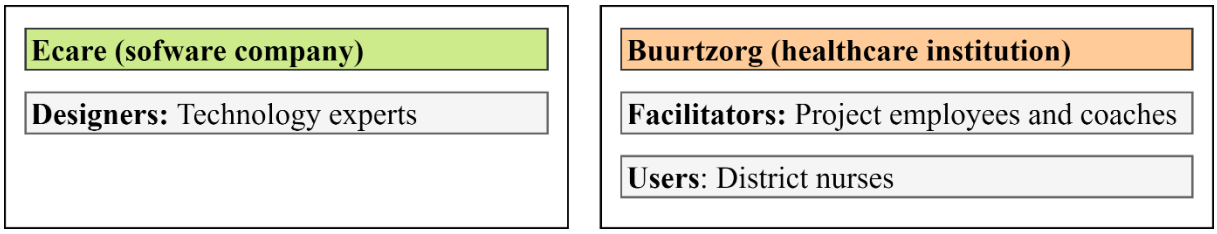

Figure 2. Overview designers, facilitators and users

The sample size was dependent upon the saturation principle, to ensure depth and breadth of information (Bowen, 2008; O'Reilly & Parker, 2013). For practical reasons, a first sample size was estimated in consultation with Ecare and Buurtzorg. This first sample size consisted of six Ecare designers, four Buurtzorg facilitators and 10 Buurtzorg users from five teams. The designers, facilitators and users were selected in consultation with Ecare and Buurtzorg based on their fit with the envisioned participant groups. Six designers, four facilitators and 18 teams were approached, from which six designers, four facilitators and six teams agreed to participate. From the six teams, five teams agreed to participate in interviews and observations and one team only participated in interviews. As saturation was achieved after this first data collection, no more participants were collected.

3.2.3 Participants

The designers, facilitators and users that agreed to participate are discussed per group. An overview of all participants can be found in Table 1.

Table 1. *Overview participants*

Participant	Pseudonym	Team	Age	Gender	Position at Ecare/Buurtzorg	Experience at Ecare/Buurtzorg
Designer 1	-	-	31	Female	Product strategist	3 years
Designer 2	-	-	26	Male	Product owner	4 years
Designer 3	-	-	31	Female	Manager operations	3 years
Designer 4	-	-	57	Male	Advisor	7 years
Designer 5	-	-	46	Female	Advisor	4 years
Designer 6	-	-	36	Female	Advisor	4 years
Facilitator 1	-	-	49	Female	Project employee	5 years
Facilitator 2	-	-	50	Male	Founder	12 years

Facilitator 3	-	-	34	Female	Project employee	11 years
Facilitator 4	-	-	51	Male	Regional coach	8 years
User 1	Amy	1	29	Female	Registered nurse	7 years
User 2	Bernice	2	39	Female	Registered nurse	3 years
User 3	Cynthia	1	31	Female	Registered nurse	1 year
User 4	Daphne	3	53	Female	Licensed vocational nurse	5 years
User 5	Esther	3	37	Female	Licensed vocational nurse	1 year
User 6	Francine	2	54	Female	Registered nurse	7 years
User 7	Gwen	4	39	Female	Nursing aide	1 year
User 8	Heidi	4	46	Female	Nursing aide	4 years
User 9	Iris	5	44	Female	Nursing aide	4 years
User 10	Julia	5	42	Female	Licensed vocational nurse	5 years
User 11	-	6	26	Female	Registered nurse	1 year
User 12	-	6	50	Female	Registered nurse	5 years

Designers (technology experts) – Six designers participated in the study. They were involved in the development, design and implementation of software program BIS. Within Ecare, they had different positions: three technology experts were advisors, one was product owner, one was product strategist and one was manager of operations. Four designers were female and two were male. They were aged 26 to 57 and the average age was 37 years. They all worked at Ecare for at least 1 year.

Facilitators (project employees and coaches) – Four facilitators participated in the study. They supported and advised the self-managed teams, also regarding the use of BIS. Within Buurtzorg, they had different positions: two were project employees, one was founder and one was a regional coach. Two facilitators were male and two were female. They were aged 34 to 51 and the average age was 46 years. They all worked at Buurtzorg for at least 1 year and were located in the eastern region of the Netherlands.

Users (district nurses) – Twelve users participated in the study. They worked at a Buurtzorg location in the eastern region of the Netherlands and used BIS in their daily work. The group consisted of six registered nurses, three licensed vocational nurses and three nursing aides. The 12 users worked at six different teams in the same region. All users were female. This is no surprise, as male nurses are relatively scarce in extramural care. Specifically, 1 in 7 nurses is male and only 10% of these male nurses work in extramural care (CBS, 2017). The users in this study were aged 26 to 54 and the average age was 40 years. They all worked at Buurtzorg for at least 1 year and had at least 1 year of experience with BIS. Users 1 through 10 participated in interviews and observations, users 11 and 12 only participated in interviews. The users that participated in observations were given a pseudonym name in alphabetic order.

3.3 Research methods

The study used a combination of participant observations, interviews and document analysis. Furthermore, demographic information was collected. The methods are discussed in more details below.

3.3.1 Participant observations

In participant observations, the researcher joins the study population in the organizational setting to record actions, interactions or events (Ritchie & Lewis, 2003). In this study, nurses and their use of technology BIS in practice were observed. Hence, the researcher joined nurses at work to observe how BIS was used in practice. Furthermore, the researcher observed which facilities, norms and interpretive schemes played a role in the use. For the observations, a semi-structured observation list was used to

help the researcher focus on the most relevant aspects of the practice (Harinck & Harinck, 2009). This observation list can be found in Appendix A.

The methodology of observations provides the opportunity to study practices, as it focuses on how people and actions are organized and relate to each other, and how processes unfold and patterns are created (Mackellar, 2013). It enables the observation of theory-in-action (Petty, Thomson, & Stew, 2012). Furthermore, it is considered to be a valuable research method to study practice theory (Gherardi, 2012) and has already been successfully applied in prior healthcare studies (e.g., Jones, 2014; Weigl, Müller, Vincent, Angerer, & Sevdalis, 2012). In this study, the researcher took an observer-as-participant role in which she only participated to a limited extent (see Bryman & Bell, 2015), as more active participation would have required an healthcare education. Zooming in and zooming out is considered to be the most promising form of observation (De Souza Bispo, 2015), where "a study begins as an in-depth inquiry in one location (zooming in) and then expends to other locations by following emerging relations (zooming out)" (Cecez-Kecmanovic, Galliers, Henfridsson, Newell, & Vidgen, 2014, p. 521). Therefore, five different teams of Buurtzorg were involved in the observations. During the participant observations, informal conversational interviews were used to ask for clarification of practices if necessary. These interviews more often occur as a part of participant observations (Turner, 2010).

3.3.2 Interviews

Semi-structured, individual face-to-face interviews were used to complement the findings from the observations. Interviews are often used in combination with participant observation (Gherardi, 2012; Jones, 2014), because they are able to provide supplementary information that is not accessible through observations (De Souza Bispo, 2015). Furthermore, semi-structured interviews are considered to be a popular and valuable research method (Kallio, Pietilä, Johnson, & Kangasniemi, 2016), especially for the healthcare sector (Gill, Stewart, Treasure, & Chadwick, 2008). In this study, designers, facilitators and users were interviewed about technology BIS and its use in practice. Furthermore, the researcher asked questions about the technology's facilities, norms and interpretive schemes. For the interviews, an interview guide was developed to provide guidance, but it was not strictly followed to enable follow-up questions (Kallio et al., 2016). Hereby, the semi-structured form of the interview provided the opportunity to go into depth about the research topics (Bryman & Bell, 2015; Downs & Adrian, 2012). The interview guide consisted of questions related to the practice theory (Orlikowski, 2000). The interview guides for the interviews can be found in Appendix B.

3.3.3 Document analysis

Document analysis provides a systematic procedure to review or evaluate printed and electronic material (Bowen, 2009). In this study, the nurses' use of BIS was analyzed. In BIS, all use of the system is registered in team rapports and electronic patient records. For example, the system registers which steps in a care plan are marked by the nurses and which reports they have created. An observation of the use of BIS through access to the system could provide more detailed information about how the nurses used BIS in practice. Such a form of document analysis is often used in combination with observations and interviews to establish triangulation (Bowen, 2009; Yilmaz, 2013).

3.3.4 Collection of demographic information

Demographic information about the participants was collected to explain potential differences between participants of this study or other studies. The participants were asked about their gender, age, current profession (position and experience) and experience in the healthcare sector (position and experience). The demographic information collection forms can be found in Appendix C.

3.4 Data collection

The interview sessions were recorded with an audio recorder. The observation sessions were not recorded with a video or audio recorder to preserve the clients' privacy (Mackenzie & Xiao, 2003; Parry, Pino, Faull, & Feathers, 2016). Instead, the researcher took fieldnotes to report her observations. In the collection of data, research protocols were used to ensure that all sessions would be comparable. The protocols relate to the preparation of the sessions, to the setup of participant observation and interview sessions, and to the document analysis.

3.4.1 Procedures in the preparation of the sessions

The participant was individually approached by the researcher, or via colleagues from Ecare or Buurtzorg. He or she received a phone call or e-mail to inform him or her about the research topic and the expected duration of the session. The participant was ensured that his or her personal anonymity and privacy would be respected in the research process to satisfy research ethics and prevent social bias (Bryman & Bell, 2015). If the participant agreed to participate, the session was planned. All sessions were completed in the period between July and October 2018.

3.4.2 Procedures in participant observation sessions

The researcher introduced herself to the participant and explained the research goal. She discussed mutual expectations regarding the observation session. The participant was assured that he or she would not be judged on personal expertise or actions, and that the researcher would only observe practices and would not be able to assist, as she had not followed a health education. Furthermore, the researcher described that she would retrieve herself in situations that may be privacy-sensitive or uncomfortable for the client (e.g., showering and washing). After this discussion, the researcher explained that the session would be processed anonymously, and the participant was given the opportunity to ask questions before the session started. Subsequently, the researcher asked for written permission to use the data for the research. The participant was given an information form about the study and an informed consent form to sign before the start of the session. These forms can be found in Appendices D and E.

During the session, the researcher paid close attention to the participant's use of the technology. She kept the theoretical framework of the study in mind during the observation. When there was time (e.g., during lunch breaks or in the car), the researcher took notes in a small notebook. In the notebook, there was an observation list that helped the researcher to structure the findings and to remember all important concepts to observe from the theoretical framework, while it still provided room for new or unexpected observations. Because researchers are selective in what they observe, remember and write down in field work (Baarda, De Goede, & Teunissen, 2013), the researcher wrote down and analyzed the sessions as soon as possible, to lower the dangers of selective memory.

The researcher used no audio- or videorecorder during the observations as this could disturb the practices and form a great danger to privacy, especially in the delicate context of healthcare. After the session, the researcher thanked the participant for her contribution and gave her a small present (chocolates) to express gratitude. After that, the study's use of practice theory was explained and discussed. The duration of the observation sessions was one work shift per participant. This could be a morning shift, or a morning and afternoon shift combined.

Clients that were involved in the observation sessions were also informed about the research. In consultation with Buurtzorg, the clients were informed by the district nurses during a personal visit prior to the observations. The district nurses explained the research goal and procedures. They emphasized that the sessions would be processed anonymously and that the client could ask questions if needed. Subsequently, the nurses asked for permission to use the data for the research. In case the client did not give approval for the session, his or her decision was respected, and the session did not take place.

