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Knowledge Sharing in the Public Sector

An Affordance Approach of Information and Communications Technology

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ABSTRACT

Research question How do the affordances of information and communications technology support knowledge sharing in the public sector?

Contribution With this study, we aim to contribute to the literature of qualitative research on knowledge sharing within the context of the public sector. Adapting an affordance perspective we focus on the employees' use of information and communications technology (ICT). We explain the user-technology relationship and its mutually constitutive nature in its meaning for knowledge sharing.

Methodology To answer the research question, we use an explorative approach of the interpretive research tradition under qualitative research. In total, 11 in-depth semi-structured interviews were conducted.

Main findings Findings from our empirical analysis revealed that the interviewed employees described differing individual affordances of each tool. From those, we established four categories of affordances that address knowledge sharing - *Learning*, *Helping*, *Networking* and *Accessing*. To answer our research question, we discuss these findings in light of the presented literature and draw implications on how explicit and tacit knowledge transfer in a public sector organization can be supported by information and communications technology.

Keywords: Knowledge sharing, Information and Communications Technology, Affordance, Public Sector

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1 INTRODUCTION

”Digital technologies and data are transformational. People, firms and governments live, interact, work and produce differently than in the past, and these changes are accelerating rapidly [...] They change the way firms produce goods and services...”
(OECD, 2019).

Technologies are proliferating throughout organizations, providing new capabilities and helping individuals find relevant content as they provide access to connecting with new people and expertise (Sproull et al., 1991). Not only does the quote by OECD speak about the importance of digital technology, but it also stresses the impact it has on the everyday life of all of us and particularly today’s organizations. We see this as a particular motivation for our study.

Researchers have long argued that knowledge about work processes, services, stakeholders and expertise is a profoundly valuable resource that needs to be shared throughout the organization (Grant, 1996; cited in Majchrzak et al., 2013). While privately-owned companies aim to achieve competitive advantage through the successful allocation and management of resources such as knowledge (Barney, 1991), public sector organizations do not depend on economic markets for their outputs (Rainey, 2014), as they are not characterized by competition among market actors. Yet, knowledge sharing and knowledge management are as important for the public sector as they are for the private sector (Willem & Buelens, 2007). Public sector organizations often have developing and providing knowledge as their main activity. They can be thus classified as knowledge-intensive organizations (Willem & Buelens, 2007), even though as Alvesson (2004) points out, to some extent every organization is knowledge-intensive. However, just like our investigated organization, some organizations have knowledge as their main and substantial product, and their essence is to provide knowledge to the public and have the majority of workers providing and developing knowledge (Starbuck, 1992). Public sector organizations are moreover characterised by strong control and interventions from governmental authorities, bureaucracy, hierarchy, and a rather low level of autonomy (Rainey, 2014). They also often

handle conflicting interests of various stakeholders (Rainey, 2014). For instance, the bureaucratic approach has led some public sector organizations to problems with so-called red tape, referring to lengthy procedures and great amounts of documents associated with these procedures (Willem & Buelens, 2007), as will be shown in our empirical material. Even though the evidence about the existence of bureaucracy and hierarchy is rather weak with mixed results (e. g. Boyne, 2002), the factors should not be neglected. Public sector organizations thus face an inevitable necessity for competent knowledge management due to these diverse pressures and factors.

In the recent years, we have witnessed the evolution of computer-mediated communication (CMC) tools which provide new possibilities to broadly share and foster knowledge of individuals and teams within an organization (Ellison & Boyd, 2013). The use of technology in facilitating knowledge sharing is, therefore, growing significantly. Knowledge workers are not simply users of these tools, rather creators of content valuable for their organization (Majchrzak et al., 2013). This content creation broadly distributes knowledge not only with employees' close co-workers and working groups but it also allows to share their knowledge with other unknown employees throughout the organization (Majchrzak et al., 2013).

Yet there is an under-researched area that addresses the actions that individuals take to share their knowledge inside specifically public sector organizations. While existing studies (e.g. Majchrzak et al., 2013) investigate the use of social media in organizations, we have found that in our investigated public organization, there is a mixture of social media (such as their internal 'Facebook-like' medium called Connecticum) and traditional simple CMC technology (such as email) that is used to share knowledge. The aim of our study is not to focus on one classification of tools but to identify the use of four most used information and communications technology (ICT) tools for knowledge sharing inside a public sector organization.

To focus on the action possibilities that employees perceive in digital tools, we take an affordance lens of the ICT tools used for knowledge sharing. As will be explained in this study, we define technology affordance, in line with the definition developed by Faraj & Azad (2012), as the mutuality of the technology tool's capabilities that provide the potential for action, and its

fit to the activity of the user. Therefore, when the concept of affordances is used as a perspective through which technology tools are described, it allows us to study how such tools can be appropriated or misused by its users (Barry et al., 2003). By following the mutuality of human action and the ICT capability, the affordance lens provides a means to study ICT tools and its role in supporting knowledge sharing (Faraj & Azad, 2012).

Realizing that many scholars have criticized privileging explicit over tacit knowledge (e.g. Cook & Brown, 1999, Hislop, 2013), our study accounts for both explicit and tacit dimensions of knowledge, adopting a practice-based perspective on knowledge. In that sense, our study contributes to the qualitative research that concerns information and communications technology and its affordances for knowledge sharing while taking into account the context of a public sector organization. Therefore, we aim to answer the following research question: *How do the affordances of information and communications technology support knowledge sharing in the public sector?*

2 LITERATURE REVIEW

This chapter provides a theoretical background to our topic. The first part introduces the concept of affordances and explains the term and its use. It is followed by the second subchapter that focuses on the understanding of knowledge and knowledge sharing. The third subchapter narrows our focus to the public sector and firstly characterizes a public sector organization, secondly outlines the role of knowledge and digitalization in public sector organizations which in the end leads to our research question.

2.1 The Concept of Affordances

Affordance is a relational concept of what the environment offers to an individual (Gibson, 1979). It concerns both material features of objects (e. g. material, shape, size) and subjective perceptions and goals of users (Norman, 1988). As will be shown in this subchapter, Gibson's and Norman's views do not align in many aspects. Nevertheless, affordance is understood as a property of an object which presents perceptions on what can be done with this object.

For instance, when one sees a table, the affordance is the prompt (the incentive) that he or she can use it to, for example, write on it. The affordance of the table would thus be the ability to write on it (many researchers establish their own terms, in this case, the ability to write on it would be called on-write-ability). Nowadays, the term is used in a variety of fields including human-computer interaction (e. g. Treem & Leonardi, 2013). In this subchapter, we present an overview of the literature on the concept of affordances through the introduction of the main views, as well as affordances within the field of human-computer interaction (later referred to as HCI) and affordances within the concept of knowledge sharing.

2.1.1 Gibson's Understanding of Affordances

The term affordance was first introduced by psychologist James Gibson who dedicated his research to visual perceptions. In his book 'The Ecological Approach to Visual Perception' (1979), he explained affordances in terms of the environment of an animal and what it provides.

The term affordance refers to “the environment and the animal in a way that no existing term does” (Gibson, 1979, p. 1). Affordances, therefore, complement both the animal and the environment. When applied to humans, Gibson (1979) states that people tend to adjust their environment wishing to make environment’s affordances suit them better and thus make their life easier.

Gibson’s understanding of the term is the possibility of an action in the environment to an individual. It is independent of the individual's ability to perceive this possibility (McGrenere & Ho, 2000). In traditional cognitive psychology, perception is understood as a process of developing representations (e. g. Solso et al., 2005). This process highlights working with data that have no meaning to be combined with information for it to eventually become meaningful (Solso et al., 2005). Gibson strongly opposed this view and proposed his anti-representationalist theory of perception (Kaptelinin, 2015).

2.1.2 Norman’s Understanding of Affordances

As opposed to Gibson, in Norman’s view (1988), an affordance is the design aspect of an object which suggests how the object should be used. He thus stresses an individual's previous experience and visual clues to its function and use. As he states, “when affordances are taken advantage of, the user knows what to do just by looking: no picture, label, or instruction needed.” (Norman, 1988, p. 9). Norman thus understands affordances as something that has properties both actual and perceived. When those two properties are combined, an affordance emerges as a relationship that is created between the object and the individual that is interacting with the object (Norman, 1999). Norman’s view opposes Gibson’s view who understands affordances as action possibilities that are independent of the one’s ability to perceive this possibility (Gibson, 1979).

To demonstrate the difference between those two emergent views on affordances, if an individual enters a room where there are a table and a chair, in Gibson’s definition the individual can sit on the table and write on the chair because this option is objectively possible. In

Norman's definition, though, the likelihood that the individual will sit on the chair and write on the table is highlighted because it matches their experience with similar objects and because the object's qualities are made for the "suggested" interaction (e. g. in the case of the chair, its size and shape "suggests" sitting on it).

2.1.3 Affordances in the Human-Computer Interaction Concept

Norman's (1988) explanation of affordances has become widely used and appropriated in the context of human-computer interaction (Kaptelinin, 2015), sometimes referred to as human-machine interaction. Unintentionally, he referred only to actions possibilities that are readily perceivable by an individual. This definition of action possibilities has mistakenly become a synonym with Gibson's concept throughout the years, even though Gibson never referred to perceived action possibilities in his work (Osborne, 2015). The concept of perceived action possibilities is dependent on the individual's physical capabilities, goals, beliefs and past experiences (as again opposed to Gibson who disregards this dependency) (Norman, 1988). Therefore, also in our understanding, Norman's view makes the concept of affordances more graspable in terms of human-computer interactions, which might explain its popularity and widespread adoption within the field of HCI (Gibbs et al., 2013).

Information and communications technology (ICT) is derived from information technology (IT) that puts emphasis on the role of communications and the integration of telecommunications and computers and software that enable users to access, store and transmit information (Oyanagi, 2002). ICT features and functions are derived from the product's classification which is created by the product's developers (Barry et al., 2003). This traditional approach puts emphasis on how the product was designed to be used (Faraj & Azad, 2012). However, through the perspective of affordances, it draws attention to the fit of the technology to the activity of the user. Therefore, when affordances are used as a lens through which researchers describe technology tools, it allows for studying how such tools can be appropriated or misused by users (Barry et al., 2003).

According to Treem and Leonardi (2013), affordances are “constituted in relationships between people and the materiality of the things with which they come in contact” (Treem & Leonardi, 2012, p. 146). It means that the same technology tool can provide varying affordances when used by different users. The affordance lens is thus helpful in explaining why people, in our case employees, use different digital tools in similar ways and/or the same technology tool in different ways (Fulk, 1993; cited in Gibbs et al., 2013). Just as every technology tool has affordances available to it, they also have constraints. Constraints are limitations imposed by the tool which somehow limit the ways in which users can use the technology. In our study, in line with Norman (1988), we use the term constraints when we refer to aspects of the tool that perceptibly limit its use for the user. This, in some cases, leads to working around certain constraints that are imposed by the tool.

Affordance lens, as presented above, explores that the use of technology is socially constructed by users who choose strategically how to take advantage of technology tools in a way that meets their objectives. Such use may not be in accordance with the intentions of the tool’s designers (DeSanctis & Poole, 1994; cited in Gibbs et al., 2013). Affordance view thus helps explain the user-technology relationship and its mutually constitutive nature (Gibbs et al., 2013).

Affordances for Knowledge Sharing within the HCI Concept

In our research, we aim to study the affordances of digital tools for knowledge sharing. According to Gibbs et al. (2013), a majority of the emerging research suggests that digital tools, especially social media, promote knowledge sharing (e. g. Majchrzak et al., 2013). One of the most influential and early studies concerning affordances of digital tools was done by Treem and Leonardi (2013), who propose four types of affordances of social media that are used inside organizations; visibility, editability of content, association of people and content, and persistence. Their explanation of visibility is tied to the “amount of effort people must expend to locate information” (Treem & Leonardi, 2013, p. 11). Editability concerns “the fact that individuals can spend a good deal of time and effort crafting and re-crafting a communicative act before it is viewed by others” (Treem & Leonardi, 2013, p. 25). Associations are “established

connections between individuals, between individuals and content, or between an actor and a presentation” (Treem & Leonardi, 2013, p. 30). Persistence refers to the accessibility “in the same form as the original display after the actor has finished his or her presentation” (Treem & Leonardi, 2013, p. 18). They argue that social media are consistently high on all four presented affordances and other technologies, such as e-mail and teleconferencing, provide only limited affordances (Treem & Leonardi, 2013).

Majchrzak et al. (2013) became inspired by Treem’s and Leonardi’s study and proposed a similar framework of social media’s affordances, but focused particularly on knowledge sharing. Their taxonomy includes metavoicing, triggered attending, network-informed associating and generative role-taking. Metavoicing refers to “reacting online to others’ presence, profiles, content and activities” (Majchrzak et al., 2013, p. 41). Triggered attending concerns relying on automatic notifications about changes to specific content for guiding an individual’s participation (Majchrzak et al., 2013). Network-informed associating in their study points out linking with others to improve opportunities to engage (Majchrzak et al., 2013). Finally, their fourth affordance generative role-taking means taking on “emergent rather than prescribed roles to facilitate dialogue” (Majchrzak et al., 2013; cited in Gibbs et al., 2013, p 105). Our taxonomy of affordances is inspired by both those taxonomies that were created by Majchrzak et al. (2013) and Treem and Leonardi (2013). Based on the empirical material we established our own framework of affordances that are presented later in this study. Those affordances are developed within the concept of knowledge sharing.