3.4.3 Procedures in interview sessions

The interview sessions took place at a location that was convenient and comfortable for the participant. The researcher welcomed the participant, introduced herself and the research goal. Furthermore, she explained the structure and expected duration of the session. The researcher described that the session would be processed anonymously and the participant was given the opportunity to ask questions before the session started. After that, the researcher asked for written permission to use the data for the research. The participant was given an information form about the study and an informed consent form to sign before the start of the interview. These forms can be found in Appendices D and E. When the session started, the researcher turned on the audio recorder to record the session. In the session, the researcher followed the structured question list, but sometimes deviated from the list to ask further questions to retrieve in-depth insights. The researcher kept the theoretical framework of practice theory in mind during the interview. At last, the participant filled in the form with demographic information. After the session, the researcher thanked the participant for his or her contribution and gave him or her a small present (chocolates) to express gratitude. After that, the study's use of practice theory was explained and discussed. The duration of the interview sessions was between 20 and 60 minutes.

3.4.4 Procedures in document analysis

The clients were asked for permission to provide the researcher access to the documents, as they are the official owners of the electronic dossiers. They were informed about the document analysis by the district nurses during a personal visit prior to the observations. The district nurses explained that the researcher would use the access to the system to provide more insight into how the technology was used and that the researcher would not focus on the content of the dossier (e.g., personal information, diagnoses or treatments). They emphasized that the researcher signed a nondisclosure agreement at Ecare that ensured all data would be processed anonymously. Subsequently, the nurses asked for permission to access the dossiers for the research. In case the client did not give approval for the session, his or her decision was respected, and no access was granted to his or her dossier.

3.5 Data analysis

After the sessions, the interviews and fieldnotes from the observations were transcribed. These transcriptions were imported into Atlas.ti to code and analyze the data. The data analysis followed an iterative pattern of comparing data to theory to gain insights into the use of the technology. The practice theory formed the theoretical basis for this analysis.

First, open codes were identified in the data that reflected facilities, norms, interpretive schemes or technology use. For example, codes of "frameworks Buurtzorg" (norm) and "technical boundaries system" (facility) were found. Similar open codes were categorized through axial coding. To illustrate, the open codes of "freedom in how to organize team" (norm) and "freedom in how to use the system" (norm) were both categorized under the axial code "freedom in way of working" (norm). To illustrate, the following quote fit the axial code of "freedom in way of working" (norm): *"We have all freedom. I have never been corrected." (User 10, interview).*

Through a network analysis, the researcher looked for possible connections between the axial codes to see how these could relate to each other (Baarda et al., 2013). Interestingly, the codes seemed to both relate and contradict each other. In earlier studies, scholars have found comparable relating and contradicting aspects of technology use. They refer to this as a "technology paradox". For example, scholars have found paradoxes in productivity (Hajli, Sims, & Ibragimov, 2015; Van Ark, 2016), connectivity (Fonner & Roloff, 2012; Leonardi, Treem, & Jackson, 2010), and privacy (Kokolakis, 2017; Pentina, Zhang, Bata, & Chen, 2016). A paradox is defined as "contradictory yet interrelated elements that exist simultaneously and persist over time" (Smith & Lewis, 2011, p. 386). The core

characteristics of a paradox are: 1) elements that seem opposite, but irrational when appearing simultaneously, and 2) interdependence or complicated links between the elements (Lewis, 2000; Schad et al., 2016).

In this study, five paradoxes were found. One of the paradoxes is flexibility versus uniformity, which can be found in Figure 3. This paradox focuses on how even though the users have norms of freedom to use the system in flexible ways, uniform use may be more convenient in teamwork. As one user said: *"Everybody uses it in their own way and that is difficult." (User 1, interview).* The codebook is structured according to the five paradoxes. The paradoxes are further discussed in the findings chapter.

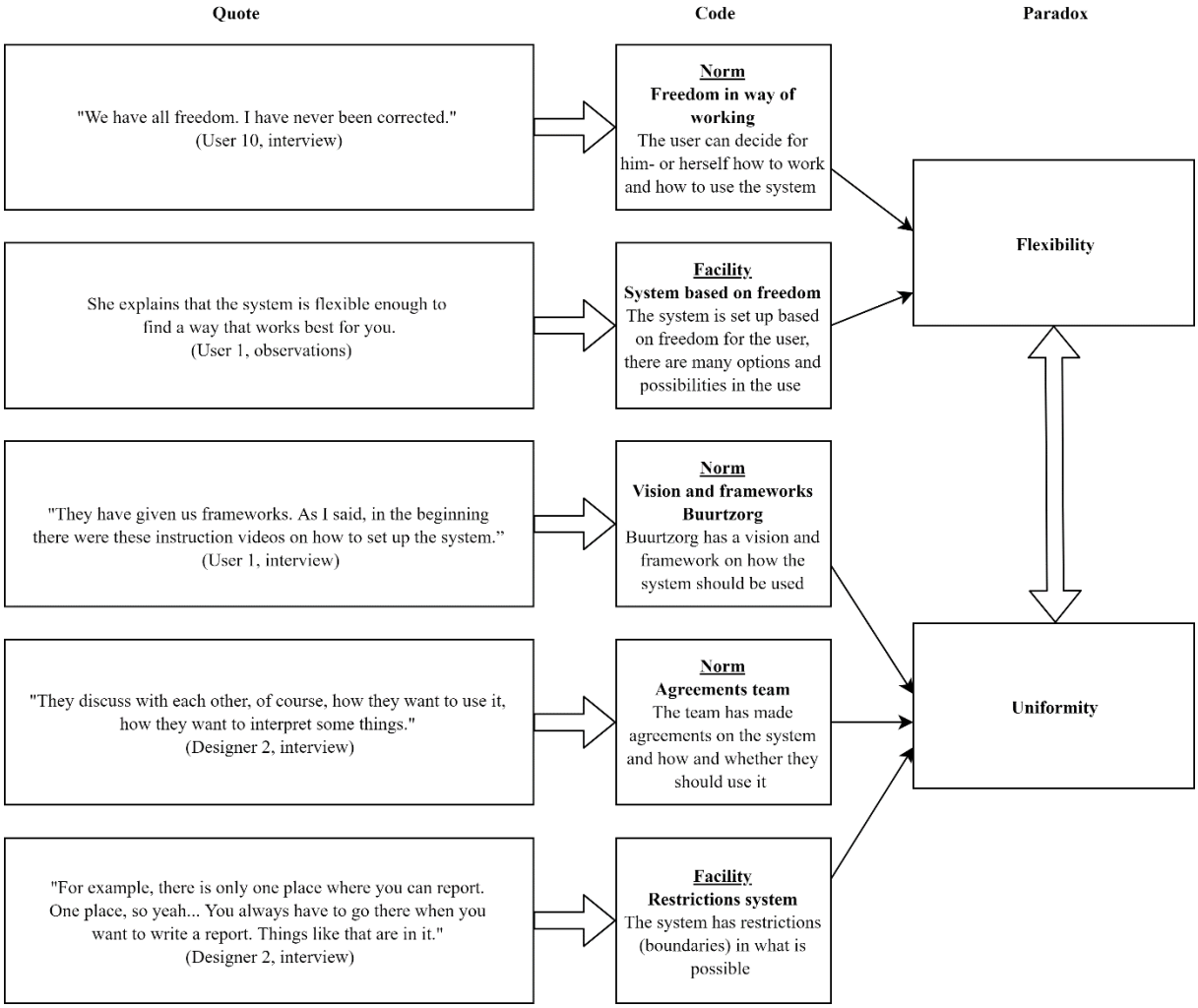

Figure 3. Paradox flexibility versus uniformity

To ascertain reliability of the coding, intercoder reliability of the codebooks was measured using Cohen's Kappa (Cohen, 1960, 1968). First, the codebook was discussed with a second coder who was not involved in the study. In this discussion, the title and description of two codes were refined. Furthermore, the researcher discussed with the second coder how the codes represented facilities, norms, interpretive schemes or technology use.

After the second coder agreed on the codebook, the researcher and second coder conducted a data analysis independent from each other. Approximately 10% of all interview and observation transcripts was used, the pages were selected randomly. In preparation of the sessions, the researcher selected meaningful units of analysis to code that consisted of one single or multiple sentences. In total, three

coding sessions took place, in which respectively 143, 126 and 77 text elements were coded. Differences in coding were compared and discussed. After the first session, the descriptions of four codes were refined and no further adjustments were made. The intercoder reliability was measured after each coding session. The average weighted Cohen's Kappa score was .78. As the average score was above the threshold of .7, the intercoder reliability was sufficient (DeCuir-Gunby, Marshall, & McCulloch, 2011; Landis & Koch, 1977). The Cohen's Kappa scores per paradox are presented in Table 2. Paradox 5 is the only paradox that has a Cohen's Kappa lower than .7, which could be explained by the relatedness of the different codes. When participants talked about this paradox, they often discussed different codes from this paradox in the same sentences, which made it more difficult to assign codes. For example, when they talked about how the system is always available, they also talked about how they would use the system outside work hours. Furthermore, the intercoder agreement on this paradox may also be relatively low because only 37 text elements were coded.

Table 2. *Cohen's Kappa*

Codebook	**Codes**	**Cohen's Kappa**
Paradox 1. Caregiving versus system use	103	.79
Paradox 2. Flexibility versus uniformity	61	.76
Paradox 3. Complete versus simple	95	.78
Paradox 4. Trust versus justification	50	.86
Paradox 5. Connection versus distance	37	.69

4. Findings

This chapter presents the main findings. First, the paradox of caregiving versus system use is discussed. Second, the paradox of flexibility versus uniformity is presented, followed by the paradox of complete versus simple. Last, the paradoxes of trust versus justification and connection versus distance are elaborated upon. The findings are illustrated by quotes from the interviews or segments from the observations and the document analysis.

4.1 Paradox 1. Caregiving versus system use

Since the introduction of the system of BIS, nurses encounter a paradox of caregiving versus system use. This paradox revolves around the role and involvement of the system in their daily work practices, where the system is important and inferior at the same time.

From their interpretive schemes, many nurses feel that the system is an important aspect of their daily practices. They describe it as the guide that helps them through the day, they experience that it has all information available and they feel secure when they have the system with them. One user said: *"It is a little piece of security." (User 4, interview).* As a result, they use the system often. They feel a close connection to the technology, which often developed over time, and they describe the system as their friend or partner in work. As one user described: "*The system and I were not friends from the start. It had to grow." (User 3, interview*).

Most nurses admit that they could not work without the system as they have become dependent on it. As one nurse put it: *"Now that I work with the system, it has become so important. [...] I could not work without it. I am serious, I would fool myself." (User 6, interview).* They could not imagine a workday without it and are easily stressed out when it is not accessible. For example, one user described: *"It is a matter of life or death. If it does not work, I have no access to anything." (User 12, interview).* During observations, clients were aware of the importance of the system, as shown in the following segment:

We join the client in the kitchen for coffee. She is curious about my research and we start talking about the system. […] She smiles and remembers the time that a nurse accidentally forgot her tablet. The nurse immediately rushed back home to get the tablet, because she claimed that she would not be able to work without it. The client smiles and says: "It must be quite handy, that thing." (User 2, observations).

However, use of the system is also described as an inferior aspect of nurses' daily work practices. The norm at Buurtzorg is that nurses should not spend too much time on the system, as caregiving is the most central part of their job. One facilitator described it as follows: *"What is central? That process of caregiving. […] If I have to choose today: everything is perfect with the digital system, but that gives less time for the client, I say no." (Facilitator 1, interview).* Some facilitators and users emphasize how the system is nothing more than a support tool for the caregiving process. As one user put it: "*It should not be a sacred object, it is just a tool." (User 3, interview).* Even the designers, who are involved with the implementation of the technology, emphasize that the system should play a minor role in daily practices. They would prefer nurses to focus on the provision of care. As one designer said: *"I would prefer them to use it as little as possible, so they have enough time and space to do their work." (Designer 5, interview).*

Designers and facilitators fear that extensive system use may overtake the care moments and interfere with the personal moments between nurses and their clients. As one designer said: *"What is most important is that they deliver high-quality care to the client. It would not be correct if they use the system non-stop when they are with a client. That is also not pleasant for the client." (Designer 1, interview).* Most nurses also recognize these problems with system use, as one user described: *"The moment of care to me is the contact with the client and the care that you provide. […] I am visiting the client and I am*

here for the client. I find it impersonal to be looking at a tablet screen." (User 2, interview). These quotes show that system use could interfere with the personal caregiving of nurses and would not be "pleasant" towards the client, hereby endangering the quality of care.

Hence, the norm is that the system is an inferior aspect of nurses' work daily work practices, as caregiving is most important. However, nurses have built a personal connection and need for the system. As a result, the nurses struggle to find an appropriate role and involvement of the system in every moment of care. They aim to put caregiving central, but also feel like they need the system to provide that care. This paradox of caregiving versus system use can be found in Figure 4.

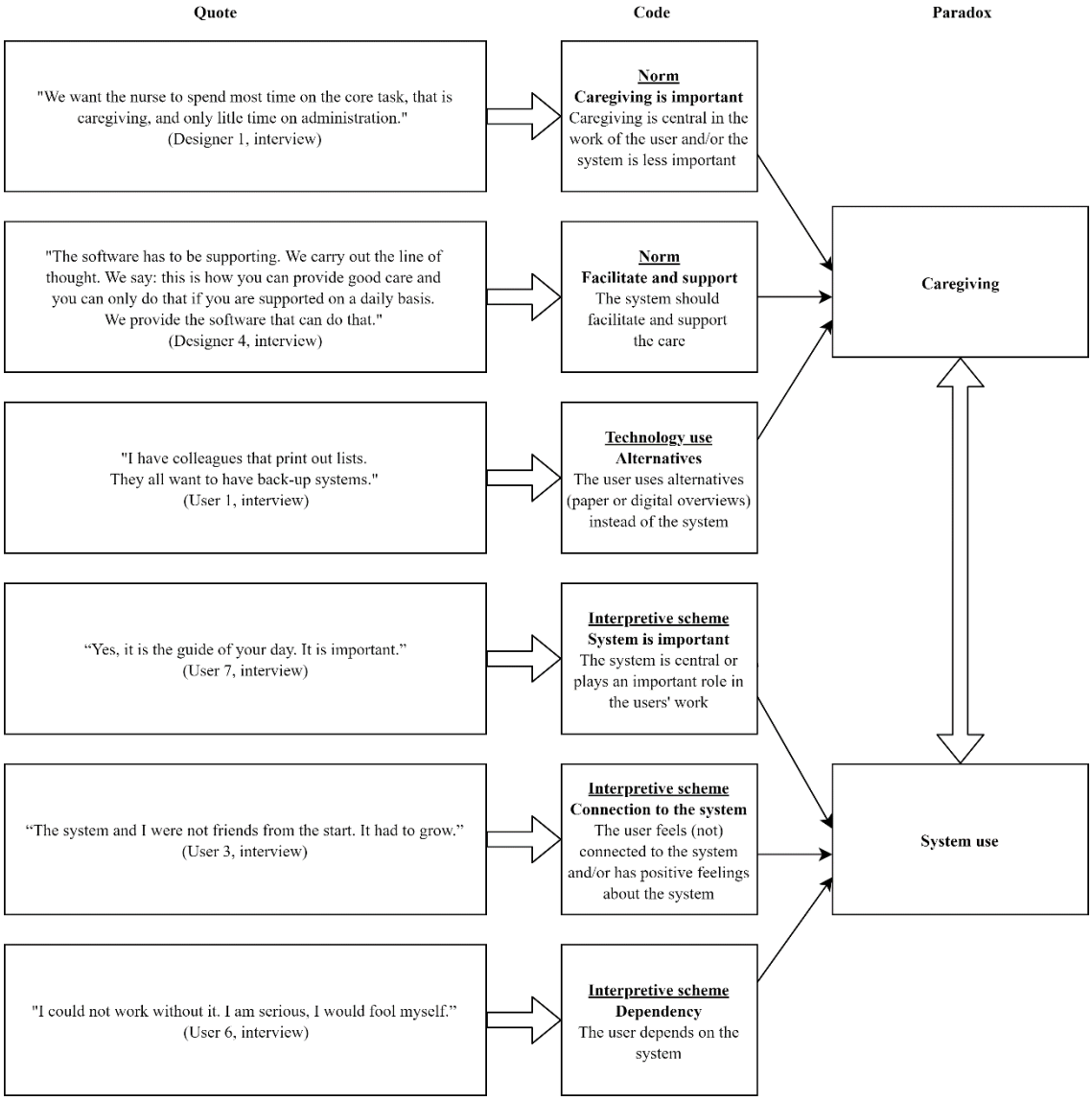

Figure 4. Paradox caregiving versus system use

As nurses try to find a balance between caregiving and system use, they estimate how important the system is for them in that moment of care and they adjust their use accordingly. Nurses claim that they need the system most when they do not know the client or care well. For example, when they visit new clients and do not know what care is needed. To illustrate, one nurse stated: *"Of course, I have my work experience and I know my clients. But when we have a new client, I need to see [in the system] what I have to do and where I have to go. No, you could not work without it then." (User 8, interview).* This quote emphasizes that nurses could not "work without it" when they do not know the clients or needed

care. As a result, the nurses use the system more in these moments of care. For example, during observations, one nurse had to perform a complicated bandaging procedure and used the system frequently in the moment of care to see which techniques her colleagues had used.

In comparison, the system is not that important when the care plan is relatively simple or when nurses know the clients and needed care. As one nurse argued: *"When you know the clients, you know what you have to do." (User 11, interview).* For example, during observations, one nurse knew by heart what care her client needed because the care was the same every day. She used the system only briefly for registration afterwards. Hence, in these moments of care, the nurses do not need to use the system as often and are able to put caregiving more central.

Most nurses have created a structure of technology use that helps them to find an appropriate role and involvement of the system in every moment of care. They acknowledge that the system is more important when clients and their care change. Therefore, the nurses prepare their workday with the system to read the latest reports to see if anything has changed. One nurse explained: *"I always read it in the morning, and often also the night before, in case something has changed." (User 7, interview).* In case something has changed, the nurses adjust their system use accordingly. For example, when they do not know the changed care, they use the system more elaborately to support them. This preparation helps them to evaluate and adjust the needed role and involvement of the system in the moments of care.

4.2 Paradox 2. Flexibility versus uniformity

In daily work practices, nurses encounter a paradox of flexibility versus uniformity. Whereas organizational norms emphasize flexibility, teams may benefit from uniformity. Nurses try to tune technology use to find a balance between these norms.

Buurtzorg is organized around self-managed teams of nurses. These teams have a great amount of freedom and are able to work in flexible ways. One nurse explained it as follows: *"We do not have a hierarchical system. We can decide upon many things ourselves, we can figure them out ourselves. We do not really have restrictions." (User 1, interview).* Designers and facilitators value this norm of freedom, as they think it ensures professionality and high-quality care. To illustrate, one facilitator stated: "*It is important that a healthcare worker has the space to provide care the way he or she pleases, that he or she gets the space to show his or her own professionality." (Facilitator 1, interview).*

The nurses also have freedom to use the system of BIS in flexible ways. Even though they are obliged to use the system, they can decide for themselves how they use it. Buurtzorg has organized several instructions on how the system can be used, but nurses can choose whether they follow the advices. As one facilitator said: *"If it fits you, you should use it like that. If it does not fit you, you do not have to." (Facilitator 2, interview).*

The system's facilities are flexible, as they provide multiple options to access or register care. For example, nurses can document clients' temperature in two ways: they can type the results in the rapport, or they can use instruments that compare measurements over time. As one facilitator put it: *"It is so big that there is not just one route. You can use it in a hundred different ways." (Facilitator 3, interview).* Nurses feel like they can find a use that fits them best. To illustrate, one nurse experienced it as follows:

Amy tells me that she is generally satisfied with the system. There are some things that she finds less useful, but then she "works her way around it". She explains that the system is flexible enough to find a way that works best for you. According to her, the system hereby fits the Buurtzorg vision, where nurses have a lot of freedom in their work. In the beginning, the team watched a lot of instruction videos on the Buurtzorg web to get familiar with the technology, but after that, everyone has found his or her own way to work with it. (User 1, observations).

This fragment shows that nurses can use the system in flexible ways as everyone "finds their own way". However, when nurses work together in teams, they find it important that they work in a coordinated and uniform way. They strive for uniform use, because they care about their team and want to prevent miscommunication that could endanger their teamwork. As one designer described: *"It is important that a team works in the same way, that you reach an agreement in that. Because if you report extensively and your colleagues do not, you [as a team] cannot perform that analysis about wound care." (Designer 6, interview).* Most nurses have experienced the downsides of flexible use for the team. For example, they described how different use could lead to information scattering in different places. To illustrate, the document analysis showed that personal non-medical data is registered in different menus of the system: *three users register personal non-medical information under the medical background menu, four users under the profile menu, and three users register the information divided over the menus of medical background, profile and history. (User 1-10, document analysis).*

The dangers of flexible use of the system were also noticeable in two observations, where nurses could not find the information in the menu where they expected it. For example, one nurse could not find the needed information and had to call a colleague to clarify:

When we drive to the client's house, he does not open the door. Bernice checks the system to see how we can come in, but it is not clearly stated. She expects to find the needed information under the menu of appointments, but she cannot find it there. She calls a colleague for advice. (User 2, observations).

These examples show that flexible use could lead to confusion when nurses work together in the system. As one user described: *"If someone in the teams works differently, that brings confusion. We once had a colleague who, without consulting the team, had used the planning differently. […] You can't just do that. Right? Because we also have to work with that." (User 6, interview)*. This quote marks that when nurses use the system differently, it could lead to miscommunication and endanger teamwork, as colleagues "also have to work with that".

Hence, flexible use could lead to confusion and impede teamwork between colleagues. Therefore, even though nurses are free to use the system in flexible ways, they need a form of uniformity when they share the system. When nurses choose to use the system in flexible ways, they counteract uniform use with their team members. This paradox can be found in Figure 5.