2.2 The Concept of Knowledge and Knowledge Sharing

2.2.1 The Concept of Knowledge

Apart from philosophy (e.g. Plato) and culture studies (e.g. Foucault) knowledge literature has been established in organizational and management studies (Styhre, 2011). With today’s economy being characterized as a “post-industrial service economy” (Bell, 1973 cited in Hislop, 2013, p. 3) knowledge has become an important factor of production. Ragab and Arisha even

refer to it as “the currency of the current economy” (2013, p. 873). Yet, knowledge and its management are broad and ambiguous concepts (Kalling & Styhre, 2003; Newell et al., 2001). One reason for that lies in the difficulties to grasp its nature, namely its epistemology (e.g. Hislop, 2013). Thus, we want to point out the two most recognized and rather contrasting perspectives in organizational theory and management studies (e.g. Hislop, 2013) in that sense. These are the objectivist and practice-based perspective.

Knowledge Epistemology

In an objectivist understanding, knowledge is viewed as an entity that individuals, groups or organizations possess (Cook & Brown, 1999). By the use of language and symbols, it is possible to externalize this entity (Hansen et al, 1999). That means that it is possible to separate knowledge from the person creating it (Hislop, 2013). Thus, it can be codified, captured and stored (Hansen et al, 1999). Due to this impersonal character, it is furthermore assumed that knowledge can be distributed in written form. Information and communication technology play a prominent role in knowledge management. They serve as repositories, for example, in form of databases; workflow support in terms of templates (Alvesson & Kärreman, 2001) and can support decision making processes when working with big data (e.g. Hislop). To enhance an organization's knowledge base, it is knowledge management's aim to motivate employees to externalize their knowledge (Hansen et al., 1999) and contribute to an organization's knowledge stock.

In contrast, the practice-based perspective emphasises knowledge embeddedness in practice (Cook & Brown, 1999) and (inter-)action. Hislop defines the practice as “purposeful human activity” (2013, p. 31). Consequently, knowledge is not understood as an object but as an integral part of purposeful human action (practice). It is understood to be anchored in human minds and thus, inseparable from the person who creates it. This intangible character is understood to make it impossible to fully capture, codify and store it. Rather knowledge is created and distributed by personal (inter-)action (Hansen et al., 1999). Consequently, an organization does not directly possess knowledge resources as a distinct entity. Moreover, through the minds and actions of

people, an organization is able to access a wide range of individual knowledge indirectly. In that regard, information and communications technology plays a subordinate role in knowledge sharing. In contrast to the objectivist perspective where explicit knowledge is directly shared through ICT, from the practice-based perspective, ICT supports knowledge sharing (Styhre & Gluch, 2010). Due to its character that is understood to be embedded in practice, knowledge is characterized through a high level of subjectivity. Thus, in the practice-based perspective knowledge is furthermore understood to be socially constructed. In other words, knowledge has no universal objective truth but is rather a socially and culturally contingent (Hislop, 2013).

Types of Knowledge

Depending on the respective epistemology, knowledge can be classified into two distinctive categories. Either following an either/or logic (Schultze & Stabell, 2004) (objectivist perspective), or it is understood to follow the logic of both/and (Schultze & Stabell, 2004) where both types exist simultaneously and in duality as dimensions of knowledge (practice-based perspective). However, regardless of its nature being seen as either an object or understood subjectively embedded in human practice, most scholars classify knowledge into explicit and tacit knowledge (Hislop, 2013).

Explicit knowledge is the knowledge that is formal, systematic and therefore knowledge that can be verbalized and codified (Hislop, 2013). It is impersonal and context-independent (non-subjective). Therefore, explicit knowledge from an objectivist perspective is synonymous with theoretical objective knowledge (Hislop, 2013).

Tacit knowledge, however, is the knowledge that is personal, embedded in practice, and subjective (Hislop, 2013). It cannot be expressed verbally. Therefore, it can only be transferred by applying it (Choi & Lee, 2003) which makes it difficult to share and retain (Sandhu, Jain & Ahmad, 2009). Tacit knowledge is obtained through learning and experience. (Sandhu, Join & Ahmad, 2009). A common example of tacit knowledge is the ability to ride a bike (Cook &

Brown, 1999). Knowledge enables a person to carry out a certain activity but is yet, difficult to communicate.

Taking into account the differing epistemologies, from an objectivist perspective, explicit knowledge is understood to be the equivalent to objective and thus, valid knowledge (Hislop, 2013). This character turns explicit knowledge into a valuable commodity resulting in privileging explicit over tacit knowledge (Hislop, 2013). That is because the latter is understood to refer to subjective knowing (Jonsson, 2015) and is regarded to be more informal (Hislop, 2013). This assessment of knowledge stresses either/or logic of the objectivist perspective (Hislop, 2013). In mainstream literature, knowledge is most commonly viewed through the objectivist lense. However, researchers such as Cook & Brown (1999) or Hislop (2013) criticize prioritizing explicit over tacit knowledge and call for a practice-based understanding.

To sum up, the two perspectives on the nature of knowledge are contrasting in their fundamental assumptions. Yet, both acknowledge explicit and tacit elements are found in the knowledge. The objectivist perspective follows an either/or logic classifying knowledge into either explicit or tacit with privileging explicit over tacit knowledge. Rather than a strict classification, in the practice-based understanding, the existence of explicit and tacit elements are acknowledged in duality following a both/and logic.

Defining Knowledge

Due to its heterogeneity defining knowledge is not a trivial task. Davenport and Prusak (1998) conceptualize it in distinguishing between data, information and knowledge. While the first two refer to an objectivist perspective, knowledge is defined in a practice-based manner. For our purpose, we follow this understanding.

In that sense, data is defined as “discrete, objective facts about events” (Davenport and Prusak, 1998, p. 3). It represents pure facts with a narrow or non-existent scope for interpretation. The date of a historical event is an example of data. Information, however, is defined as a “message” (Davenport & Prusak, 1998, p. 3) with a sender and receiver. In that sense, information is data

that is contextualized or categorized. It provides a higher degree of subjectivity. Davenport and Prusak argue that data turns into information when the meaning is added. Thus, several factors, such as language, tone and the situation in which the information is sent or received matter for its understanding. Although information is context-specific and therefore, more subjective, its nature of being sent from one entity to another yet reflects objectivist assumptions.

Knowledge, on the other hand, is a deeper concept that builds upon the two terms outlined above. It is defined as “a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of knowers. In organizations, it is often embedded not only in documents or repositories but also in organizational routines, processes, practices and norms.” (Davenport & Prusak, 1998, p. 5). Other than Alvesson and Kärreman (2001) who criticise this definition to be too broad and thus, meaning rather nothing, we value this openness for our purpose. In using this definition’s single elements, we create an understanding that allows us to acknowledge the complexity and intangible character of knowledge. In sense, in contrast to information, knowledge is created by adding more meaning. Nonaka and Takeuchi (1995) argue as Davenport and Prusak saying that “knowledge, unlike information, is about beliefs and commitment” (1995, p. 58). In that sense, knowledge is understood as first of all a fluid mix which emphasizes that it is not static but continuous. It is built upon experiences, values and beliefs. Those constitute a framework for evaluating but also further developing information. In that sense, according to Davenport and Prusak knowledge originates from information by comparing, balancing possible outcomes and pondering on further possible connections. Furthermore, knowledge is intangible. Unlike data or information, knowledge contains a time horizon of previous experiences and future possible outcomes. It is directed towards some end or purpose (Nonaka & Takeuchi, 1995). Thereby, it enables the subject to practice (= purposeful human activity). An example that marks the distinction between information and knowledge is artificial intelligence (AI). Based on the information that is given to a system, AI aims to evaluate that information and to make knowledgeable decisions based on it (Forbes, 2018). However, the line between information and knowledge blurs significantly. In

this definition both explicit (“embedded [...] in documents”) and tacit (“it originates and is applied in the mind of knowers”) dimensions of knowledge are addressed. This duality is characteristic of the practice-based understanding of knowledge.

For our purpose, we draw upon Davenport’s and Prusak’s conceptualization and understand knowledge in distinction to data and information. It contains both tacit and explicit elements which co-exist in duality. We understand knowledge, furthermore, as a framework for evaluating information based on existing experiences and for enabling further development of it. Thereby, our understanding refers to the practice-based understanding of knowledge without neglecting the objectivist understanding in acknowledging its existence in data and information.

2.2.2 Knowledge Sharing

In conceptualizing knowledge, we constitute an understanding of how knowledge is shared in organizations. Hence, in this chapter, we discuss firstly the term knowledge sharing, secondly, we outline two strategies for knowledge sharing in the organizational context and thirdly, we discuss potential barriers and enabling factors for knowledge sharing.

Knowledge Management and Knowledge Sharing

Besides the difficulty to grasp knowledge itself, researchers highlight the difficulties in defining management (Styhre, 2003). The consequence of this difficulty combined with the ambiguity outlined above is that there is no general understanding on how to manage knowledge successfully (e.g. Edwards et al, 2009).

To address that, Jonsson (2015) differentiates knowledge management definitions into generations. While the first generation refers to an understanding of knowledge is managed that focuses on knowledge “generation, representation, storage, transfer [...]” (Schultze & Stabell, 2004, p.551), the second generation stresses on the human factor in knowledge management. In the understanding of Davenport and Prusak (1998), the first generation refers to data and information management while the second generation refers to actual knowledge management. Since we view knowledge along with Davenport and Prusak’s (1998) understanding as a

framework for evaluating and enabling further development and creation of tacit and explicit elements, our understanding of knowledge management is based on the second generation.

In terms of knowledge sharing, Kalling and Styhre (2003) understand knowledge sharing as knowledge management in practice. Jonsson however, labels it the “key process of knowledge management” (2015, p.46). While some researchers understand knowledge sharing as transferring or disseminating units of knowledge (e.g. Lee, 2000; Argote & Ingram, 2000), Østerlund and Carlile emphasize that “[...] knowledge sharing is a complex process that goes beyond the mere transfer of abstract bodies of knowledge” (2004, p. 91). In that sense, Willem (2003) defines knowledge sharing as the “exchange of knowledge between at least two parties in a reciprocal process allowing reshaping and sense-making of the knowledge in the new context” (quoted in Sandhu, Jain & Ahmad, 2009, p.209). This definition aligns with our understanding of knowledge. Stressing knowledge sharing as a reciprocal exchange that allows sense-making points out that humans and their understanding are actively involved in it. Hence, it highlights subjectivity and the human factor in knowledge sharing. Consequently, knowledge sharing touches upon the actual exchange process in terms of knowledge transition but also the sense-making of the involved parties. As Kim and Lee (2006) point out, knowledge sharing requires the dissemination of individual employees’ work-related experiences through the collaboration between and among individuals, subsystems (groups) and organizations.

To sum up, our understanding of knowledge is a concept with tacit and explicit dimensions for evaluating and enabling further development of it. Hence, we understand knowledge sharing as the process of exchanging and disseminating knowledge in a reciprocal way which includes facilitating the sense-making of the involved parties. In other words, knowledge sharing touches upon the distribution of knowledge, making it accessible, enabling the organization’s members to develop an understanding of and fostering a recursive exchange about it.

Knowledge-sharing Strategies

Based on this understanding of knowledge sharing, in the following paragraph, we will outline knowledge management strategies and highlight respectively how knowledge is shared in organizations.

One of the most widely acknowledged (Hislop, 2013) frameworks for knowledge management is from Hansen et al. (1999). They discuss the two strategies “Codification” and “Personalization” (Hansen et al., 1999, p.3). Codification aims to motivate employees to codify their knowledge into databases. It is based on the assumption that knowledge can be verbalized. By that, the codification strategy aims to be used for explicit dimensions of knowledge. Secondly, the personalization strategy emphasises that the key knowledge of an organization is tacit knowledge. Due to its tacit dimension, it cannot be verbalized. Therefore, this strategy aims to motivate people to share their knowledge in practice and through interaction with other employees. To facilitate this interaction, knowledge management should make sure that working groups are small and that there is a high turnover rate to distribute knowledge. In that sense, knowledge is, on the one hand, shared from “people to documents” (Hansen et al., 1999, p.3) (codification) and on the other hand from “person to person” (Hansen et al., 1999, p.3) (personalization). Consequently, we understand the codification strategy as mainly aiming for the dissemination and accessibility of knowledge by focussing on its preservation. The personalization strategy, however, we understand as aiming to facilitate the sense-making of the involved parties by enabling personal interaction. In that sense, we see the personalization strategy as creating the possibility for a direct recursive exchange. For our purpose, combining the outlined strategies by Hansen et al. (1999) provides us with an understanding of how knowledge is shared in an organization.

Another knowledge management concept, that due to its practice-based focus is of particular relevance for our purpose, is the distinction of three knowledge management logics by Jonsson (2015). In conceptualizing the knowledge management process in three steps, her framework points out three different actions that include information and knowledge sharing. The first logic

is labelled as “Knowledge management logic” (p.54) and describes actions and practices for “Knowledge handling” (p.54). It aims to make the work more efficient and easy “by storing and using documents and templates” (p.54). In other words, the logics practices are about routines to structure and organize knowledge. According to Jonsson, it is the basis and a necessity (“Hygiene factor”, p.54) before the actual knowledge sharing. Thereby, it can be seen as the first step in the knowledge management process. The second logic is about the practices of “Knowledge sharing”. Here, co-workers learn from one another through shared experiences and by doing and/or observing. In that sense, Jonsson labels this the “Professional logic”. This logic aligns with our understanding of knowledge sharing as a reciprocal exchange that not only disseminates knowledge but furthermore enables the other parties’ sense-making. Jonsson also highlights the further development of knowledge during the knowledge-sharing process. Lastly, the “Business logic” takes place after knowledge sharing and consists of actions such as “Debriefing” (p.54) and reflection. We understand this logic to be crucial for an organization to anchor or institutionalize the exchanged knowledge. Jonsson points out that based on reflecting the shared knowledge, the Business logic enables an organization to further develop and start the outlined process from the beginning. For our understanding of knowledge sharing, we view the three logics (Jonsson, 2015) outlined above as specifically valuable because it highlights knowledge sharing through shared experiences and by doing/observing.