When nurses encounter the negative consequences of flexibility in technology use, they set up norms of agreements and protocols with their team to establish more uniform use of the system. As one user argued: *"It is important that you make clear agreements with your team: what is important and what information should be in there?" (User 10, interview).* To illustrate, the document analysis showed that some teams have implemented uniform protocols as they used standardized reporting styles: *two teams use SOAP note, a documentation method, to write their reports. (User 1-10, document analysis).*

Most nurses adjust their technology use to team norms to prevent miscommunication and enhance teamwork. As one user said: *"We adjust that [the use] to each other." (User 9, interview).* They see the added value of the agreements, as one user said: *"When you make agreements, you can accomplish a lot together." (User 10, interview).* However, some nurses deviate in use when they think that it could benefit care. As one user confessed: *"Then I think: this is the best way. Of course, I also get remarks about my use. If it was an agreement and I am the only one who does not follow. But then we discuss it as a team. These are never insuperable things, of course." (User 1, interview).* This quote shows that deviation from team's norms is often not appreciated, however, the team is open to discuss their team agreements to adjust them where necessary. As another user said during observations: *"When we encounter problems [of different use], we discuss it and try to find consensus." (User 8, observations).*

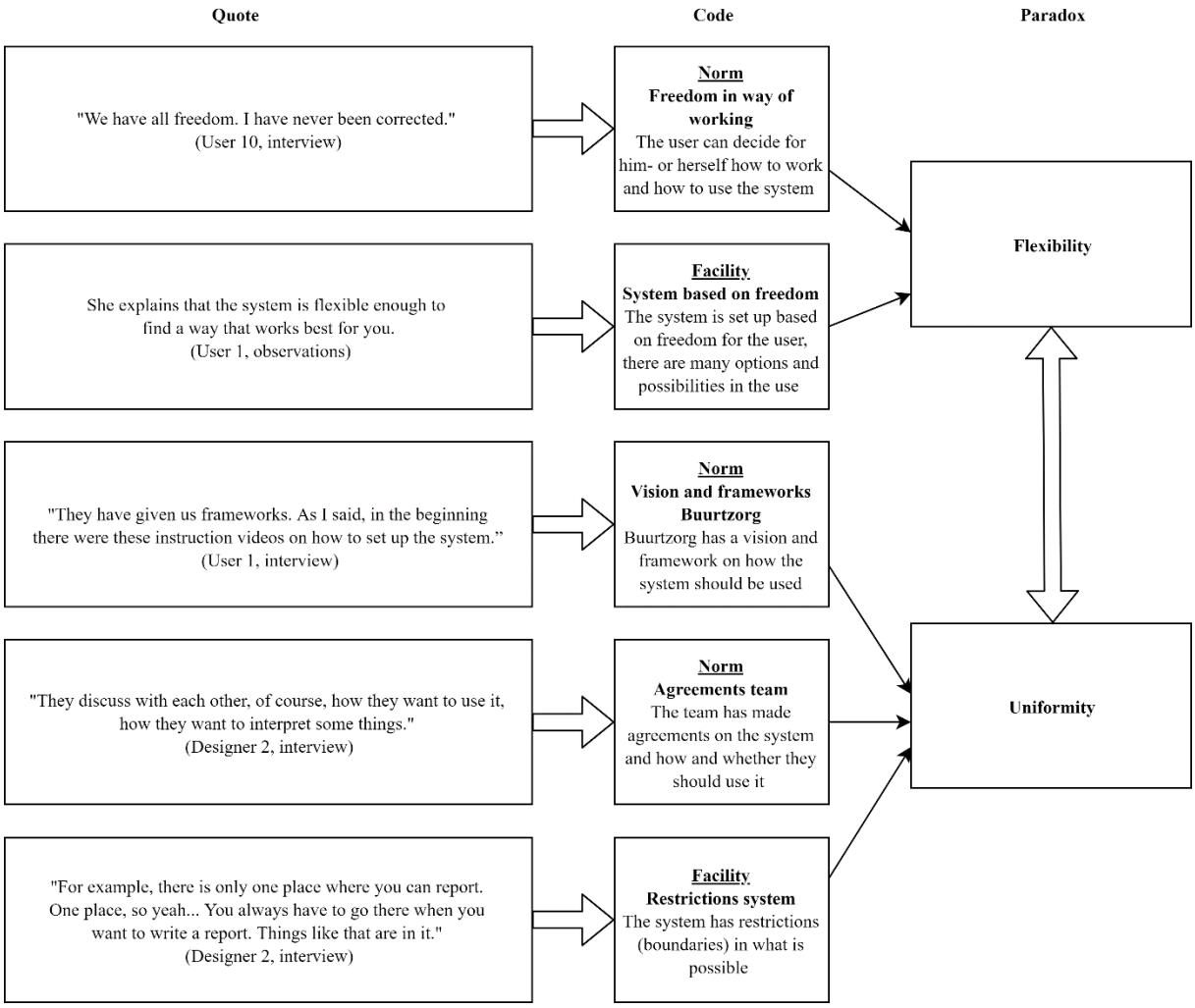

Figure 5. Paradox flexibility versus uniformity

Even though most nurses tune their use to team agreements to enhance uniformity in technology use, they still encounter problems of flexibility when they work together with other teams. Because teams are free to make their own agreements about system use, their use of the system is different from each other. To illustrate, one nurse described the following: *"I was a substitute nurse for another team. […] Of course, you check out: how do you do it? Yes, they do it differently. In the planning appointments, they had detailed descriptions, whereas ours are global and short. Or they had care plans that were not updated adequately." (User 12, interview).*

When teams work together but are not familiar with each other's agreements, their different use of the system could again cause confusion about clients or expected care. For example, one nurse mentioned that she had not administered medication to a client, because the other team registered the medicine procedures in a different way. Consequently, the client did not receive the needed medication. She explained: *"Because the other team interprets the care plan in a different way and works differently than our team, it is difficult. Errors could easily occur." (User 4, interview).* This quote shows that flexible system use could lead to misinterpretations and errors that endanger the quality of care. A few nurses recognized this danger and emphasized the need for more uniformity or consistency in use across teams. One of these nurses stated: *"It is difficult that you do not work consistent as Buurtzorg. Everybody does his own thing, people try to do it the right way." (User 10, interview).* From this quote, it becomes evident that even though teams try to do it "the right way", they may benefit from working more uniformly. A few nurses even claimed that more rules and guidance around use would be needed. One

of them explained: *"You have a lot of freedom, but I think it would be more practical when there is a guideline on how to use the system." (User 10, interview).*

Thus, for teams that work together with other teams, agreements on a larger scale could benefit their uniformity. However, Buurtzorg does not want to enforce one way to use the system. One facilitator stated: *"I want to leave that to the nurses, that has always been our strategy. […] You have to use the system in a way that helps you most." (Facilitator 2, interview).* This means that teams that work together and prefer uniform use of the system, either to ensure clear communication, or to enhance cohesion among the teams, could together adjust or tune their agreements. Hence, uniformity between teams may be needed to counteract the negative consequences of freedom and flexibility.

4.3 Paradox 3. Complete versus simple

Another paradox that nurses encounter is complete versus simple. This paradox focuses on how use of the system is related to an interplay of facilities, norms and interpretive schemes that emphasize completeness on one side, and simple use on the other side.

At Buurtzorg, an important norm is that care needs to be organized in a simple way. Project employees and coaches aim to ease the process of organizing care, so that nurses can focus on caregiving. For example, administration processes are simplified, and lines of communication are shortened. As one user explained: *"One of the core values of Buurtzorg is […] not too much nonsense or fuss." (User 2, interview).* The nurses also expect their work system to be simple and self-explanatory, based on their interpretive schemes. As one user said: *"Let it be as simple as possible." (User 6, interview).*

Another important norm at Buurtzorg is that the care has to be complete. Whereas nurses from other healthcare organizations provide fragmented pieces of care, Buurtzorg nurses are responsible for the entire care process. As one user said: *"We are responsible for the entire care process from start to finish." (User 2, interview).* The system of BIS is designed to reflect and support the complete work process. Hence, like the care is complete, the support from the system is also complete. A broad range of system facilities could be found in the document analysis: *The system provides options to register client information, history, profile, care assessments, care plans, planning, agreements/appointments, evaluation and care moments. (User 1-10, document analysis).* Facilitators and nurses appreciate the completeness of the system. They explain that the entire care can be registered with the system's tools. For example, one facilitator argued: *"They [nurses] are often pleasantly surprised by its completeness, that you can register the entire care from A to Z and that you have tools to do that." (Facilitator 1, interview).*

The designers draw on the norm of completeness, as they aim to complete the system to a greater extent. They endeavor to add missing facilities like a roster or medicine registration. To illustrate, one designer mentioned: *"Unfortunately, there is no roster in the system, but we are working on that." (Designer 6, interview).* Even though users appreciate the designers' efforts to complete the system, they recognize the disadvantages involved with these developments. The system becomes grander with every addition. Nurses complain about the system's complexity, size and its many changes. They acknowledge that the system becomes more complete but feel like the system's simplicity is threatened. During observations, one user explained it as follows:

Francine comes to the conclusion that the BIS is a beautiful system, but also far too complicated. "You can never achieve its full potential, you do not have the time to do so," she says. She is also bothered by the many changes in the system. The menus often change names and buttons are relocated. She understands that Ecare wants to improve the system, but she finds it frustrating that the system is never the same. "If we would have the same system for a year, that would be great," she laughs. (User 6, observations).

This fragment shows that when designers aim to complete the system by adding missing facilities, they could endanger the system's simplicity. This often leads to frustration, loss of energy and negative moods among the nurses at work. As one user put it: *"I like it when it works, I like it when I understand it. When I don't understand it and it does not work, I am no fun." (User 6, interview).* Another user said: *"You can feel that your energy leaks away, like: oh, I do not know how it works, it is all so complicated." (User 3, interview).* At the same time, an oversimplified system may miss important facilities to support the nurses adequately. As one designer put it: *"I think it already supports them now, but we [as designers] are never finished. We could always improve [the support]." (Designer 3, interview).* This paradox is illustrated in Figure 6.