In sum, both concepts show the necessity of knowledge preservation and dissemination in documents and templates for knowledge management. Moreover, they show that knowledge is exchanged through interpersonal contact. Jonsson (2015) however, gives a certain order to the actions of knowledge management and includes a reflection in the management process to institutionalize the exchanged knowledge. For our purpose, both concepts are highly relevant since they reflect a practice-based understanding of knowledge sharing. Moreover, combining the single elements of each concept they provide a framework not only for the dissemination but also for enabling the sense-making of knowledge respective to our knowledge and knowledge-sharing understanding.

Enabling and Hindering Factors for Knowledge Sharing

Due to its intangible character, there is no distinctive list of factors that influence knowledge sharing. Moreover, researchers have investigated enabling and hindering factors in terms of potential barriers to knowledge sharing. The following paragraph gives an overview and understanding of factors that influence the likelihood of knowledge to be shared.

Information technology is widely recognized to support and enable knowledge sharing (Hislop, 2013). Besides the preservation of information and data in the form of databases, it provides collaboration tools which enable interpersonal contact. In his research on organizational spaces where knowledge exchange takes place, Nonaka and Konno (1998) coined the term Cyber Ba which refers to a virtual space for informal exchange of knowledge and the development of interpersonal trust. As we will show later, trust plays a crucial role in knowledge sharing. In that sense, IT supports both sharing explicit and tacit knowledge. Even though face-to-face interaction is regarded as specifically important for the dissemination of tacit knowledge and the development of trust, video conferencing and virtual reality (VR) are substantial alternatives (Narciso et al, 2019). They are regarded to provide a likewise rich knowledge exchange due to transferring social clues of communication such as gestures, facial expression, etc. Additionally, they provide the possibility to give and receive spontaneous feedback. Emails, however, serve mostly for data and not knowledge exchange due to the lack of social clues. Moreover, varying answer speed among employees inhibits spontaneous feedback and thereby the reciprocal exchange.

Besides, information technology enables knowledge sharing by providing the possibility to network (Treem & Leonardi, 2013). Just as a database, a network provides the user with a memory system of knowledge that is yet, embodied in people. In other words, it provides maps of experience which enable employees where/in whom to find the desired knowledge. Even though, as Alavi and Leidner (2001) point out, the user-friendliness of IT tools are crucial for its level of support and inadequate IT systems can inhibit knowledge sharing (Willem, 2003), their

adequate use, however, as shown above, can leverage of both explicit and tacit sharing knowledge.

Besides technology that organizations use to enhance knowledge sharing, socio-cultural factors on the individual and organizational level are key in shaping the likelihood to share knowledge (e.g. Hislop, 2013; Kim & Lee, 2006). Most commonly interpersonal trust is regarded to enhance the communication speed and to empower coworkers to share their personal knowledge (Von Krogh, 1998). Group identity and shared values are furthermore associated to support a high level of knowledge sharing (Hislop, 2013). Many researchers have also investigated the nature of work and its impact on knowledge sharing. Most commonly a high level of autonomy and creativity are regarded to foster an environment where knowledge is shared easily (Jonsson, 2013). Willem (2003) summarizes these observations and points out that trust, power and social identification are crucial characteristics that influence knowledge sharing.

On the organizational level, the organizational culture should, therefore, reflect that. Kim and Lee (2006) come to the conclusion that social networks and performance-based rewards systems are structural elements of public sector organizations that are positively associated with a high level of knowledge sharing. Many scholars highlight moreover that the organization's culture influences knowledge sharing in framing individual factors such as a human's personality, gender, education etc. (Eaves, 2014). Consequently, organizational culture and structure are important factors in shaping individual employees attitudes (Hislop, 2013).

On the other hand, individual barriers that are associated with inhibiting knowledge sharing are among others the lack of time, personal interaction and trust (Willem, 2003). On the organizational level, a lack of reward and recognition is viewed to inhibit knowledge sharing (Willem, 2003). Consequently, a knowledge-sharing culture should aim to be integrated and supported by the employees, its systems, processes and technologies to maintain this culture (Riege, 2005).

One example that emphasizes knowledge sharing on the organizational level is organizational learning. As outlined earlier, knowledge exists in the minds of individuals, in workgroups and is

used by whole organizations - and so does learning. Besides learning on the individual and group level, organizations can take the role to support this process (Bui, 2019). Consequently, a knowledge-sharing culture can be supported by a focus on organizational learning.

2.2.3 Chapter Summary

In this chapter, we have outlined the theoretical grounding and our understanding of knowledge and knowledge sharing. Other than data and information we understand knowledge in terms of practice and as a framework for evaluation that enables further development and creation of it. Knowledge sharing in that regard is understood as a reciprocal exchange that disseminates knowledge and facilitates the sense-making of the involved parties. Consequently, in our understanding, the distribution, access and understanding of knowledge are essential for its transfer. We have outlined knowledge management strategies and their respective implications for knowledge sharing that in our understanding are most relevant. These are Hansen et al's (1999) two strategies of codification and personalization such as Jonsons (2015) three logics of knowledge management. Lastly, we have provided an overview of factors that influence knowledge sharing such as information technology and socio-cultural factors on the individual and organizational level.

2.3 Public Sector Organizations

Based on the foundation of the two previous subchapters, in the following one, we will firstly differentiate public from private sector organizations. Along with this differentiation, we will point out the significance for digitalization and knowledge sharing for public sector organizations. Combining these parts will lead to our research question.

2.3.1 Differentiating Public Sector

Benn and Gaus differentiate public from private organizations in terms of three major factors: interest, access and agency (1983). The interest of a public organization refers to its outcome, meaning its benefits and losses. Other than within private organizations, the benefits and losses

of public organizations that are mutualised with the community. The outcome of a private organization, however, depending on ownership structure, is divided by the owners of the company. Benefits and losses are privatised among the owners. In public sector organizations, however, there is no ownership that can be purchased with monetary means. Secondly, access refers to the funding of public organizations which is mostly based on public resources e.g. taxes. Moreover, public organizations act in the name of the public instead of a private entity. That is why their agency characterizes them in Benn and Gaus' understanding to be public. Rainey (2014) however, questions this categorization and argues that privately-owned companies are equally able to act in the public interest. Non-profit organizations, for example, provide goods and services that serve a common goal without accumulating profits. Their funding can, furthermore, depend on governmental (financial) resources (Rainey, 2014).

Due to multitude legal forms of ownership that are anchored in civil law a private company's financial funding can, moreover, be scattered and not necessarily be provided by a private but likewise from a legal person. Consequently, a clear distinction based on the category of access is questionable in contemporary organizations. The German carmaker Volkswagen, for example, is 11,8% owned by the German federal state Niedersachsen (Volkswagen AG, 2020). But not just an organization's shares can partly be state-owned. In times of crises, it is possible for companies that have a great impact on a nation's economy for example in terms of employment or contribution to a nation's gross domestic product to receive funding in terms of a loan given by the state (Financial Times, 2017). Both examples highlight to what extent boundaries between private and public organizations can blur. Hence, Rainey (2014) distinguishes public from a private organization in a multidimensional concept where several variables determine to what extent an organization can be seen as public. Based on a collection of literature and writings regarding the public sector, he suggests a catalogue that summarises distinctive characteristics and "Common Assertions" (Rainey, 2014, p. 79) that are found in public sector organizations.

Environmental Factors that shape external pressures of public sector organizations are among others the "absence of economic markets for outputs" (Rainey, 2014, p. 79), exclusive dependence on governmental financial resources and being subject to "intensive external

political influences” (p. 80). Here, elements of Benn & Gaus (1983) access category regarding financial resources can be found. Especially the latter resulting in an “idiosyncratic nature of governmental institutions” (Balasubramanian, Al-Ahbabi & Sreejith, 2020, p. 5) highlighting the co-dependency not only from public sector organizations to political decisions but also among each other.

The second dimension, Organization-Environment Transactions (Rainey, 2014), elaborates the character of public organizations outputs. Other than private companies, public organizations do not produce a commodity that is tradable at an economic market to a certain market price. That means that public services are not dependent on market demand and supply. Rather the services provided by public organizations are often monopolistic meaning that the government is “often the sole provider” (Rainey, 2014, p. 80). The reason for the states monopoly on distinctive services is that these services refer to a common good and aim to maintain the system of law, justice and social order (Rainey, 2014). In other words, services that touch upon civil rights are provided by a state monopoly to secure and control their production.

In terms of Organizational Roles, Structures, And Processes (2014) Rainey, along with Willem and Buelens (2007) and Mintzberg (1989) suggest a higher significance of formal systems, bureaucracy and standardisation of processes. One reason for that is the importance of external reporting imposed by law (Lopez-Portillo, 2016) and often conflicting goals which lead to an inherent ambiguity in public organizations (Hall & Quinn, 1983). Hence, values such as honesty, fairness, cost control and goal orientation have a strong impact on the character, administration and organizational structure of public organizations (Willem and Buelens (2007).

To summarize, there is an ongoing discourse to what extent public organizations are distinctive to private companies. When distinguishing them, boundaries can blur. Furthermore, there exist hybrid forms that are neither fully public nor private. Along with Rainey (2014), we argue that public organizations exist to secure civil rights that economic markets and thereby private organizations that participate in them, are unable or unsuitable to address. Using a one-dimensional classification provides an ineligible categorization that is unable to reflect the

spectrum of organizational forms differing between private and public. Hence, for our purpose, we draw upon a multitude of dimensions that reflect the external environment, the character of outcomes and internal structures of the respective organization. Without claiming integrity, the summarized characteristics can elaborate on how far an organization can be seen as public without neglecting the existence of hybrid forms. For our study, we focus on public sector organizations that meet the characteristics elaborated above and therefore can be located on a high degree of being public.

2.3.2 Knowledge within Public Organizations

As shown in the previous paragraph, the nature of public sector organizations differs significantly from the nature of private organizations regarding environmental, output-related and internal factors. According to Barney (1991), knowledge is a valuable resource since it does not only provide an organization's competitive advantage but also strengthens its market power. Consequently, its distribution and transfer are crucial in order to benefit and develop this valuable resource (Barney, 1991). While public organizations, as shown above, do not depend on economic markets for their outputs, and consequently competitive advantages and market power are of little relevance, knowledge and its transfer, however, play an equally important role (e.g. Willem & Buelens, 2007).

Due to environmental developments such as the increased use of knowledge-intensive work that characterizes nowadays economy as knowledge economy (Powell & Snellman, 2004) and the society's increasing demand for transparency, governmental actors have acted accordingly and initiated an array of reforms in the public sector to align with those external pressures (Pettigrew, 2005). Due to the dependency outlined above public sector organizations are forced to also act accordingly. As Pettigrew (2005) observed multiple governmental reforms that aim to renew the public sector to increase efficiency and innovation. Sharing information and knowledge thus is an essential task for nowadays public sector organizations in order to meet their stakeholders' demands (Buunk et al., 2018). According to Lopez-Portillo (2016), knowledge sharing is

moreover, an increasing challenge for public sector organizations to achieve a high level of transparency and consequently, regain citizens' trust.

Additionally, as public sectors organizations, the main objective is to produce knowledge-intensive services that among others maintain the nation's system of law (Rainey, 2014) their effectiveness translates directly into the sustainability of a nation's social order and economic growth (Lopez-Portillo, 2016). That highlights the importance of public sector organizations outputs which depend essentially on knowledge. Two contemporary trends of public administrations stress the importance for successful knowledge sharing furthermore (Pee and Kankanhalli, 2016). Firstly, downsizing of the public sectors workforce and demographic developments call not only for the effective preservation but moreover, the effective exchange of knowledge to minimize potential loss. Secondly, due to the increased use of information technology and networks among public sector organizations, knowledge sharing takes a crucial role to be able to share and apply the respective knowledge across boundaries (Pee & Kankanhalli, 2016). Since public sector organizations do not compete with other organizations, knowledge sharing across boundaries can benefit and increase the effectiveness of the involved parties significantly. Consequently, internal and external pressures stress the significance of sharing knowledge in public sector organizations.

2.3.3 Digitalization within Public Organizations

The world is experiencing a shift from analogue to digital systems (Rafiq & Ameen, 2013) and public organizations are no exception. Digitalization is one of the processes that many public organizations currently face and undergo (Mergel et al., 2018). The demand for immediate and easy access to rich and up-to-date content is growing significantly (e. g. Rafiq & Ameen, 2013). At the centre of these efforts are users, both internal and external, of digital services who are included in the digital transformation efforts (Mergel et al., 2018).

Digitally managing public administration allows governments to benefit from it in terms of governance. Such benefits include, for example, an increase in resource management, higher efficiency in providing services or better transparency (EESC, 2017). Digital transformation has been used lately as a term that describes the revision of policies, processes and services to create a simpler user experience for citizens and frontline workers (Mergel et al., 2018). This transformation is the next wave of digital governance that reviews existing services (Dunleavy, 2007), instead of simply digitizing analogue services which has been the case for many countries for some years now (Stanga et al., 2019). In our view, this transformation stresses the importance of digital tools and calls for studying how public sector employees use them, thus how these tools afford them.

2.3.4 Developing Research Question

Given that technologies are proliferating throughout organizations, we found many articles that addressed our issue of interest, which is affordances of information and communications technology for sharing explicit and tacit knowledge. However, there seems to be a neglected area which specifically addresses public sector organizations. As outlined above the digitalization of the public sector is a contemporary relevant process. Simultaneously, external as well as internal pressures increase the necessity for successful knowledge sharing in public sector organizations. Constituted by their public nature, these pressures differ significantly from those that private organizations face. To address these, information and communications technology, as outlined above, plays a highly relevant role in supporting knowledge sharing. Yet, their use in public sector organizations is an under-investigated field. While existing studies investigate the use of social media in public sector organizations, we have found that in our investigated public organization there is a mixture of social media and traditional CMC technology that is used to share knowledge. Consequently, the aim of our study is not to focus on one classification of tools but to identify the use of information and communications technology for knowledge sharing. Based on our study we point out consequences for successful knowledge sharing with digital tools.

In analysing the affordance that these tools provide for public sector employees to share their knowledge, we address the shortage of acknowledging the public sector in qualitative knowledge management studies. While many scholars have criticized privileging theoretical in terms of explicit over tacit knowledge in the contemporary knowledge management literature (e.g. Cook & Brown, 1999, Hislop, 2013), our study takes into account both explicit and tacit dimensions of knowledge equally taking a practice-based perspective on knowledge. In that sense, we wish to contribute to the so far little qualitative research on information and communications technology affording knowledge sharing in the context of a public sector organization. Based on that, our analysis and thus the implications that we draw from this study differ significantly from previous studies. Our study discusses the implications for the use of ICT for knowledge management to address the significance of knowledge sharing in the public sector. Consequently, we aim to answer the research question: *How do the affordances of information and communications technology support knowledge sharing in the public sector?*

3 METHODOLOGY

3.1 Philosophical Grounding

As indicated at the beginning of this study, we have engaged in qualitative research. The strength of qualitative research is its ability to provide complex textual descriptions of how people experience a given research issue (Silverman, 2016). Starting with our ontological considerations, ontology relates to the nature of reality, whether it is objective or constructed through social interactions (Bryman & Bell, 2003). In this study, we focus on a socially constructed part of organizational reality. Social constructionism aims to uncover the way in which employees interact with each other and participate in their groups to develop their own perceived reality of the organization (Berger & Luckmann, 1991). As such, we recognize that there is no absolute truth and the representations, perceptions, ideas, language and beliefs make up the perceived organizational reality.

Our study is interpretive in nature and it is inspired by the ethnographic tradition of qualitative research (Prasad, 2018). Using this tradition of focusing on culture, beliefs and values (Merriam, 2002), we want to gain an understanding of the everyday life processes in the investigated organization. We use two qualitative methods for data collection – interviews and secondary data. The secondary data includes a short on-site observation and a presentation of tools for knowledge sharing. The focus is on subjective understanding as the basis for organizational behaviour. The interviews are, therefore, the main source of data to gain a deeper understanding of the various perspectives.

3.2 Data Collection

This study is based on interviews with employees of a public services organization. We conducted interviews with 11 employees who agreed to contribute to our project. The majority of them worked with internal matters in the human resources department and/or in strategic managerial and middle managerial positions. We also interviewed one external consultant and two officers who are employees who work directly with customers (for more details about this

position see chapter 4). Prior to the interviews, an introductory face-to-face meeting at the headquarters was conducted at the beginning of our study. During this meeting, we toured the facility and learned more about the organization's procedures. In addition to that meeting, we were also provided with a detailed presentation of each of the digital tools that were available for employees for the purposes of knowledge sharing. We found these two meetings to be particularly helpful because this way we gathered data on the organization and the context in which digital tools were used. We became familiarized with the working environment, we could thus create our first impressions of the organization and a clearer picture of the employees' work life. We used the insights that we gained to formulate our interview questions (for interview questions see Appendix 1).

The interviews were semi-structured, which allowed us to preserve consistency while allowing for unanticipated issues to emerge. This also allowed us to have an open exchange of questions that evolved and changed throughout the data collection process. Our goal was to get diverse perspectives on the use of digital tools for knowledge sharing at various organizational levels. We selected this organization because its distributed nature (offices all over Sweden) created some interesting knowledge sharing challenges. We sense that it is also important to note what we meant by knowledge sharing when asking questions during the interviews. While many of the interviewees were familiar with the term and the concept, we made sure to explain that the focus was not only the exchange but also facilitation of access to knowledge, which in our understanding is also important for knowledge sharing. From the interviews and the initial presentation of the organizational tools, we found out that employees that we interviewed communicated and exchanged knowledge primarily through email, Skype, their intranet In and its chat forum Connecticutum. Therefore, we focused our analysis primarily on these tools and their affordances.

Despite our initial intention, the interviews were conducted digitally due to circumstances caused by the current Coronavirus pandemic. For the purpose of the interviews, we used Google Hangouts, and in cases where the interviewee did not own a Google account, we used Skype for Business. The majority of the interviews were conducted with a camera switched on, which

allowed us to observe the interviewee's reactions and body language despite the distant locations. The rest of the interviews were conducted without a video, which then held characteristics similar to a phone call. During each interview, one of us took the role of an interviewer while the other one was taking notes, allowing us to document the process. In our notes, we especially focused on the questions of what is talked about? and how is it talked about?. Interviews ranged from 30 to 90 minutes, with an average of 50 minutes. Names of all participants are anonymized to protect their identity and confidentiality. The organization is referred to as a 'public services organization' and internally developed tools are given pseudonyms.

3.3 Data Analysis

All of the interviews, besides the two introductory ones, were recorded and consequently fully transcribed for the data analysis. Studying the topic with the help of interviews provides us with deeper insight into the employees' everyday work through their perceptions, opinions and descriptions. Interviews allowed us to understand the context, how employees understood their digital tools used for sharing their knowledge.

We decided to transcribe all the interviews as soon as they ended so that we could have added additional notes while we had the interview still in our memory. For instance, when an interviewee said "they", we realized that after several days it could have been difficult for us to understand who he/she talked about in the particular context without the access to the video. Transcribing immediately afterwards helped us overcome such issues.

Since this study is qualitative research based on interviews, there was a large amount of unstructured data, around 150 pages, that needed to be sorted and reduced to make sense of it (Rennstam & Wästerfors, 2018). Our categories emerged inductively from the data. We started by quickly browsing through all the transcripts as a whole. We made notes about our first impressions and then we re-read the transcripts again, one by one and line by line. We continued by labelling relevant words, phrases, sentences and sections. Those labels were about opinions,

activities, differences, etc. The reason for doing so was to choose the most relevant parts of the collected data that represented examples (Rennstam & Wästerfors, 2018) of our outlined problem in a clarifying manner. We referred to the outcomes as codes. We decided that something was relevant because it was either recurring, surprising or when the interviewee explicitly said that it was important. Sometimes we chose parts that were similar to something that we had previously read about, for example in published reports or articles, or when it reminded us of a theory or a concept. At this stage, we ended up with about 30 codes where affordances of digital tools began to emerge.

From these codes, we decided which ones were the most important and relevant, and created categories by bringing several codes together. To sort the material, it was necessary to divide it based on content by adopting the approach of *whats and hows* (Gubrium & Holstein, 1997), i.e. what is said and how it is said. Using the method of switching between ‘what and how’ allowed us to understand employees’ social reality (Rennstam & Wästerfors, 2018) and thus the digital tools’ affordances in terms of knowledge sharing, which we aim to discover in this study. After the conceptualization of the data, we continued by labelling categories and deciding which were the most relevant for our purposes and how they were connecting to each other. By this time we had codes that were “flagged” for more in-depth analysis. We performed a second round of coding on these specific themes. The themes were the affordances that we present in the next chapter - learning, accessing, helping and networking. At the end of the analysis process, we drew a figure that summarized our results. The categories which are the four affordances are considered the main result of our study as they bring new knowledge about the world from the perspective of our interviewees.

3.4 Credibility

Qualitative research is conducted for gaining in-depth analysis of underlying reasons and motivations (Silverman, 2016). However, that comes with limitations. Issues of trustworthiness are among common problems with qualitative analysis. The purpose of the criteria of credibility is to establish confidence that the results are true and believable (Lincoln and Guba, 1986; cited

in Forero et al., 2018). In this sense, we sense it is important to speak about research bias, which is applicable not only to quantitative research (Murphy & Beck, 2020). Research bias occurs when researchers try to influence the results of their work to get the desired outcomes. In many cases, researchers are not even aware of doing so. However, it often severely affects the impartiality of the research and thus reduces the value of the results (Murphy & Beck, 2020). Since qualitative research depends on the experience and judgment of the researcher, and the collected data is subjective, it is difficult to avoid bias. Therefore, it is important to recognize that bias exists, realize what type of bias there might occur and learn how to overcome it (Murphy & Beck, 2020). In the following text, we present different types of bias that, we believe, are important to be aware of.

This research was conducted by two master students. Intentions of both of us, as well as of all participants, are considered sincere and not purposely deceiving to manipulate outcomes. However, we are aware that informing interviewees about the purpose of our study in advance allows for bias. Being aware of this while conducting analysis can, however, minimise this bias. Interviewing process, as mentioned above, was evolving, as after each interview, we spent some time discussing the relevance of each question, editing and changing them when they were irrelevant for our research purpose. Due to the exploratory nature of our study, we eliminated purposely manipulating any of the participants' answers by, for example, asking differently or with a subtone. During analysis, we followed agreed-upon steps, and any modifications of the coding system were discussed and verified by both of us. This way we made sure to establish consistent interpretation throughout the analysis.

In terms of establishing investigators' authority, we were not influenced by any other party that would somehow change the information that we received. The interviews were conducted by us, therefore, they served as the primary data for this study. We also ensured that we had the required knowledge and research skills to perform the role of researchers. We gained the knowledge through previous university courses as well as from research conducted beforehand, which is depicted in the literature review of this study. Our initial intention was to meet in person on a frequent basis to discuss future steps and to work together, but due to the pandemic

situation, we were able to meet only digitally during the first half of our research period. Potentially, this could be seen as a limitation to the study in the sense that we were forced to work independently without each other's physical presence. However, from the beginning, we had a detailed draft of the study protocol that was digitally shared between us where we could see changes made in real-time. This study protocol ensured that both of us understood our research purpose in the same way.

3.5 Reflexivity

Being self-reflexive was a central objective of our research. Qualitative research is, however, inherently subjective and influenced by the researchers' basic assumptions and understandings (Alvesson, 2004). The analysis was, after all, conducted by two researchers and we thus brought different perspectives to the data interpretation. As mentioned in the previous subchapter, during each interview, one of us took the role of an interviewer and one of us was taking notes, which allowed us to document the interview process. However, that also means that we could have gained different angles on each interviewee (as one of us had a direct conversation with the participant and one was "only" listening), and this way bias the data analysis (for the explanation of what we mean by 'bias' please see the previous subchapter).

Moreover, even though everyone that we interviewed agreed to participate voluntarily, there is a risk that some of the questions or the whole discussion could have been too sensitive to talk honestly about, since we only shared the general topic of our research and not concrete questions before the interview (which would then support interviewees' tendency to give answers that they think are "correct"). If some questions were too sensitive to talk about, but the interviewee decided to answer them anyway, there is a risk that the interviewee's talk got affected by "the discourse they are engaged by, rather than an expression of their subjectivity or the cultural community they belong to" (Alvesson & Sveningsson, 2003, p. 967). Murphy and Beck (2020) call this a response bias. This is especially true for interviewees who were not so comfortable with sharing opinions via digital tools and who thus might have thought that their answers would be (digitally) traceable by their employer or colleagues. The issue of sensitivity is also true for

participants who did not build trust with us throughout the interview. Either way, this then means that although people say that they are, for instance, motivated to share knowledge, it does not mean that they truly are. Being aware of this and presenting the data in the way ‘they say they are’ lowers the level of bias in our analysis.

Throughout conducting our analysis we also noticed a few things allowing for somewhat biased data. First of all, except two participants, all of them explicitly described themselves as ‘curious’ in terms of digital tools and sharing knowledge through them. Interestingly, this has not happened as a consequence of a question that would ask for such an answer. We realized that this self-image could incline towards rather positive outcomes of our analysis. What can also be perceived as a source for bias is the age difference between us and some participants. In addition to that, we noticed signs of scepticism that were twice shown towards our study and us in general. This issue could have been perhaps reduced if the interviews were conducted in person, which was unfortunately not under consideration due to the global pandemic. Potential problems could also arise from the language barrier given that all the interviewees were Swedish having English as a second language. Whenever needed, we tried to help the participants with translating Swedish words into English to bridge language barriers. Even though their English was very good in most cases, we sensed that the results of this study were to some extent affected by language barriers, both on our and the participants’ side.

Additionally, we would like to say that the organization is a complex and big governmental organization, and even though we feel that we got a good glimpse of the organization, we believe that to truly investigate the organization and its maze of tools, positions and structures, one would need to spend a significantly longer time than we had the opportunity for. In this regard, we realized that what helped us with a better understanding of the organization was re-reading interview transcripts several times. For example, transcripts from the first interviews made a lot more sense after reading all other transcripts. This way helped us reflect on the case as a whole and prevented us from making any wrong or biased assumptions after the first interviews.