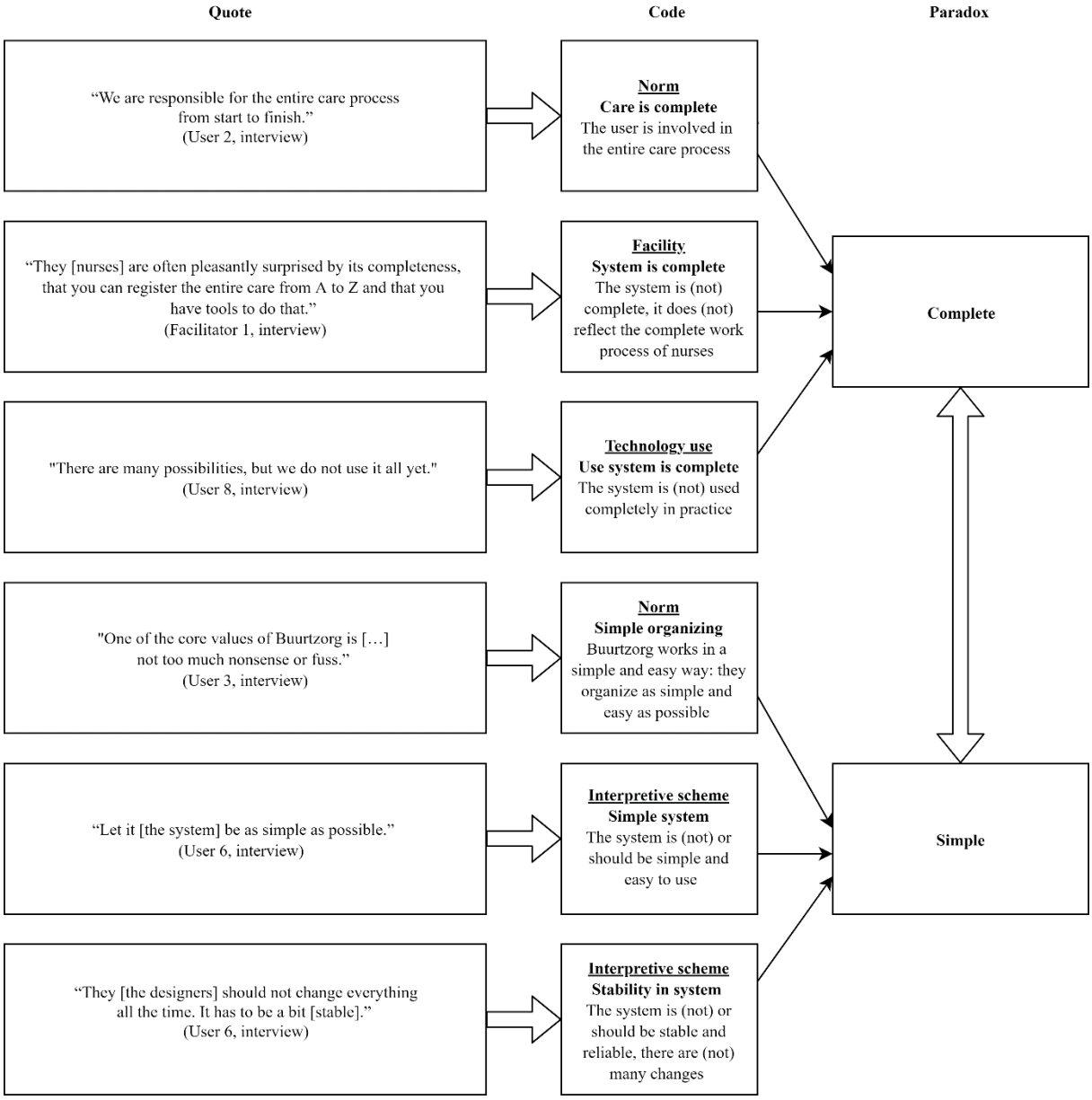

Figure 6. Paradox complete versus simple

The users have found a way to use the system in a way that bridges the two norms. They do not use the system as complete as intended by designers or facilitators, but instead focus on the features that are most relevant to them and their team. Hence, they ignore facilities that make the system too complicated to work with and find a use that is sufficiently complete to them. For example, one user explained that

she stopped using facilities that were not relevant for her team: *"In the beginning, I was so busy with it, like: oh, I wanted to arrange it all in a great way and make sure that it was clear for everybody. When it turned out that not everybody was going to read it, I thought: that is a waste of my time. If nobody is going to read it, it is not relevant." (User 10, interview).*

Nurses emphasize that it is their own responsibility to set up the system in a way that supports their team best. To illustrate, one user stated: *"It is also up to ourselves what we improve, it is not just up to the system." (User 10, interview).* They endeavor to use the system "most optimal" within their frame of reference, considering their knowledge of the system, available time and effort. They recognize that they have an influence on how simple and complete the system is, depending on what facilities they use or ignore. They claim to want to take an active role in that. For example, one user explained it as follows:

Julia also thinks that they cannot blame all problems on the system. She realizes that they have a great influence on how they use and organize the system. "We play a great role in this and we should take that role to make optimal use of the system. We are not making optimal use of it now, but it would be great if we did." (User 10, observations).

By taking this responsibility to decide for themselves which facilities to use or ignore, they could find a balance between a workable, easy system and a complete system that provides all options they need in their work. As one user put it: *"We can decide for ourselves what to put in the system in what order. So yeah… If it is not easy to use, we are not doing it right." (User 12, interview).*

4.4 Paradox 4. Trust versus justification

Buurtzorg and the healthcare industry contradict on norms regarding the monitoring of care. As a result, nurses encounter a paradox of trust versus justification. Users take a role in the system that complies with either one of the norms.

At Buurtzorg, an important norm is to have trust in the nurses and their professionality. Facilitators emphasize that nurses have the right education and experience, and therefore, they know what to do best. To illustrate, one facilitator said: *"That, to me, is the basis, that they are the professionals. They studied for it, most of them studied for a long time. They know what to do." (Facilitator 4, interview).* The designers at Ecare also put great trust in the nurses. They have built the system's facilities accordingly, as one designer explained: *"The software works best for organizations like that [like Buurtzorg], because it is based on trust." (Designer 3, interview).*

Many nurses recognize the trust they receive at Buurtzorg. One nurse compared it as follows: *"Now [at Buurtzorg] I can do it myself again, I can think of things myself. […] These things derive from my professional insights and not because the organization tells me that I can only do this and that, and I have to justify every second." (User 12, interview).* This quote shows that nurses learn to build on their professional insights when they are trusted. When they have to justify all their actions, it costs them a lot of time that could be spend on care instead. As one nurse described it: *"I am happy that we can focus on caregiving and the client. They are most important. […] It is not like: we have to fill in these papers [for justification] and oh, you [as a client] are also here." (User 12, interview).* Hence, nurses may be able to focus more on caregiving when they experience trust instead of justification demands.

However, the healthcare sector demands justification of provided care. First, clients and their close family have the right to be informed about the care. As one facilitator put it: *"These justification requirements are huge, which seems fair. I mean, if someone takes care of your body once or twice a day, they should be able to justify what they are doing and why." (Facilitator 2, interview).* Second, health insurance companies have the right to be informed about the care, as they pay for it. In fact, if the care cannot be justified according to their standards, insurance companies could refuse to pay. One

designer explained: *"If you do not justify your care, you will not receive money and you will not last long as a team." (Designer 6, interview).* This quote shows that if nurses do not justify their care, their jobs may be at risk.

Therefore, to comply with the healthcare's justification demands, facilitators and designers have provided clients and healthcare insurance companies access to the system. Here, they can monitor the provided care. One designer explained: *"The word justification […] at Buurtzorg, has a bad connotation. But some things are obliged when they are laid down by law." (Designer 5, interview).*

Thus, even though designers and facilitators trust the nurses in their professionality, they allow clients and healthcare insurance companies to check on the care they provided. While the industry holds on their norm of justification, the organization emphasizes their trust in the nurses. Both norms can be found in how users structure their technology use. The paradox can be found in Figure 7.

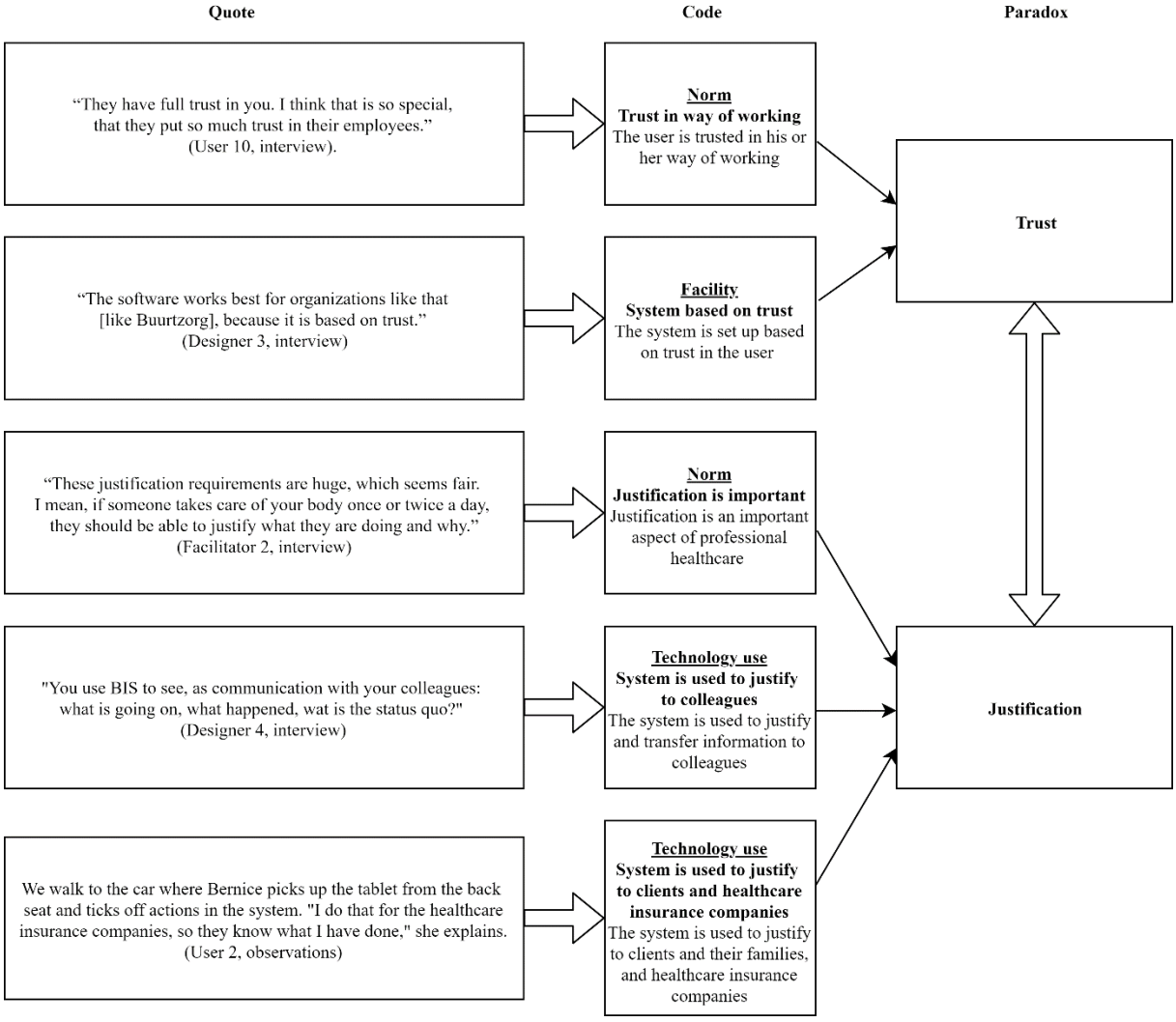

Figure 7. Paradox trust versus justification

Designers experience that nurses struggle to use the system as a support tool when the system is also used to justify care. They emphasize that it is important that nurses do not simply take a "role of justification". Instead, nurses should focus more on how the system could help them to provide care. As one designer explained: *"What you hear people say every now and then: 'but I have to tick off what I have done, I have to justify the care I provided.' I always say: 'you should not look at it as justification of your actions, you should see it as your own check.'" (Designer 6, interview).* The designers claim

nurses should build on their norms of trust, take responsibility and use the system accordingly. In other words, they think that nurses should emphasize trust over justification in how they use the system. As one designer put it: *"The system is completely supportive if you have an attitude like: I am the professional, you can trust me, I take that trust and responsibility. If you stay in the role of justification, it is going to be tricky." (Designer 6, interview).*

Some nurses use the system from a "trust role". For example, they use digital reports to register particularities that they have observed. In these reports, they have trust in their capabilities to recognize relevant information and act upon it. As one user put it: *"I am a nurse and I have a good clinical view." (User 3, interview).* Their colleagues also trust their capabilities and observations, as one user said: *"Your colleagues also trust it, so that you can perform the same procedures with clients." (User 4, interview).* This quote shows that nurses draw on the norm of trust, as they trust each other's professionality and use their reports to continuate the care.