3.6 Transferability

Transferability's purpose is "to extend the degree to which the results can be generalized or transferred to other contexts or settings" (Lincoln and Guba, 1986; cited in Forero et al., 2018, p. 3). According to Eisenhardt (1989) case study research "provides freshness in perspective to an already researched topic" (Eisenhardt, 1989, p. 548). As for knowledge management and affordances, both of which have been extensively researched, we aim to provide 'freshness' in those two fields by combining and interrelating them within the public sector. Moreover, "the likelihood of valid theory is high because the theory-building process is so intimately tied with evidence that it is very likely that the resultant theory will be consistent with empirical observation" (Eisenhardt, 1989, p. 547).

In this sense, it is also important to speak about the contribution of our study. Some researchers (e. g. Easton, 2010) criticise the lack of generalisability. According to these critiques, theory can become too detailed, lacking an overall perspective or 'grandness'. With this research, we do not attempt to develop some 'grand' theory, but rather to provide theoretical contributions and practical insights that are generalisable to theoretical propositions, not to populations or universes (Yin, 1989). As Yin (1989) points out, "the investigator's goal is to expand and generalise theories (analytical generalisation) and not to enumerate frequencies (statistical generalisation)" (Yin, 1989, p. 126) and that is exactly what we are aiming for in our study.

4 CASE PRESENTATION & ANALYSIS

In this chapter, we aim to explore our investigated organization's knowledge sharing in practice. We hereby follow our main research question: How do the affordances of information and communications technology support knowledge sharing in the public sector? This chapter starts with a brief case presentation for the reader to gain an overview of the research context. As mentioned in the previous chapter, from the interviews and the initial presentation of the organizational tools, we found out that the four most commonly used ICT tools for sharing knowledge are Skype for Business¹, Email, intranet In and the social media forum Connecticum. Thus, in the following paragraphs we will briefly outline each tool with its material features and secondly, analyse the employees' individual use of them. Findings from our empirical analysis revealed that the interviewed employees described differing individual affordances of each tool. From those, we established four categories of affordances that address knowledge sharing - Learning, Helping, Networking and Accessing. To answer our research question, the chapter following this one (chapter 5 - Discussion) discusses these findings in light of the presented literature and draws implications on how explicit and tacit knowledge transfer in a public sector organization can be supported by information and communications technology.

4.1 Case Presentation

The organization that our study is based on is a public services organization. It is a state administrative authority that currently employs around 10 500 people, from which circa 70 % work as officers - that is employees who work directly with customers, either personally, over the phone or through online chat. To create a clearer picture about the organization, around two thirds (66%) of all the employees are female. This ratio is similar in the working group of all officers where 67% are female, as well as in the internal support and management working group where 62% of the employees are female.

¹ Unless stated otherwise, whenever we refer to Skype in this study, Skype for Business is meant

In terms of knowledge sharing and based on governmental demands, the organization has implemented several organization-wide digital tools for the preservation and distribution of knowledge that are both internal (i.e. tools developed by the organization) and external (i.e. tools that are not developed by the organization, but employees use them for communicating and sharing their knowledge). According to our interviewees, in terms of knowledge sharing, four technologies stick out. Among internal tools, there is the organization's intranet called In and its integrated chat forum Connecticum. External tools include Skype and Outlook email. In this study we will discuss the affordances of these four most used tools.

Besides these four technologies, personal face to face interaction plays an important role in the organization. One organization-wide initiative that illustrates that is the network of so-called digital coaches. It was institutionalized as a response to a governmental demand (in Swedish “Regeringbrev”) to reform administration and become more data driven (Regeringskansliet, 2017). To support this aim, employees who are interested in the digital transformation can join the digital coaches network and take the responsibility to help their co-workers to use digital tools. Thereby, the coaches support their co-workers in terms of digitalization besides their own usual work. Through the network the coaches can exchange their experience and obtain further education provided by the organization. According to our interviewees, there is at least one digital coach in every office around Sweden.

Knowledge sharing through information and communications technology (ICT) plays an important role in our observed organization. One employee explains:

“Most of the meetings.... I would say usually there is someone calling in from Skype, even though it is a physical meeting since most people are spread out throughout the country. So in many meetings there is someone connected through Skype and I think a lot of the knowledge sharing is semi digital in some way or another.”

Pontus, external consultant

With this quote the employee highlights two valuable insights that are interconnected but yet worth to be pointed out separately. Firstly, he emphasizes that nowadays in face-to-face interactions, for example in meetings, ICT plays an important role. He highlights in his last sentence: "...a lot of knowledge sharing is semi digital in some way or another". We see that as a particular motivation for our study to understand the role of ICT in knowledge sharing. Secondly, he points out that most employees are "spread out throughout the country". For us, that stresses the significance of not only exchanging explicit but also tacit knowledge via ICT. From our empirical material we found that the employees' use of the tools differs significantly. The following subchapters describe and analyse the employees use of each tool, pointing out the respective affordances that each tool provides for the employees.

4.2 Skype for Business Affording Knowledge Sharing

As presented earlier, Skype for Business (referred to as Skype by our interviewees meaning Skype for Business), is one of the external tools that employees of our investigated organization use. Skype for Business is a Microsoft software (Microsoft Skype, 2020) that enables its users to chat, call and conduct online meetings. According to some (e. g. Ebner, 2017), Skype in general has become the synonym for 'video calling' and is thus often used in a verb form 'to Skype' perhaps due to its early worldwide implementation and easy-to-use functions. According to the official website of Microsoft Skype (2020), Skype for Business is being replaced by Microsoft Teams which combines instant messaging, video conferencing, calling and document collaboration in an integrated application. However, since our interviewees spoke mainly about 'Skype' and did not mention Teams, we would like to clarify that we focus purely on Skype for Business in this study.

Skype for Business is part of the Microsoft Office suite and Office 365 (Microsoft Skype, 2020). It is designed to support text, audio and video chat, which are considered the basic features. Users can also use advanced features where they can, for example, integrate Skype for Business with Microsoft Office components such as Exchange, Outlook and SharePoint or record their meetings (Microsoft Skype, 2020). It can be used both inside and outside the organization (as we

wrote under the methodology, we had the chance to try Skype for Business externally during some of our interviews for this study). There can be up to 250 people connected to one session and up to 10 000 people connected to join broadcasted meetings (Microsoft Skype, 2020). Users can also have Skype for Business as a phone system allowing them to make and receive traditional phone calls right from inside Skype for Business. Among Skype for Business services, there is a presence indicator, which shows others when a user is online, offline or busy. Besides sharing files, users can also use Skype for Business to share their own desktop screen and thus let the recipient see what is being done on the other sender's desktop and how.

All employees came across speaking about Skype for Business when asked how they communicate and thus share their work knowledge with their colleagues. According to most of them, Skype is fast, convenient and it is an advantage that everybody in the organization knows about it. We assume that many employees are comfortable with the tool not only because of its user-friendliness, but also because they have come across its free version Skype in their private, outside-their-work lives. Skype for Business seems to be a major tool used daily and, as we showed on Pontus' quote in the case presentation, it is also the main substitute for physical presence during meetings. As we also presented in the case presentation, according to some employees, the importance of face-to-face meetings decreases when they already know the person that they are interacting with. Therefore, in this sense, the importance of Skype for Business increases once they have met their colleague in person at least once.

Many interviewees highlighted easy access to education when referring to Skype for Business. Inside the organization, Skype for Business is used for the purposes of digital classrooms, indicating that employees who are spread all over Sweden do not need to travel to take a course or to take part in a mandatory training:

“...we have transformed classroom education trainings to Skype online learning. We have transformed from classroom to online learning [...] And we usually do video conferences with cameras [on] and one person speaks and we listen...”

Lisa, human resources

Because of the possibility of Skype for Business to connect employees from all over Sweden, education is, according to Lisa and some other employees, easier to access. Lisa also spoke about how they use Skype for Business for such purposes, and that is mostly through video conferences with one main speaker and larger groups of listeners.

Especially now during the global pandemic where employees of our organization needed to work from home, many spoke about distance meetings on Skype being the main way of working:

“... Right now during the Coronavirus, we need to do many distance meetings over Skype [...] I created my list of people that I talked to with some side notes about their occupation”

Tove, middle manager

As Tove puts it, Skype for Business is the main communication tool for most interviewees during working from home. Using the tool facilitates establishing a network since the employees have a list of colleagues who were invited to the same meetings and whose contact information might come in handy.

Other employees also spoke about Skype for Business' usefulness during the pandemic and particularly used also because their headquarter is situated as a one big open office where informal chats are happening all the time. One of them highlighted that he used Skype as the main tool that had replaced informal chats that took place at their workplace:

“Now when I'm at home I have more Skype meetings. that are very short term, not planned - they are like 'oh man can I swap a word with you?' Or 'can you take this now?' And so the things we use when we are running around are now on Skype... as we are alienated.”

Christoffer, manager

Some also spoke about the way they use Skype for presentations of their projects, either sharing their desktop screens or presenting with a board behind them. Either way seems to simulate in-person presentations and allows them to get and give feedback and questions in real time:

“... We also present on Skype. Sometimes I stand and present my stuff on a white board behind me, like an actual board where I write and draw and stuff like that [...] But mostly I make the presentation in PowerPoint and tell people to open it while I present it over Skype. [...] I also sometimes share my own screen with people and they do the same.”

Andreas, middle manager

For the officers, who as mentioned earlier, are closely working with the organization's customers, Skype is also the main ad-hoc tool. For them, Skype for Business is the fastest way to communicate with other officers who can help them with questions while being on the phone or on a chat with customers:

“... I use Skype for quick information or to have help with some questions. It's the chat on Skype...I use that daily [...] Whenever I have time, I try to answer as many questions as possible, from other officers. And they do the same for me. It is a tool for all of us [...] That is the big group chat that I'm talking about. Or I go and see someone who is online and who can help me.”

Susanne, officer

Here we can see that Susanne sees Skype as a chat possibility that is fast and convenient because she can get help with her proposed questions and, when she has time, she also replies to questions from other employees working in the same position. She also told us that she uses either one-on-one or group chats depending on whether she sees someone online who she knows

would possess the desired knowledge. In that case she contacts the person who holds the specific knowledge directly.

One particular question arose when we learned that employees prefer Skype for Business's chat function over their internal chat forum Connecticum, which is supposed to be the main tool for text messaging inside the organization. We soon found out that the option to set notifications is what differentiates Skype for Business's chat from Connecticum, and thus makes it more convenient to chat among each other. Therefore, when a new message comes through Connecticum, an employee does not get any notification so the sender can wait even several days for an answer – until the recipient opens Connecticum. We present and analyze Connecticum more in detail later in this chapter. However, it is worth noting here that many employees pointed out that one of the reasons why they use Skype for Business is the notification option:

“It’s more difficult to ... have a chat in Connecticum. It’s not easy. You have to make a decision: ‘now I am going to check if I have a message in Connecticum’ ... it’s not like that when you have it on Skype. [Notifications] are coming up all the time there [on Skype] ... so it’s very easy to follow and that is why I use it at my work.”

Lisa, human resources

To provide a summary of this subchapter, the employees we interviewed used Skype for Business in many individual ways to share their knowledge. Since the organization transformed its education to be based digitally, learning and on-the-job training take place mainly through Skype for Business. It is especially true for the current pandemic situation when employees' work became home-based. The employees also use Skype for Business for presenting with a board behind them, and sharing their desktop screen while presenting. Moreover, Skype for Business provides the possibility for quick chat communication. In comparison with the internal tool Connecticum specifically made for internal communication (for detailed analysis of Connecticum see chapter 4.4), we found that employees prefer Skype for Business because of its notification option and thus the possibility to exchange quick chat with a shorter delay. In this

chapter we also highlighted the employees' use of the tool for helping each other mainly through text messaging.

4.3 Emails Affording Knowledge Sharing

As mentioned in the case presentation, emails are an example of an external software that is used in the investigated organization, in this case Microsoft Outlook. Even though the software package Microsoft Office provides multiple integrated tools, for our purpose we will focus purely on the email service Outlook as it is reflected in our empirical material. According to Microsoft's website, Outlook is a technology that integrates Mail, Calendar, People and Tasks (Microsoft, 2020).

Mails (synonyms with emails) provide the opportunity to send and receive messages based on the exchange of electronic data. In that sense, emails provide the opportunity to send and receive messages "unencumbered by time and space" (Treem & Leonardi, 2013, p.175) meaning that the exchange possibility is independent of the sender's and receiver's geographic locations. Additionally, since the message is codified digitally, it is saved for the receiver to read it regardless when that happens. According to Microsoft (2020) the described features are furthermore the option to not only exchange messages with one but with multiple people (CC function) and even the possibility to hide people's participation in the exchange (BCC function). Furthermore, the programme's features are the organization of mails through folders, flagging, starring and prioritizing the importance of mails. A search field provides the possibility to search all mails by keywords. Moreover, there is the feature to attach files and to include them to enhance mails' visual appearance. What can be seen as constraints of Outlook email regarding knowledge sharing is first of all its limit regarding the number of files that can be sent and therefore viewed, and secondly the limit of the file size. Therefore, the sender in this case needs to either manually lower the size of the files, which requires certain technical skills and can be time consuming and sometimes not optimal, or he/she can upload the file elsewhere and send the link through an email. That way, it might be more difficult to find such an email.

Through the integration of a calendar, meetings can not only be booked but also sent via email. The features People and Tasks provide the possibility to save and organize contacts as well. Like the calendar function, personal Tasks can be created, saved and sent as well. In sum, according to Microsoft (2020) the email software Outlook contains several features that connect people through data-driven messages.

In spite of those material features that Outlook provides, our first finding is that in terms of knowledge sharing, the employees use Outlook mostly for sending and receiving messages. Other features such as the People and Tasks function have not been mentioned and were thus not subject of the interviews. Hence, this finding is reflected in our analysis where we refer to and focus on the employees use of emails for knowledge sharing.

The second most prominent finding regarding the use of emails in terms of knowledge sharing, is that when asking the employees how they share knowledge with their colleagues, the vast majority agreed that emails, beside Skype, are the main area of communication. In that sense emails are highly used to send and receive information among two people or smaller groups.

”Emails are probably the main area of, you know, communication and sending out and returning information at least for small one-to-one, maybe semi-small groups.”

Pontus, external consultant

Besides the apparently high use of email and it being “the main area of communication” we want to highlight that the employee described his use to be “sending out and returning information”. Along with that, other employees criticise the use of emails because there is little to no certainty if the information reaches the recipient in the way it is intended. Thus, we conclude that the employees use emails to inform one another when there is no or little need for interpretation.

When asking for the reasons why the employees use email, many point out that first of all every colleague knows about its functions and secondly that they are used to doing so:

”Two reasons. The first reason is that it was the only thing we had from the beginning. We only had email... [...] and the other thing about email is that if you’re very formal you need to have an email to trace it and you can save it or whatever you want. But I think it is overused.”

Christoffer, manager

The quote illustrates two important findings. Firstly, even though the employee believes emails are overused, he and his colleagues use it because they are used to it. Even though there are other technologies that have been implemented and that provide the possibility to send and receive information in the form of codified messages, emails stick to be the major tool of communication due to habit and tradition. However, most employees agree that emails are not the best solution. Especially employees in management positions point out that they handle about 100 emails every day. That in return leads to confusion and makes it difficult for them to keep the overview which information is to be found in which email. This critique contrasts with the actual use that all employees agree on. That, we understand as an indicator for the influence and emphasis of tradition and habits in the organization.

The second finding that the employee points out is that he uses emails to save information which he later can search by keywords. He highlights the necessity of this function, referring to the context of the public sector where “you're very formal”. In that sense, he uses emails to save information and browse them. We understand this statement as an indicator for the necessity of formal structures and consequently, the importance of bureaucracy for his work.

To sum up, despite the features that Outlook provides in terms of knowledge sharing, the Mail function is the most commonly used function and hence it is the focus of our analysis. There are two overarching uses of emails. The employees send and receive but also save and search information through the technology. Thus, it affords the employees to exchange, save and access information. Despite most employees criticizing the technology it is yet, one main area of communication in the organization.

4.4 Connecticum Affording Knowledge Sharing

Since Connecticum is an internally developed software our understanding of its material features is based on and limited to what has been shown to us. However, in the beginning of our research project we had the opportunity to visit the organization's headquarter and meet two contact persons. During that meeting and later via an online presentation of their tools, some basic features were shown to us. In that sense, Connecticum provides the features of a social media and social networking service. It consists of an interface in the form of an activity stream where every organizational member can post texts, links and single files. Thus, as a user one can scroll the activity stream (the frontpage), comment on and upload content. Furthermore, it provides the user with the possibility to join groups, follow certain content or connect to certain people. Through these links, the user is notified when content is added to the linked groups, content or by the linked people. Additionally, the technology provides private text messaging. An example that illustrates the features of Connecticum is the social media service Facebook. According to our interviewees and contact persons, Connecticum provides similar features but is yet, limited to the functions listed above.

Restrained by these material features the employees use Connecticum for two-way communication to inform and receive feedback.

“For instance, if I have some information I would like to share, that has to do with an event... I usually put an invitation into Connecticum and ask them to comment on it ... and then I have a group of people who can comment on that. It could be thousands of people. It could also be like 10 people who do that. So, I use that as well. I think that's quite a good way of communicating.”

Carin, manager

In that sense, the employee uses Connecticum as a technology to spread information but also to receive feedback on it. It enables her to interact with other organizational members. However,

the quote illustrates that this interaction only takes place in certain groups or between people that are linked to a certain content. The organization's members use their access which is limited to the content or groups that they are linked to. Furthermore, we have been told that Connecticum is used for group discussions. In that sense the employees use it furthermore to ask for help:

“It is like really the basic Facebook type of flow where you can write a question and then somebody can answer. So, it's also through that way that I can share my knowledge with everyone in the organization, doesn't matter where they are in the country.”

Martin, officer

Here the employee not only points out that he uses Connecticum to seek help but also that he shares his “knowledge with everyone in the organization”. He highlights that the tool enables him to do so regardless of geographic locations. In that sense, some employees said that they can reach Connecticum also through their phones.

One manager explained that Connecticum was implemented to reduce the extensive use of emails. Thus, in his team he reinforces its use in that sense:

“So, if you have been to a seminar or something and you want to tell your co-workers: this was a good seminar, and those are documents about it - Then we send it on Connecticum, not in email. That's a rule we set up in the team.... but if you don't do that you have to take donuts to the next meeting or something.”

Christoffer, manager

Besides sharing information, the manager set “a rule” in his team that documents are shared via Connecticum. In that sense, the technology enables the employees to exchange files but also link

the files to a specific content such as, for example, a seminar. Secondly, the team uses Connecticum to reduce the exchange of emails.

However, other employees criticized the limited use possibilities in Connecticum. Especially when using it to share files they complement it with other channels as well:

“It’s a very limited tool... The only thing that you can do is you can create a group and you can share text messages or posts. But you can only add one single file. So, if you add, for instance, a PowerPoint presentation, there is no way to make, for example, a header and then text underneath. You have to be a little skilled to do that. It is very limited. If it is for example a larger document, you can’t add it. So, what I do then is I put it in SharePoint and then create a link to this SharePoint and then I paste the link in Connecticum.”

Tove, middle manager

Besides criticising the limits of Connecticum, the employee summarizes the features and their respective use. Connecticum affords her to create a group, thus linking her to other people and sharing text messages or posts within this group. However, she is one of the few that points out the function of text messages in Connecticum. We conclude from this that most employees do not use the chat function. Most interestingly, based on her critique she explains her use of Connecticum in relation with other tools. Since it affords her only to share one single file, she works around that limit and uploads the respective file elsewhere. Then she uses Connecticum to share the link to that file.

In that sense, another employee explains his way to work around the limits of Connecticum. He points out that information is lost easily since notifications do only pop up when the programme is opened. Thus, the sender has no security whether the information is received. To secure that, the employee sends out emails to the respective co-workers additionally. For us this finding was

very interesting because it contrasts the statement above, using Connecticum to reduce the immense exchange of emails.

To sum up, our main findings of the internal technology tool Connecticum are that it enables the employees to share information and receive feedback on it. In the sense they use it moreover, to connect with co-workers through shared groups or content throughout the country. Employees seek and furthermore provide help through Connecticum. While the technology enables the exchange of files, it is yet limited to one file that is furthermore limited in its size. To overcome these limits we found that the employees used alternative technologies to complement their use of Connecticum.

4.5 In affording Knowledge Sharing

Just as Connecticum, In is an internally developed technology which has been shown to us by our contact persons. Thus, the material features outlined here are somehow limited. Yet, throughout the interviews and the initial meeting prior to our research project, some material features became apparent. In serves as the organization's intranet. All content is either published by the organization's communication department or by few employees with a "licence" to do so. In that sense, In is a one-way communication type of flow that cascades top-down in the organization. The frontpage contains a news flow that is updated daily and mostly covers internal articles and external press reports that address the organization. Furthermore, it serves as a database that provides documents, such as guidelines, reports, rules as well as statistics about the organization's customers. Through the built-in search engine it is possible to search content by keywords. Furthermore, there is an address book built in the intranet which organizational members can search by typing a person's name or a department.

The first and most recurrent pattern we discovered regarding the intranet In was that most employees referred to it as 'a lot of information'. One manager illustrates this view with a metaphor:

“It’s like a card game where you pick cards and see if you can get a hand or something... and they called our intranet for that - everything and nothing in there. Really.... it’s a gigantic system.”

Christoffer, manager

Two very interesting and yet contrasting findings stick out here. Firstly, comparing the intranet to a card game where players face unforeseeable outcomes, shows that the employee sarcastically criticized its content’s unreliability. Furthermore, in the second sentence he highlights that the intranet is a “gigantic site”. He even more stresses his critique with pausing before this explanation. In the outlined context we understand the word gigantic as negatively connoted referring to something overwhelming, unclear and unstructured. Even though the employee referred to his colleagues as being the ones drawing the comparison to the card game, his second sentence indicates that he shared their critique. Secondly, he referred to the intranet to be “everything” meaning it contains every information one needs. For us this ambiguity of being “everything and nothing” at the same time, was a recurrent finding throughout our interviews and we found it to impact the employees' respective use highly.

Many interviewees pointed out that they use the intranet to gather daily news and general information from the front page. One employee explains:

“Oh, I use it daily basically. It’s access to organizational news. So, it’s much static information. Plus, it is where in the organization to find, if you’re looking for some kind of ruling principles or official documents and support... for example, what is the official version of different ways you should work.”

Pontus, external consultant

In this quote the employee's highlights that he uses the intranet daily to find news, guidelines and reports which he describes as static information. Being a public sector organization, with a characteristically high level of bureaucracy, process orientation and documentation, we believe that this access is highly relevant. Yet, when asking the same employee, in his position as an external consultant how helpful he thinks the intranet is, he answers:

"It's a very large source of information. An issue that has come up over and over again is the challenge of how to find information by searching. It's not the most smart search engine. Also, there's a challenge with [...] knowing if the information you're looking at is up to date, or if it's true [...] It is good for general information, for news feed. But it's not really helpful. [...] It takes a long time to find something. Then you usually try to go through your other channels like people you know more."

Pontus, external consultant

Both quotes illustrate the ambiguity outlined above. On the one hand the employee uses the intranet daily, finds access and gathers news and documents that are crucial for his work. Yet, the information he finds is often unreliable since it might be outdated. In that sense, multiple employees told us that new information is just added without removing the old ones. As one employee highlighted, with one letter difference, he received a different and outdated result when searching for information in In:

Well, we have something called "Erbjudanden och tjänster" - that's the basics of what we offer to our customers and it's called "Erbjudanden" with an "N" and "Tjänster", services... And when it was launched it was called "Erbjudande" without the "N". And if you search "Erbjudanden och tjänster" you get one result. And if you take away the N, you get a completely different result and it's ... you get linked to an

old page with information that isn't relevant today. So it's just... with one letter you get the wrong kind of information.

Jakob, officer

Thus, new and old information are mixed and consequently, unreliable. Moreover, the information is difficult to spot. Thus, one of the most outstanding findings of our study is the observation that employees develop alternatives to overcome this challenge and share knowledge autonomously. These initiatives are based on intrinsic motivation meaning that they were not imposed by management or required by job descriptions. Lisa, for example highlights the importance of networking when asked how she gathers information that she cannot find on the intranet:

"If I can't find the information in In, I talk to colleagues... and I try... I try to have contacts from every project I've been in. [...] I try to not let it go because I need contacts within the organization. You cannot work isolated. "

Lisa, human resources

When facing a problem that she is not able to solve with the help of the intranet, Lisa addresses her colleagues. She stresses the importance of interpersonal contact. Besides her close colleagues Lisa tries to save contacts from projects that she has been in. In that sense, she establishes a network. We understand this initiative not only as means to overcome the limits of the intranet. But also speaking generally that one cannot work isolated and that she needs contacts in the organization indicates that she uses networking to access all kinds of information and knowledge. In other words, we understand Lisa's alternative way of working not only to supplement the use of the intranet but also to replace it. The information provided by her network seems to contrast with the types of information that she finds in the one-way communication platform for top-down data and information on the intranet.

Most interestingly, when speaking about the alternatives most employees were rather neutral and descriptive in their tone. In that sense we did not hear any frustration which one would expect. We see the potential reason for that to be a sensed level of autonomy which enables them to deliberately share and receive knowledge. This might be perceived to be more valuable than the perceived lack of organizational structure. Lisa specifically highlights:

"I think we are fortunate in my unit. I'm not sure if it is this culture in every unit. [...] Because knowledge is ... it needs a bit of autonomy."

Lisa, human resources

In that sense the level of autonomy to overcome problems might heal the possibly negative perception of lacking structure. However, Lisa also points out that she is not sure that this level of autonomy can be found throughout the whole organization.

In total seven out of eleven interviewed employees developed similar individual strategies to share knowledge. For us this highlights an overall perceived importance of knowledge sharing combined with a perceived lack of support and actions that can be done with the given technologies. In other words, the establishment of own initiatives can be seen as a means to overcome the sensed gap between the perceived importance of knowledge sharing and the possibilities/constraints the organizational tools provide.

Besides the ambiguous use of the intranet to gather necessary documents and news, we find that the employees do not refer to the intranet's address book. When we asked about it, the answer we got was that there is an address book function with the possibility to search for names and departments. Yet, no one pointed out its use which shows us that the intranet is not a technology that is used by the employees to connect with people.

Since we had the opportunity to speak to one employee with the license to publish content in the intranet, a specific use for him is to publish information. Yet, he pointed out that before publishing, he is supposed to send the respective content to the communication department to view it.