Nurses that build on trust do not see the clients' access as a way to justify care to clients, but they see it as a way to improve care through client involvement. As one user said: *"I think it is an advantage. They are able to read along and think along. Maybe it could even stimulate some self-reliance, when they think: maybe I can do this myself, because it states that I cannot do it, but I do not know that for sure." (User 6, interview).* This quotation marks that nurses with a "trust role" mainly focus on how the system can be used to enhance quality of care.

However, when clients and healthcare insurance companies have access to the reports, some nurses take a "role of justification" and adjust their reports accordingly. They consider who can read along and what would be suitable for them to read or know. For example, one nurse explained she nuances her reports for the clients: "*I do not mind it [the clients' access], but you do consider it. When you think: yes, should we write that down or not? That is, yeah… When little accidents or awkward things happen, I think: well, let's write that down in a more nuanced way." (User 7, interview).* One team has even decided not to use the client portal yet, because they were afraid they would not be able to justify the care properly. During observations, one of the nurses explained it as follows:

I ask her if the clients use the client portal where they can access the system. Bernice tells me that her team is thinking about how to implement it. […] "It could be useful," she explains to me, "but we do not use it yet." They are scared that they have to be more considerate in how to formulate reports when clients and clients' close family can read along. "You just have to think even better about how to formulate things." (User 2, observations).

From this segment, it becomes clear that "justification" nurses are mainly focused on justifying their care. Use of the system is more complicated and takes more time, because these nurses want to make sure that they justify the care in a proper and considerate way.

Thus, in this paradox, the same facilities of the system are used in different ways, depending on how nurses view their roles. For example, when nurses draw on the norm of trust, they use the system as a tool to support them in their professionality, by discussing reports with clients, or by ticking of boxes to check the provided care. In comparison, when they draw on the norm of justification, they use these same features of the system to justify their actions to clients or healthcare insurance companies.

4.5 Paradox 5. Connection versus distance

Through their close involvement as self-managed teams, nurses at Buurtzorg encounter a paradox of connection versus distance. A healthy distance from work is difficult to preserve when people feel connected to their work. The system of BIS has made this paradox more prevalent.

From their interpretive schemes, nurses value a healthy work-life balance. As one user said: *"I also try to keep a fun situation at home, for myself." (User 10, interview).* In their private life, they value a distance from work to focus on their family, friends and personal interests.

At work, however, the nurses interpret a personal, close connection to their organization, team and clients. Most nurses strongly identify with Buurtzorg and their vision of care. One nurse described: *"People always say that I live and breathe Buurtzorg, that is how I feel. Yeah, I work here with great enthusiasm." (User 10, interview).* They claim to experience a warmth and familiarity throughout the organization that makes them feel like home. The nurses also feel a personal connection to their clients and their team. They visit their clients often and get to know them very well. Furthermore, they value their colleagues and teamwork. During observations, one nurse described her team as follows:

Gwen tells me about her team. She experiences that they really do it together and help each other. As an example, she said that there is always someone who will cover your shift if you are too busy. (User 7, observations).

As the nurses feel connected to their work, they feel responsible for their team and clients. Taking responsibility is one of the main organizational norms at Buurtzorg. As described by one nurse: *"Buurtzorg is an organization that gives a lot of responsibility to the people themselves. People feel called to run and carry a team." (User 5, interview).* The feeling of responsibility is often so great, that it motivates people to go above and beyond to support their team and provide high-quality care. For example, when a team deals with problems, such as work overload, they step in and work extra hours or adjust the schedule. To illustrate, during observations, one client asked to be sedated in the night. The nurse had to cancel her personal plans to organize the sedation:

Amy explains that this is a typical disadvantage of self-managed teams. When something unexpected happens, they as a team have to solve it themselves. She shakes her head. "I can forget about that birthday party tonight." (User 1, observations).

Buurtzorg nurses sometimes go overboard in this feeling of responsibility. They forget to balance their work and private life and overload themselves with work. In other words, they find it difficult to keep a distance from work when problems need to be solved. During observations, one nurse confessed that she once left Buurtzorg, when her feeling of responsibility disrupted her work-life balance:

In the car, Iris tells me that she likes her job at Buurtzorg. She is happy with her self-managed team and the pleasant teamwork with colleagues. She feels very connected to her team and responsible for their clients. She explains to me that this is also one of the disadvantages of Buurtzorg. When she started her job at Buurtzorg five years ago, she felt so responsible that she wanted to solve all the problems that the team encountered. For example, when nobody was available to do a shift, she would work overtime to help the team. This would leave her only little time for her private life. "Sometimes you want to do fun things next to your job, but I just could not do it." She lost the balance between her job and private life and she saw no other solution than to quit her job at Buurtzorg. (User 9, observations).

The coaches at Buurtzorg acknowledge that this is a main issue that Buurtzorg faces. Many Buurtzorg nurses find it difficult to distance themselves from work. The dangerous consequences of a continuous connection to work are reflected in the organization's great amounts of health-related absenteeism. As one coach explained: *"The availability of people is immense. We work a lot on guidance in health-related absenteeism. […] It is a major factor in the development of stress symptoms." (Facilitator 4, interview).* As one nurse put it: *"You forget how important it is when it is too late. For example, when you have colleagues that have major stress or fall out." (User 1, interview).*

Apparently, it is difficult for the nurses to have a healthy balance between their responsible job and private life. The nurses recognize that when they personally feel connected to their work, a distance from work is threatened. This paradox can be found in Figure 8.

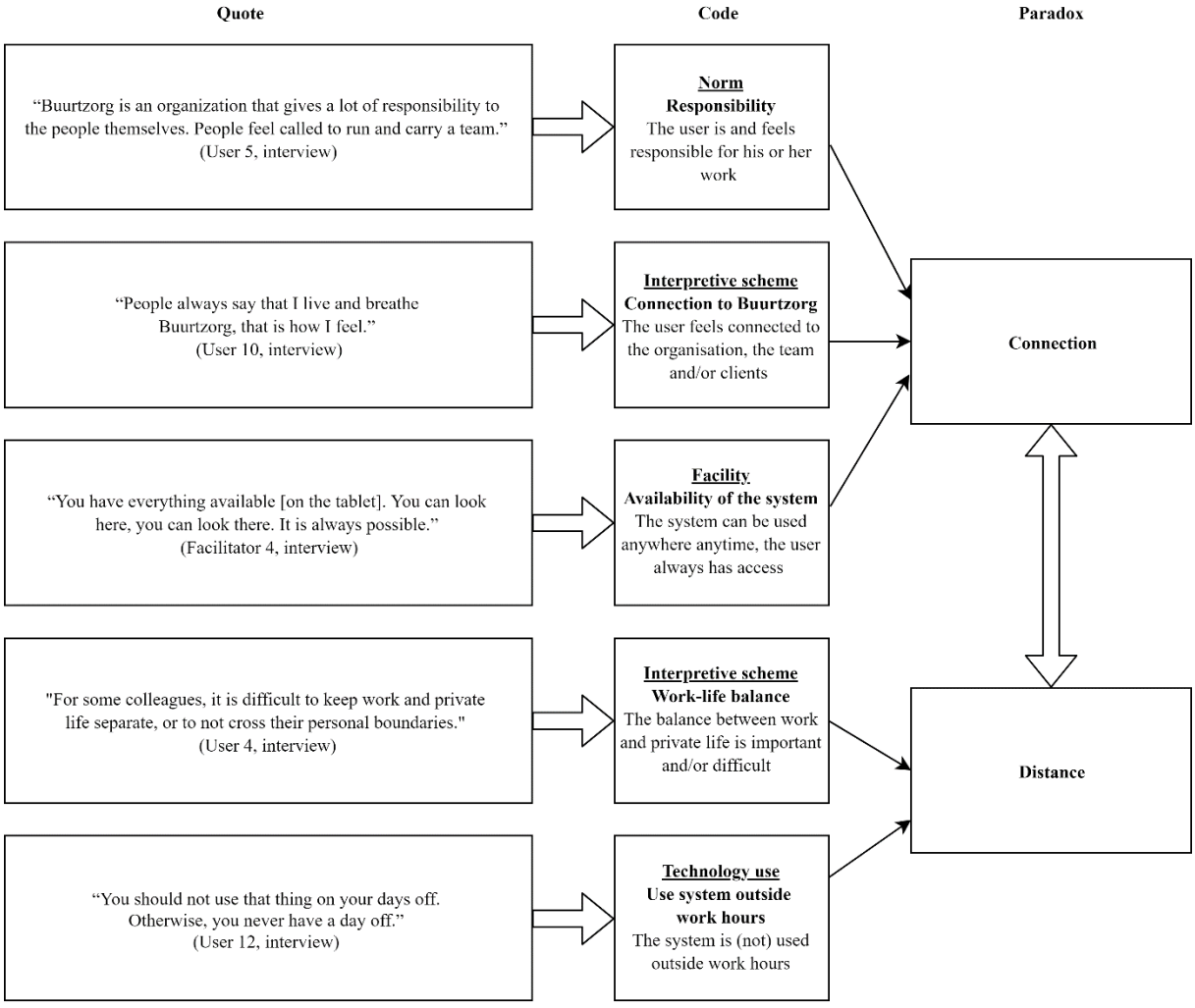

Figure 8. Paradox connection versus distance

The paradox has become more complicated through use of the system. Before the system, the nurses registered their care in a paper map that was kept at the client's home. When these paper maps were replaced by the digital system, the nurses could suddenly access the registration of their clients all the time, which made their work more accessible than before. One facilitator explained: "*You have everything available [on the tablet]. You can look here, you can look there. It is always possible." (Facilitator 4, interview).* The nurses experienced that the system further enhances their connection to Buurtzorg and their team. As one user said: *"I have to say that the homepage [of the system] is my connecting factor with Almelo [headquarters Buurtzorg] and other teams." (User 5, interview).*

Many nurses describe that the enhanced connection through the system makes it more difficult to distance themselves from work. To illustrate, one user argued: "*You are always connected, literally and figuratively. And sometimes I really do not feel like it. When I am off for three days, I think: oh, I do not want to think about opening that thing, I just do not want to know." (User 9, interview).* This quote shows that the paradox of connection and distance is reinforced through use of the system, as it has made work more accessible outside work hours. Hence, even though the nurses already deal with a continuous struggle between being connected to work and having a healthy distance from work in their

private life, the system has made this paradox more prevalent by enabling a continuous connection to work.

Coaches at Buurzorg often advise teams to keep a distance from their work through adjusted use of the system. For example, they recommend teams to make clear agreements about limited or even no use of the system outside work hours. One coach advised the following: *"I tell them to stop it. […] When you have a day off, you have a day off." (Facilitator 4, interview).* Most nurses have made such agreements with their team, as they recognize that high expectations from the team could lead to more use of the system. One user explained: *"It depends on your team. In your team, they may expect you to always be connected to that thing." (User 9, interview).* Nurses claim that agreements about use have helped them disconnect from their work and focus on their private lives when needed. Thus, even though the system provides the option to connect to work, teams may consider to limit or stop system use outside work hours to preserve a healthy distance from their job.

5. Discussion

This chapter describes the main discussion. It reflects on the study's implications for theory, practice and policy. After that, it discusses the limitations that need to be considered and addresses insights for future research. At last, the conclusion is presented.

5.1 Theoretical implications

The objective of this study was to provide nuanced insights into how healthcare workers use ICT in daily work practices. The findings show that users establish and re-establish a structure of technology use based on paradoxes that they encounter when technology's facilities, norms and interpretive schemes interact. The study presents four theoretical implications for literature on technology use.