“Yes, it should be someone else reviewing it, but I just publish it. Otherwise it would take forever.”

Pontus, external consultant

This quote highlights the level of bureaucracy resulting in slow processes within the organization. Moreover, it is yet another example to what extent the employee uses the intranet in a different and individual way than it is intended.

To sum up, the intranet In is a platform-based structure with all kinds of information that the employees use for their daily work. Especially the access to documents and news is highlighted which we understand to be of specific importance given the context of a public sector organization. In that sense, the employees use the intranet to gather information which is more formal but enables them to fulfil their work tasks. However, the empirical material on the use of the intranet showed that the employees do not use it to connect to other employees. Thus, we conclude that their use of it is more formal. Additionally, the problematic search engine slows down the work process. Moreover, the mixture of new and outdated content results in a certain degree of unreliability regarding the information that is found on the intranet. Thus, most employees find alternative ways to supplement their access towards information and knowledge.

4.6 Chapter Summary

In this chapter we have outlined the employees' use of the information and communications technologies that they use for knowledge sharing. The four respective technologies, two

externally and two internally developed, are both social media and traditional simple (non-social media) CMC tools.

Skype for Business is an externally developed Microsoft software that the employees make diverse use of. It provides them with easy access to the organization's education programmes. In that sense, the employees use Skype to participate in digital classrooms to develop their existing knowledge in a more formal context. However, the employees use Skype mostly to communicate with one another. Either in formal meetings through videoconferencing and using desktop sharing tools, or in informal conversations using the chat, call or video functions that Skype for Business provides. These informal exchanges are used both for seeking help and supporting co-workers. Due to the open office at their headquarter and especially due to the corona pandemic which caused employees to work from home, this informal communication via Skype has increased.

While the organization's email programme Microsoft Outlook provides multiple functions, the email function is the major use that the employees point out. In that sense, they send and receive information among each other. This way of communicating, beside Skype, makes up the main area of communication in our investigated organization. Furthermore, the employees use their emails to save and search information. The search function enables them to access information.

The internally developed forum Connecticum is used to share information and receive feedback on the shared content. In that sense, it connects employees through linking them to specific content, groups or people. Furthermore, employees seek and provide help through Connecticum. Since they face certain limitations when exchanging information, we found that they use alternative technologies such as Skype for Business to supplement their use of Connecticum.

Lastly, the intranet In provides the employees with a wholesome body of information. On the one hand everything from documents, guidelines, principles to reports can be accessed. On the other hand due to its lack of structure, some employees said that it is very difficult to find

something in there. Thus, the employees found their own alternatives to cope with these limits, which supplement and replace their use of In.

5 DISCUSSION

As our analysis has shown, the four analyzed technology tools provide their users, public organization's employees, with multiple individual affordances. We found a certain overlap of distinctive knowledge-sharing practices to emerge that are afforded by the use of information and communications technology. We understand knowledge as a framework for evaluating information based on existing experience and for enabling its further development. Thus, knowledge sharing is the process of exchanging and disseminating knowledge, including the facilitation of the sense-making of the involved parties. Table 1 provides an overview of our findings, where we refer to the level of affordances drawn from our empirical material. Consequently, in this chapter we will discuss the four affordances that emerged and their implications for successful knowledge sharing in a public organization to answer our research question: *How do the affordances of information and communications technology support knowledge sharing in the public sector?*

	Learning	Helping	Networking	Accessing
Skype	high	high	high	medium
Email	medium	low	low	medium
Connecticum	medium	medium	high	medium
In	medium	low	low	medium

Table 1 - Emerged affordances (source: authors)

5.1 Learning

The affordance of learning refers to the perceived possibility to learn via the information and communications tools presented in this study. Learning is the process of acquiring new knowledge, understanding and skills (Senge, 1990). The affordance of learning developed by us is thus the perceived possibility to receive information and knowledge, both tacit and explicit.

From the empirical material we found out that the one tool that affords employees to learn the most is Skype for Business. As we described in the analysis, through this software users can audio and video chat, transfer text, images and files. These are considered the basic features. Users can also use advanced features where they can, for example, integrate Skype for Business with Microsoft Office components such as Exchange, Outlook and SharePoint, they can invite for chats and calls both people inside as well as outside the organization, they can share desktop screens, they can find out when others are online and record and playback meetings (Microsoft Skype, 2020).

With the affordance lens which allows us to describe how a technology tool can be appropriated by users (Barry et al., 2003), we found out that employees at our investigated organization used Skype for Business in many various ways. Affordances suggest the range of perceived possibilities and in this sense it is also important to mention constraints which limit the alternatives (Norman, 1988). In the organization, for the purposes of learning, Skype for Business afforded users to conduct online classrooms, videoconferencing, group chatting and one-on-one chatting. What can be seen as constraints is the fact that Skype for Business allows its users to invite max 250 people to a video chat and max 10 000 people to a broadcasted meeting. Among other constraints that somehow limit the use of the tool there could be the necessity to sustain the Internet access and, for some cases, to own a video camera, as without those one cannot use the tool in all the ways that it is designed for. Whatever remains within these boundaries is the place for action possibilities that employees perceive.

Starting with the digital classrooms, employees at our organization informed us that since there is the possibility to conduct digital training and online courses and they thus do not need to travel to be part of them, education is easier to access for them compared to times before implementing ICT tools to the process of learning. As we were informed, they usually gather semi- to large groups for video conferences where one main speaker holds the course, meeting or training, and the group listens. Skype for Business thus affords employees of public organization to learn through conducting video conferences with the majority of attendees' cameras on. It can be said

that through video conferences, which can transfer social clues, employees mainly share tacit nature of knowledge, the one that is personal and embedded in practice (Hislop, 2013). It can also be argued that in line with the practice-based understanding where both dimensions of knowledge exist in duality, these video conferences afford attendees to also share and receive explicit knowledge that is verbalized (Schultze & Stabell, 2004).

Another way employees spoke about Skype for Business in terms of learning was when they described how they share their desktop screens. This way an employee not only sees other employee's opened windows, but also his or her mouse cursor, and is therefore afforded to follow what the person does in real time step by step. While doing that, they can ask questions, request reiteration of actions, clarification etc. In terms of knowledge epistemology, we see it in line with the practice-based perspective which puts emphasis on knowledge embeddedness in practice and interaction (Cook & Brown, 1999). Practice in this sense is conforming to the definition by Hislop (2013) who states that it is a "purposeful human activity" (p. 31), and knowledge is understood as an integral part of the purposeful activity, which can be seen as practice. Interaction, in this case, is the affordance of reacting to the person who shares their screen. It can be said that due to the practice-oriented focus of sharing screens, it is a way of sharing tacit knowledge which is knowledge that is difficult to transfer by writing it down or verbalizing it (Sandhu, Join & Ahmad, 2009). Choi and Lee (2003) even argue that it can only be transferred by applying it. In this sense, when someone watches a colleague's screen in real time and gets to react and ask questions, he or she can start applying the same on their own. An example can be watching a colleague work in Photoshop. Watching the colleague perform his or her work in Photoshop is learning, and the attempt to re-perform it on their own (during or after the screen sharing) is the experience. This can be seen in line with Sandhu, Join and Ahmad's (2009) view, who argue that tacit knowledge is obtained exactly through learning and experience. It can also be viewed in line with the second logic of knowledge sharing developed by Jonsson (2015). This logic which is labelled professional logic is about the practices of

knowledge sharing. Here, co-workers learn from one another through shared experiences and by doing and/or observing.

The affordance of learning, in the sense of acquiring new knowledge, through the use of Outlook email, Connecticum and the intranet In has not been perceived significantly by our interviewees. However, in this sense it is important to distinguish between ‘acquiring new information’ and ‘acquiring new knowledge’. It is then to discuss whether such repositories can be classified as either information or explicit knowledge.

When referencing to In, our interviewees mostly talked about receiving news and general information. In terms of Connecticum and Outlook email, they perceived their use as receiving and sending information. This way it can be said that neither In, Connecticum nor Outlook email provide knowledge but rather information which is defined as a “message” (Davenport and Prusak, 1998, p. 3). Based on that, we argue that since information is data that is contextualized or categorized and since it is sent from one entity to another, it reflects objectivist assumptions. In this sense, the intranet In, chat forum Connecticum and Outlook email can be seen as more of information sharing tools.

On the other hand, all three tools can be understood as repositories of explicit knowledge which is knowledge that is rather formal, systematic and which can be put into words and written down (Hislop, 2013). As many interviewees highlighted, In serves as a database where they can search information but also manuals through keywords, just like they can do in Outlook and Connecticum. It can thus be argued that the content that is there is codified, captured, stored and it is, therefore, knowledge that is impersonal and context independent (Hansel et al., 1999), which are characteristics in line with the objectivist understanding of knowledge and its explicit nature. Moreover, it can be said that the contents of In, Connecticum and Outlook reflect experience, values, contextual information, and are directed towards some purpose, which is what according to Nonaka and Takeuchi (1995) distinguishes knowledge from information. In

this sense, all three tools can be classified as learning tools since learning is a process of acquiring new knowledge (Senge, 1990).

As we stated in the literature review, we understand knowledge as a framework for evaluating information based on existing experience and for enabling further development of it. Therefore, our understanding of knowledge refers to the practice-based understanding without neglecting the objectivist understanding in acknowledging its existence in data and information. Due to the intangible character of knowledge, there is no exact distinction between information and knowledge. Thus we do not wish to put a concrete label on the contents that are in the intranet In, Connecticut and Outlook, but rather offer different points of view on knowledge sharing.

5.2 Helping

As our analysis suggests, a further recurrent pattern throughout the empirical material is that the ICTs afford the employees to help and receive help from their co-workers. When facing a work-related problem the technology enables the employees to seek help from their colleagues digitally which they describe to be quick and easy. Thus, in our study helping refers to the informal exchange of information and knowledge to solve a work related problem.

Since Skype for Business provides the employees with the possibilities to chat, call, video call and share their desktop screen (Microsoft, 2020), the employees make use of these features for example through informal calls. As our empirical material points out, these ad-hoc and informal calls nowadays replace to some extent the informal talk on the corridor. We found communication through chats and calls in Skype to be very common for solving work related problems. As our empirical material suggests, the employees call or chat with their colleagues in order to simultaneously solve a work related problem or give help in solving a work related problem. In that sense, the employees are in constant exchange with their co-workers, not only with those they physically meet. We see that as a factor that supports knowledge sharing within the organization.

Moreover, the employees use the internal social media-like forum Connecticum not only to share and comment on content, but moreover, to link to certain people, groups and content. In that sense, we observed that employees post questions and receive feedback in certain groups or linked to specific content. Thus we argue that ICT, in linking people to groups or content, affords helping (giving and receiving help) through the collective experiences that are found in a web-based space. In other words, through group discussions employees can receive or give help in an informal quick way that is independent from their geographic location. However, in Connecticum this help appears in written form. We argue that this kind of helping differs from email exchange through the explicit link to content, groups and people where the exchange of multiple involved parties take place.

Drawing upon our understanding of knowledge which is a framework for evaluating information based on existing experiences and for enabling further development of them, helping is about generating new experiences in solving a work related problem with the help of colleagues. This takes place through informal exchange. We argue that ICT enables this generating since the employees solve problems actively while drawing upon the experience of their colleagues. Those experiences in return enable the evaluation of information which might be further developed into knowledge. Knowledge, which is a framework for evaluating information, is enhanced.

With our understanding of knowledge sharing to be the exchange and dissemination of knowledge in a reciprocal way, the affordance of helping distributes knowledge throughout the organization since this practice is not limited but independent from geographic location. Through the recursive exchange of previous experiences and searching for solutions, the practice facilitates the sense-making of the involved parties. Especially during the current Corona pandemic which forces the employees to work from home, our empirical material stresses this affordance to be crucial.

We argue that helping is knowledge and information sharing that is informal and afforded by ICT. In the context of a public sector organization, as our empirical material suggests, process orientation and documentation play an essential role (Rainey, 2014). In order to find and use the

right guidelines or a form, helping is essential to reduce the time effort to find and familiarize with the respective form. Instead of asking a coworker in the hallway and remembering the answer, helping enables the employees to solve their problems collectively with a crowd of collective knowledge regardless of the geographic location. Taking a critical perspective on knowledge arguing that knowledge is power (Hislop, 2013), we suggest that in distributing knowledge, this form of new collectivism has the ability to shift power relations especially within public organizations which are typically characterized in terms of bureaucracy and hierarchy. Further studies would need to invest that. Yet, we can conclude that affording helping supports knowledge sharing through collective problem solving.

In putting the employees' knowledge in action, our argumentation aligns with Davenport and Prusak (1998) who point out that knowledge should be evaluated by the actions it leads to. Thus, the employees perceive helping in terms of giving and receiving help in informal exchange with their co-workers to be an action possibility that is afforded by ICT. Styhre and Gluch (2010) argue that platforms can bridge between dimensions of knowledge. Platforms do so in “capturing the accumulated know-how of the firm and enabling a more systematic exploitation of collectively acquired knowledge.” (Styhre & Gluch, 2010, p. 596). Our argumentation goes one step further, focussing on knowledge sharing. In taking the affordance lense, we point out that by capturing accumulated know-how, information and communications technology affords the employees to informally exchange knowledge and information. Informality is considered to be a crucial factor in articulating problems and solutions since it includes human factors (Boddy et al. 2005). In Buunk et al.'s (2019) work on tacit knowledge sharing through social media in the public sector, they argue that social media platforms serve as shared spaces and thus share similar characteristics as Nonaka's Ba for knowledge creation and development (Buunk et al, 2019). Unlike our study, Buunk et al. support their findings with a quantitative study based on a questionnaire. They argue that social media is a facilitator of tacit knowledge sharing in initiating informal discussions. This finding aligns with our finding. Yet, our study design differs since we chose to conduct a qualitative study and focus on those technologies that are most commonly

found in our investigated organization and their user-technology relationship. In that sense, we aim to reflect the public sector employees' socially constructed reality.