First, the study shows the relevance of interactions between facilities, norms and interpretive schemes in technology paradoxes and use. Most studies tend to overlook the interplay between users, technology and context (Feldman & Orlikowski, 2011; Samuelsson & Berner, 2013). When scholars consider the interactions between modalities of structure, they often claim that the modalities mediate or reinforce each other (McPhee & Canary, 2014; Olesen & Myers, 1999; Orlikowski, 1992). The current study shows, however, how facilities, norms and interpretive schemes can contradict each other and cause a technology paradox in use. Hereby, the study confirms the findings of Jian (2007) that contradictions in modalities could lead to unintended consequences. For example, in this study, even though nurses are connected to work through norms of responsibility, they value a healthy distance from work based on their interpretive schemes. As a result, they make agreements to limit or stop technology use outside work hours. This example shows that technology use is based on paradoxes that users come across when their own perspective, the technology and institutional context interact.

Second, the study shows that interactions also occur within facilities, norms and interpretive schemes. Specifically, when contradicting elements within modalities of structure interact, paradoxes arise that shape technology use. Hereby, the findings show that the direction of separate modalities of structure on technology use is not always straightforward. For example, in the case of flexibility versus uniformity, two co-existing norms of freedom and uniformity are opposed to each other and cause a technology paradox. This paradox confirms prior studies who have shown that multiple norms can co-exist, also on different levels, such as organizational and team level (Putnam, Myers, & Gailliard, 2014; Schwartz, 2017), and can lead to tensions when they contradict (Jay, 2013; Voronov & Yorks, 2015). The findings also demonstrate that technology paradoxes arise from contradictions across technology facilities and between interpretive schemes. Hence, this study shows that technology use is also based on paradoxes that users encounter based on interactions within their own perspectives, the technology or institutional context.

Third, the study provides new insights regarding the role of designers and facilitators in technology paradoxes. The findings show that designers and facilitators are involved in users' coping behavior of the technology paradoxes. Most studies on technology paradoxes focus specifically on the users' perspective, and they do not consider technology designers, facilitators or managers (e.g., Fonner & Roloff, 2012; Leonardi et al., 2010). The findings from this study show how designers and facilitators recognize the paradoxes that users face in technology use and provide them with advice on how to deal with these inconsistencies. For example, facilitators advise users on use outside workhours to preserve a healthy work-life balance. Hence, the study shows that designers and facilitators who provide support and advice play an active role in how users deal with paradoxes. Hereby, it confirms prior studies who claim that users build on guidance and support when they deal with challenges regarding technology use (Strudwick, 2015; Taylor et al., 2015).

Fourth, the study contributes to the understanding of interpretive schemes. The findings show that users draw on both rational and emotional interpretive schemes in their technology use. To illustrate, users discussed their experiences and knowledge, but they also expressed personal feelings, dependency and

connection to the system. Orlikowski (2000, p. 423) acknowledges that understanding the role of attachments and meanings "could offer richer explanations for the range of structural responses enacted by users as they engage with technologies in practice". In this study, comparable to more rational schemes, emotional schemes shape technology use. For example, when people feel a close connection to the system, they use it more elaborately. This finding could be explained with the lens of information technology (IT) identity, a theory that explicates technology use based on users' identification with information technology. According to this lens, users' connection, emotional energy and dependency towards IT increase their technology use (Carter, 2013; Carter & Grover, 2015).

5.2 Practical implications

Next to theoretical implications, the study presents implications for practice and policy. These practical implications relate to designers, facilitators, users, governmental and educational institutions, healthcare workers' family, friends and clients.

First, designers could use the findings to gain more insight into nurses' use of the system in daily work practices. They are advised to use the insights to improve their technology's alignment to nurses' experiences and use. Furthermore, the study could help designers to anticipate otherwise unknown consequences in the implementation of the system. Hereby, they could turn "unintended consequences into anticipated tradeoffs" (Harrison et al., 2007, p. 543). For example, when designers develop new features to support more aspects of nurses' work life, they should acknowledge that the system becomes grander and more complicated with every new feature. Moreover, designers are advised to involve facilitators and users in further technology developments of the system, to assure that these future developments are more aligned to nurses' experiences and use in practice.

Second, facilitators and managers in healthcare organizations should acknowledge that when nurses have the freedom to use the system in flexible ways, it could lead to confusion and miscommunication. For example, when nurses use the system in different ways, information can be scattered in different places. Hereby, freedom and flexibility may counteract the system's objectives to "support networking and communication" (Monsen, 2013, p. 57). Therefore, it is important that facilitators and managers consider stricter agreements or guidelines to ensure a clear and useful information transfer in the system. Furthermore, facilitators and managers may invest in training sessions for current and new teams on how to cope with the paradoxes. For example, they could discuss the system's role in caregiving, or they can elaborate on healthy use of the system outside workhours. When they bring together different teams in such trainings, teams may also learn from each other's experiences. Hereby, the users receive more support in dealing with the paradoxes and do not have to reinvent the wheel when they encounter them.

Third, for users, it is important that they become aware of the role they have in how the system is set up and organized. They are advised to set up the system in a way that aligns best with their work practices and make clear team agreements on the use. These agreements are important, because they can prevent miscommunication, but could also enhance teamwork and cohesion. Agreements on use outside work hours could even benefit nurses' personal health, as it helps them to balance their work and private life. This study could help nurses and their teams realize what effect team agreements could have on their work and their system. When users feel that their agreements are not optimal, they are advised to reconsider them and discuss them with their team. Moreover, teams that work together with other teams are advised to tune their agreements to prevent miscommunication about clients and care. They could discuss where difficulties arise and make agreements to overcome or prevent difficulties.

Fourth, governmental institutions have invested greatly in the implementation of healthcare ICT (European Commission, 2014; Marschollek et al., 2007; Rijksoverheid, 2018). They could use the findings of this study to adjust policies, where necessary, to consider the interactions between user, technology and institutional context in daily work practices. Furthermore, they could use the findings to inform and advise healthcare workers on the use of ICT in healthcare and the paradoxes that it may

bring. Hereby, they provide support to healthcare workers in counteracting potential challenges of technology use. In addition, educational institutions are advised to discuss the paradoxes in healthcare classes, to prepare future nurses on these paradoxes before they enter the work field.

Fifth, healthcare workers' family and friends may benefit from the insights of the study, as the findings help them to understand the paradoxes in technology use at work. The findings help them realize the paradoxes that the nurses encounter, and they could open a discussion on how they could support the nurses in this process. Particularly, they could support nurses in the paradox of connection versus distance, as they personally are involved in the nurses' work-life balance (see Hart, Brannan, & De Chesnay, 2014; Jamieson, Kirk, & Andrew, 2013). Last, the findings of the study could provide clients more understanding of technology use during care moments. The findings show them that nurses often struggle with the system, because they want to use it in a way that ensures high-quality care. Hence, when technology is used during care moments, it could benefit their care.

5.3 Limitations and future research suggestions

While the study has contributed to theory and practice, it also has several limitations that need to be considered. These limitations relate to the use of practice theory as a theoretical basis, to the study's research design and to the paradoxes from the findings.

First, the most prominent limitation relates to the study's use of practice theory as a theoretical basis. This theory provides basis for powerful theoretical generalizations and practical implications (Feldman & Orlikowski, 2011). A limitation of practice theory, however, is that it provides an overly socialized view of technology (Leonardi, 2013). According to the practice lens, technologies are subject to users, as users actively choose to use a technology in a certain way. For example, Orlikowski (2000, p. 412) argues that "users have the option, at any moment and within existing conditions and materials, to 'choose to do otherwise' with the technology at hand. In such possibilities to do otherwise lies the potential for innovation, learning, and change." Here, even though the theory discusses the role of technology, it considers technology use mainly as an enactment of social processes. Therefore, scholars are advised to use sociomateriality to study technology use (Leonardi, Nardi, & Kallinikos, 2012). Sociomateriality is a follow-up-theory of the practice lens. In comparison to practice theory, sociomateriality emphasizes the perspective of entanglement of social and material in everyday organizational life (see Cecez-Kecmanovic et al., 2014; Orlikowski, 2007). Hereby, it could provide "a more useful conceptual lens with which to think about the temporally emergent sociomaterial realities that form and perform contemporary organizations" (Orlikowski, 2009, p. 15). A promising methodology for sociomaterial studies is big data analysis combined with qualitative fieldwork. Specifically, future researchers may take advantage of digital tracing and computation to analyze great amounts of routines and activities (Hedman, Srinivasan, & Lindgren, 2013), while "recognizing the local, interpretive, and situated nature of sociomaterial activity" (Cecez-Kecmanovic et al., 2014, p. 821).

Second, even though the qualitative study design was useful to go into depth about technology use, it also has several flaws that need to be considered. Because the study involves a small sample size, the findings may not be generalizable across other settings. The study's lack of generalizability is a common limitations for homogenous sampling studies (Bornstein et al., 2013). Future research is recommended to involve other technologies, healthcare institutions and countries in healthcare. Furthermore, the sample only included female nurses, due to the scarcity of male nurses in extramural care (CBS, 2017). Future research is recommended to include both female and male nurses, as gender is suggested to play an important role in technology use (Goswami & Dutta, 2016). Moreover, a longitudinal study into the role of technology in work practices could provide more depth, and it may be able to show structures are established and re-established over time.

At last, there are limitations to the paradoxes. The five paradoxes are discussed separately for analytic purposes. However, they are not entirely distinctive, as there seems to be an interplay between them. For example, the paradoxes of trust versus justification and flexibility versus uniformity are related to each other as justification demands some form of uniformity. Nurses use the system to justify their care and therefore use standardized reporting methods. These methods make reporting of the team more uniform. Furthermore, when nurses consider clients' access in the system, for example by "nuancing little accidents", this could lead to more general and comparable reports. Henceforth, when the system is used for justification, its use becomes more uniform. This example shows that the paradoxes are related to each other. Future studies could focus on how the paradoxes are related and how these interplays influence technology use.

5.4 Conclusion

This study aimed to provide nuanced insight into how healthcare workers use ICT in their daily work practices. Using practice theory as a theoretical basis enabled a deeper understanding of how healthcare workers establish and re-establish a structure of technology use based on paradoxes that they encounter. An important contribution of the study is that it demonstrates how complex interactions between facilities, norms and interpretive schemes cause technology paradoxes that shape technology use. Moreover, it shows that these paradoxes are also caused by interactions within these modalities of structure. The findings give designers, facilitators and users more insights into how technology use unfolds in practice. It provides practical implications for several groups involved (e.g., designers, facilitators, governmental and education institutions, friends, family and clients) that could help users find a balance in the paradoxes. As the study is conducted in a unique context, more research is needed to observe if the findings are generalizable to other situations or settings.

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Appendices

Appendix A. Observation list

This appendix contains the observation list used during observations.

Observation list

Date

_____

Team

_____

Participant

_____

Client

_____

The use of BIS (when, how, how often, et cetera)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Facilities (e.g., making a care plan, registering a care moment)

_____

_____

_____

Norms (e.g., protocols or agreements on the use of BIS)

_____

_____

_____

Interpretive schemes (e.g., expectations, experiences, knowledge, and attachments to BIS)

_____

_____

_____

BIS-in-practice (rules and resources instantiated in the use of BIS, e.g., company culture of Buurtzorg)

_____

_____

_____

Other observations

_____

_____

_____

Appendix B. Interview guides

This appendix contains the interview guides for designers, facilitators and users.

Interview guide designers

Introduction questions Ecare

- How would you describe Ecare?
- What is the vision of Ecare? What objectives or goals does Ecare pursue?
- How is the collaboration between Ecare and Buurtzorg?

The system BIS

- How would you describe BIS to someone who is not familiar with it?
- How would you summarize BIS in one word? And why?
- What is the goal of BIS? What do you aim to achieve for the nurses? Do you feel like that goal is achieved?
- What influence does the Ecare vision have on BIS?
- To what extent does BIS fit the vision of Buurtzorg?

BIS in use

- What role should BIS play in the work practices of nurses?
- How important is BIS in the work practices of nurses?
- How would you describe the ideal use of BIS? How (and how often) should nurses use BIS?
- Do nurses use the system in different ways? How can these differences be explained?
- Do you think that nurses are dependent on the system? In what way?
- What would their work look like without BIS? How would they work without BIS?

Norms

- What norms (or frameworks, rules) does Ecare have about the use of BIS?
- What norms (or frameworks, rules) does Buurtzorg have about the use of BIS?
- To what extent can you see the vision of Ecare or Buurtzorg in the use of BIS in practice?
- The nurses work in teams. To what extent do norms (or frameworks, rules) within the team occur in the use of BIS?

Facilities

- What facilities (or parts) of BIS should nurses use?
- What facilities (or parts) of BIS do nurses not necessarily have to use or should not use?
- Are there facilities (or parts) that the nurses miss? What facilities (or parts) would they like to add to the system?

Interpretive schemes (nurses' opinions, experiences and attachments)

- What (pre)knowledge do nurses have about BIS? How are they introduced or informed about the system?
- What are nurses' expectations and demands of BIS?
- To what extent do nurses have experiences with comparable systems (e.g., other EPRs)? Do these experiences influence their opinions or use of BIS?
- How do nurses feel about technology or ICT in general?
- How do nurses feel about BIS? How would they describe BIS? And why?
- To what extent does BIS influence the way that nurses feel about their job?

- To what extent do nurses feel connected to BIS? Do they feel a connection with the system?
- What feelings or emotions do nurses show when they talk about BIS? (For example: enthusiasm, confidence, energy)

Interview guide facilitators

Introduction questions Buurtzorg

- How would you describe Buurtzorg?
- What is the vision of Buurtzorg? What objectives or goals does Buurtzorg pursue?
- What is your role at Buurtzorg and BIS?
- How is the collaboration between Ecare and Buurtzorg?

The system BIS

- How would you describe BIS to someone who is not familiar with it?
- How would you summarize BIS in one word? And why?
- What is the goal of BIS? What do you aim to achieve for the nurses? Do you feel like that goal is achieved?
- To what extent does BIS fit the vision of Buurtzorg?
- What influence does the Ecare vision have on BIS?

BIS in use

- What role should BIS play in the work practices of nurses?
- How important is BIS in the work practices of nurses?
- How would you describe the ideal use of BIS? How (and how often) should nurses use BIS?
- Do nurses use the system in different ways? How can these differences be explained?
- Do you think that nurses are dependent on the system? In what way?
- What would their work look like without BIS? How would they work without BIS?

Norms

- What norms (or frameworks, rules) does Buurtzorg have about the use of BIS?
- To what extent can you see the vision of Ecare or Buurtzorg in the use of BIS in practice?
- The nurses work in teams. To what extent do norms (or frameworks, rules) within the team occur in the use of BIS?

Facilities

- What facilities (or parts) of BIS should nurses use?
- What facilities (or parts) of BIS do nurses not necessarily have to use or should not use?
- Are there facilities (or parts) that the nurses miss? What facilities (or parts) would they like to add to the system?

Interpretive schemes (nurses' opinions, experiences and attachments)

- What (pre)knowledge do nurses have about BIS? How are they introduced or informed about the system?
- What are nurses' expectations and demands of BIS?
- To what extent do nurses have experiences with comparable systems (e.g., other EPRs)? Do these experiences influence their opinions or use of BIS?
- How do nurses feel about technology or ICT in general?
- How do nurses feel about BIS? How would they describe BIS? And why?

- To what extent does BIS influence the way that nurses feel about their job?
- To what extent do nurses feel connected to BIS? Do they feel a connection with the system?
- What feelings or emotions do nurses show when they talk about BIS? (For example: enthusiasm, confidence, energy)

Interview guide users

Introduction questions Buurtzorg

- How would you describe Buurtzorg?
- Could you explain to me what you do at Buurtzorg? How do you feel about your job?
- How is the collaboration between Ecare and Buurtzorg?

The system BIS

- How would you describe BIS to someone who is not familiar with it?
- How would you summarize BIS in one word? And why?
- What is the goal of BIS?
- To what extent does BIS fit the vision of Buurtzorg?

BIS in use

- What role does BIS play in your work practices? What do you use it for?
- How do you feel about working with BIS? Could you tell me something about your experiences?
- How important is BIS for your work practices?
- How (and how often) do you use BIS? How did you learn to use it this way?
- To what extent do colleagues from your team use BIS in the same way? If there are different ways of use, why is that? Does it bother you?
- To what extent are you dependent on BIS? In what matter?
- What would your work look like without BIS? How would you work without BIS?
- What grade would you give BIS and why?

Norms

- What norms (or frameworks, rules) does Buurtzorg have about the use of BIS? Do you use these norms?
- To what extent do you have norms (or frameworks, rules) within the team about the use of BIS? Do you use these norms?

Facilities

- What facilities (or parts) of BIS do you use in your work practices?
- What facilities (or parts) of BIS do you not use? Why not?
- Are there facilities (or parts) that you miss? How do you solve that now?

Interpretive schemes (nurses' opinions, experiences and attachments)

- What (pre)knowledge did you have about BIS? How were you introduced or informed about the system?
- What are your expectations and demands of BIS?
- Do you have experiences with comparable systems (e.g., other EPRs)? How do these experiences influence your opinions or use of BIS?
- How do you feel about technology or ICT in general?

- Could you describe your work to me? What role does BIS play in your work?
- To what extent do you feel connected to BIS? Do you feel a connection with the system?
- To what extent is there a connection between you as a nurse and BIS?
- What feelings or emotions do you have when you think or talk about BIS? (For example: enthusiasm, confidence, energy)

Appendix C. Demographic information forms

This appendix contains the forms that were used to collect demographic information from designers, facilitators and users.

Demographic information designers

1. Age: _____
2. Gender: _____
3. Education: _____
4. Work experience at Ecare
    a. Period: _____
    b. Current position: _____
5. Work experience in healthcare sector
    a. Period: _____
    b. Position(s): _____

Demographic information facilitators

1. Age: _____
2. Gender: _____
3. Education: _____
4. Work experience at Buurtzorg
    a. Period: _____
    b. Current position: _____
5. Work experience in healthcare sector
    a. Period: _____
    b. Position(s): _____

Demographic information users

1. Age: _____
2. Gender: _____
3. Education: _____
4. Work experience at Buurtzorg
    a. Period: _____
    b. Current position: _____
    c. Amount of hours per week: _____
5. Work experience in healthcare sector
    a. Period: _____
    b. Position(s): _____

Appendix D. Information forms

This appendix contains the information forms for participant observations and interviews.

Information form for participant observations

Dear reader,

For my graduation project of the study Communication Studies at University of Twente, I would like to know more about technology in healthcare. Therefore, I will come along with you for one workday. During the day, I will observe and ask questions. The main question I would like to answer is:

How do healthcare workers use technology?

I will not judge your work as a nurse or how you deal with technology. I am not a healthcare professional or technology expert. I would simply like to know more about the use of technology in healthcare.

I will not use a video- or audio recorder. Instead, I will bring a notebook to write down notes. All data will be processed anonymously. This means that nobody can trace back that you or your clients have participated in the study.

If you wish to withdraw from the study, you are always allowed to do so. You also do not have to answer questions you would rather not answer.

I would like to ask you to sign a consent form in which you give approval for your participation in this study. This form also explains that you can always withdraw from the study. When the study is finished, I can send you the results if you are interested.

Kind regards,

Laura Morren

Student Communication Studies at University of Twente

E-mail: -

Telephone number: -

Information form for interviews

Dear reader,

For my graduation project of the study Communication Studies at University of Twente, I would like to know more about technology in healthcare. Therefore, I would like to interview you to gain more insights in this topic. The main question I would like to answer is:

How do healthcare workers use technology?

I will record the interview with an audio recorder. All data will be processed anonymously. This means that nobody can trace back that you have participated in the study.

If you wish to withdraw from the study, you are always allowed to do so. You also do not have to answer questions you would rather not answer.

I would like to ask you to sign a consent form in which you give approval for your participation in this study. This form also explains that you can always withdraw from the study. When the study is finished, I can send you the results if you are interested.

Kind regards,

Laura Morren

Student Communication Studies at University of Twente

E-mail: -

Telephone number: -

Appendix E. Informed consent forms

This appendix contains the informed consent forms for participant observations and interviews.

Informed consent form for participant observations

Title of the study: Technology in healthcare

Researcher: Laura Morren (student at University of Twente)

To be completed by the participant

1. I have received sufficient information about the study.
2. I participate voluntarily in this study. I am not forced to participate.
3. I give the researcher permission to make written notes during the observations. No audio or video recorders are used.
4. If I want to withdraw from the study, I can always stop the observations when I want to, without having to explain why. I do not have to answer questions when I do not feel comfortable to.
5. The data of the study are processed anonymously. I am not traceable or identifiable in the results of the study. My privacy is guaranteed as a participant in this study.
6. If I have a complaint with regards to this study, I can contact the Secretary of the Ethical Commission of the faculty Behavioural, Management and Social Sciences at the University of Twente via ethicscommittee-bms@utwente.nl.
7. All my questions are answered.
8. I have received a copy of this informed consent form that is also signed by the researcher.

Date: ……..

Name: …….

Signature: ……

To be completed by the researcher

1. I have explained the contents of the study in written and oral form.
2. I will answer the participant's questions to the best of my abilities.
3. The participant can withdraw his or her participation. This will have no consequences for him or her.

Date: ……..

Name: …….

Signature: ……

Informed consent form for interviews
Title of the study: Technology in healthcare

Researcher: Laura Morren (student at University of Twente)

To be completed by the participant

1. I have received sufficient information about the study.
2. I participate voluntarily in this study. I am not forced to participate.
3. I give the researcher permission to use audio recording and written notes during the interview.
4. If I want to withdraw from the study, I can always stop the interviews when I want to, without having to explain why. I do not have to answer questions when I do not feel comfortable to.
5. The data of the study are processed anonymously. I am not traceable or identifiable in the results of the study. My privacy is guaranteed as a participant in this study.
6. If I have a complaint with regards to this study, I can contact the Secretary of the Ethical Commission of the faculty Behavioural, Management and Social Sciences at the University of Twente via ethicscommittee-bms@utwente.nl.
7. All my questions are answered.
8. I have received a copy of this informed consent form that is also signed by the researcher.

Date: ……..

Name: …….

Signature: ……

To be completed by the researcher

1. I have explained the contents of the study in written and oral form.
2. I will answer the participant's questions to the best of my abilities.
3. The participant can withdraw his or her participation. This will have no consequences for him or her.

Date: ……..

Name: …….

Signature: ……