As we have argued under the helping affordance, it enables the employees to informally exchange knowledge and information which is mostly explicit. Taking into account the role of interpersonal trust, which in our literature review we have pointed out to be essential in knowledge sharing, further research might address its role in helping. As we have shown, Skype for Business has replaced much informal talk in the hallway. Yet, it remains open how the informal knowledge and information exchange that is afforded through ICT relates to interpersonal trust among coworkers. On the one hand, it might increase the level of trust since the employees potentially give and receive help from co-workers that they might have never talked to before. On the other hand, through ICT social clues are lost which are usually provided by face-to-face interaction which in return is viewed as positively correlated to building interpersonal trust (Davenport & Prusak, 1998). In that sense, it would furthermore be interesting to investigate the degree of knowledge sharing with ICT in relation to face-to-face interaction, as our case presentation has shown that most communication in our investigated organization is semi-digital meaning that face to face interaction plays, besides digital interaction, a major role.

5.3 Networking

Thirdly, we found networking to be afforded by information and communications technology. We understand networking as the possibility to connect with multiple co-workers for sending and receiving knowledge in an informal manner. Other than helping, networking focuses on the practice of establishing contact with colleagues despite their location and for the informal exchange of knowledge.

As our empirical material suggests, the employees use ICT to develop and maintain a network of colleagues to share and receive knowledge from. In that sense, Skype provides the employees with a contact list of people who have attended the same meeting. Unlike interacting face to face, the respective contact is automatically saved and can be recalled later to reach the respective

person. This use has especially been highlighted in times of the Corona pandemic where working from home and thus distance meetings were a daily routine. As pointed out earlier, by providing basic social media features, Connecticum links people not only to groups but also to content. These links provide a network structure for the employees. Our empirical material moreover shows that employees make use of individual network structures they implemented for themselves to supplement their work with the possibility to receive or share knowledge with people that they have been previously working with. As one of the interviewees points out “you cannot work isolated.”

While Storey and Quintas (2001) refer to knowledge management among other things in terms of mapping knowledge, we use this understanding and argue, as Swan et al. (1999), that networking supports knowledge sharing by facilitating dialogue and thus enhancing people's sense-making. Many researchers highlight maps of experience that show where to find the respective know-how as a way that ICT affordance can support knowledge sharing (e.g. Hislop, 2013, Swan et al, 1999). However, we lift this finding in the context of a public sector organization.

In the theoretical background we have distinguished public from private sector organizations along three dimensions (Rainey, 2014). Firstly, *Environmental factors* mostly highlight the absence of economic markets for outputs and the dependency on governmental influence in terms of political and financial decisions. In the light of this environment, networking plays an essential role. Due to the absence of economic markets, public sector organizations do not compete with other organizations in this sense. Thus, an active network does not only provide intra- but also inter-organizational knowledge sharing. Since public sector organizations do not aim for competitive advantage to “survive” among other organizations, we see inter-organizational knowledge-sharing barriers to be lower. Their monopolistic position secures a certain level of financial resources (Rainey, 2014). Pardo et al. (2006) argue that the higher the level of trust between public sector organizations is, the more knowledge sharing, and consensus building is to be found among these organizations. Thus, informal networking across organizational boundaries might furthermore have a positive effect on the development of trust

among public sector employees and result in a higher level of knowledge sharing among those employees. Drawing upon Riege's (2005) argumentation, the lack of social networks serves as an individual barrier for knowledge sharing. We argue that in the light of a public sector organization's environment, networking can play a crucial role in developing trust among employees and consequently share knowledge across organizational boundaries. Moreover, since public sector organizations also depend on governmental decisions, Balasubramanian, Al-Ahbab and Sreejith (2020, p. 5) point out the "idiosyncratic nature" of public sector organizations, which suggests the parallel development of public sector organizations. We see that as a further argument in how far networking for knowledge exchange among public sector organizations, across organizational borders, can benefit the involved organizations.

The dimension of *Organization-Environment Transactions* (Rainey, 2014) elaborates on the character of public organizations' outputs. Among others, Rainey (2014) points out that the produced outputs mostly aim to secure the system of social order and justice. In other words, since public sector organizations' outcomes touch upon civil rights, they are secured by the government's monopoly. In that sense, improving and increasing the output efficiency plays a crucial role in our society since it refers to a greater good. Willem and Buelens (2007) argue that new public management has had the intention to increase public sector organizations' efficiency with instruments that are more likely to be found in private sector organizations being the "frugality of resource use such as cost-effectiveness and output control" (Willem, Buelens, 2007, p. 583). However, they point out that these instruments might conflict with values that are found in public sector organizations. Empirical evidence, they say, shows that these goals are not always reached. Therefore, they call for the development of "distinctive organization design principles for public sector organizations" (Willem, Buelens, 2007, p.583). We draw upon this argumentation and suggest a knowledge management approach in order to increase public sector organizations' effectiveness. As we have pointed out, the necessity for knowledge management is not a demand that is unique to the private sector, but equally essential for public sector

organizations. Using public sector networks has the potential to acknowledge these guiding values.

Organizational Roles, Structures, and Processes (Rainey, 2014) focus more closely on principles, driving forces and values within public sector organizations. Rainey (2014) lists, among other things, the significance of formal systems, bureaucracy, standardization and process orientation, the importance of external reporting, and values such as honesty, fairness, cost-control and goal orientation. As it is reflected in our empirical material, factors such as tradition and habit can be added to this list. At first sight networks might be the exact opposite of formal systems and bureaucracy. Yet, as the example of Connecticut has shown, data driven ICT networks provide and illustrate a structure of connections and links. As Treem and Leonardi argue, social networks among other social media technologies “afford users the ability to make (...) communication network connections that were once invisible (or at least very hard to see) visible to others in the organization” (2013, p. 150). We argue that this affordance of social media networks aligns closely with the need for documentation, process orientation and bureaucracy because it illustrates and thus supports those claims.

As we have argued in this chapter, networking is a commonly emphasized supporting factor of ICT in knowledge sharing. Especially when taking a practice-based perspective on knowledge, mapping to find respective know-how can facilitate knowledge sharing essentially. Yet, due to shortcoming of research in the public sector regarding knowledge sharing, we lift this argument into the context of a public sector organization. On the three dimensions we have shown that networking afforded by ICT can provide substantial benefits for sharing knowledge in the public sector.

5.4 Accessing

The last recurrent affordance of the four digital tools that we found in our empirical material concerns knowledge and information accessibility. In contrast to the previous affordances that we discussed above, accessing refers to a formal way of retrieving information and knowledge.

In other words, the employee's perceived action possibility is to access not only knowledge but also information that might develop into knowledge. We see this affordance to be especially relevant given the context of a public sector organization and the characteristically high level of documentation and formal systems (Rainey, 2014). Also, because as Rafiq and Ameen (2013) state, the demand for immediate and easy access to rich and up-to-date content is growing significantly. While helping refers to an informal way of exchanging knowledge among coworkers, accessing describes a more formal and impersonal way of gaining information and knowledge. Along with Jonsson (2015) we argue that accessing knowledge and information can be seen as a hygiene factor to facilitate and thus support knowledge sharing. With this affordance we explore how the tools presented in the analysis afford the employees to access existing knowledge and information. What we mean by accessing in practice is thus saving knowledge for later access and consequently retrieving it. In other words it refers to getting to existing knowledge and thus explores how those tools afford employees to access existing knowledge through them.

In Skype for Business, there is the option to record video and/or audio conferences (Microsoft Skype, 2020) which allows its users to access knowledge and information through playing back the records, viewing and hearing the content. However, since our interviewees did not speak about this option, it is arguable whether they know about that and whether they use it for the purposes of later access. In this way, Skype for Business does not afford our interviewees to access knowledge that has been exchanged through unrecorded video and/or audio conferences. On the other hand, the tool affords them to browse through written chat.

Looking at the affordances of helping and networking from a different perspective, one could argue that accessing existing knowledge can also mean getting in touch with co-workers (either face-to-face or through ICT tools, but as we explore affordances of ICT tools in this study, we disregard the face-to-face option). Even though this refers more to networking, we still wish to explain how it can be seen from the perspective of accessing. We learnt that our interviewees spoke about keeping contacts of people which might be helpful for their future work. This way it can be said that employees see the "knowledge repositories" in people's minds and whenever

they wish to access this knowledge, they contact the respective people. This, therefore, implies an easy access of knowledge through Skype for Business where one can contact people directly through chats/calls/videocalls or in a group, since through Skype for Business one is provided with a list of attendees connected to every videoconference that one has also attended (as we mentioned earlier). To sum up, Skype for Business has a quite good affordance of access looking at it from the perspective of accessing knowledge through the “knowledge repositories” in people’s minds. However, since the interviewees did not speak about using the option of recording video/audio calls, it can be said that Skype affords employees of our investigated organization with a medium level of access to knowledge.

Another tool which affords employees to access existing knowledge and information is Connecticum. As we described in the analysis, it affords employees to access documents through people’s posts in various forums and direct chats. Due to the excessive use of emails, one manager spoke about encouraging others to use Connecticum for uploading documents there instead of sending emails. This way it reaches more employees in Connecticum who would potentially not be among the email’s recipients. However, as some pointed out, accessing files shared through Connecticum is sometimes not user-friendly. As Alavi and Leidner (2001) point out, the user-friendliness of IT tools is crucial for its level of support. Inadequate ICT can thus inhibit knowledge sharing (Willem, 2003). For instance, one employee told us that a PowerPoint presentation does not preview as it should when uploaded to Connecticum. The tool thus does not afford employees to access those files without having to download them to their computers. This can be seen as a constraint of Connecticum as it is something that limits the range of possibilities that can be done with the tool (Norman, 1988) in terms of accessing information.

In Outlook email, employees have the option to sort, label, prioritize and flag emails and later search through them by keywords via a built-in search engine (as in any other email programme). As our analysis shows, many employees were, in fact, confused when it came to searching for a particular piece of information in Outlook email. With the growing amount of emails received per day, employees admitted that they got easily lost while searching for a particular email. This implies that the employees either do not use the sorting options (e. g. flagging, starring, labeling

or putting them in different folders), or because of the excessive use of Outlook email, they lose the track of what information is in what email despite using the sorting options. It could be particularly true for forwarded emails which usually cover many different topics and one can easily get lost in them. Especially when an email is sent to a group and each participant decides to answer to different people, which can be demonstrated, for instance, in the difference between the functions “reply“ and “reply to all“. However, there must be a reason why it is one of the most widely used technology tools in the organization. Based on our empirical material, the reason can be because the tool has been there since the organization started working with digital tools. In that sense, this tradition is difficult to let go, for instance, due the lack of perceived alternatives of email. Or the reason for this tradition might be the accessibility of information, due to Outlook’s reliable search engine, which is perceived to be efficient.

The search engine brings us to the last studied tool, the intranet In. In’s search engine is what almost every interviewee called „unreliable“. In line with Hansen et al.’s (1999) codification strategy, we agree that to share knowledge successfully, knowledge must be accessible and well preserved in the first place. Agreeing with Jonsson’s (2015) Knowledge management logic, which concerns knowledge handling, sorted and structured knowledge is the necessity before the actual knowledge sharing. In the following text we discuss the affordance of access in the intranet In, where most interviewees agreed that it is an example of knowledge that is not easily accessible.

One employee told us how changing one letter in a searched word changed the found results completely, and the difference between the searched words was the article *the* and *a*. Other employees also spoke about searching manually, for example through a side menu, and said that sometimes they found what they were looking for and sometimes not. One manager gave us a metaphor for In of a card game where the player has to count with unforeseeable outcomes. Moreover, the search engine provides employees with outdated and thus irrelevant contents. It then causes confusion about which article is the most recent one, which holds many employees back in using In. Inadequate ICT, as Willem (2003) points out, can inhibit knowledge sharing. Having outdated articles that are not replaced by new ones does not support user-friendliness of

the tool, and as Alavi and Leidner (2001) argue, user-friendliness is a crucial factor that impacts facilitating knowledge sharing. However, when it comes to official documents that are, for example, required by law, employees said that such documents are quite easy to access. All in all, In affords employees to access existing information that can become knowledge on a medium level. The reason for that is that many spoke about mainly In's front page, which we interpret as refraining of searching beyond the front page. But on the other hand, In affords its users to access official documents which are an important part of many officers' work since they need easy access to those in order to perform their work tasks.

6 CONCLUSION

In our study we have investigated the affordance of information and communication technology, focussing on how these affordances support knowledge sharing. This field of interest is by no means new. However, what distinguishes our study from existing ones is the investigation in the context of a public organization. As we have shown in our literature review, a clear distinction between private and public sector organization can barely be done. Thus, in our study we draw upon dimensions that show to what extent an organization can be categorized as public. In order to investigate how the employees' use of ICT supports knowledge sharing, we used an affordance approach. Through in total 11 interviews that were conducted via Google Hangouts or Skype, we gained insight in the employees actual use of those ICTs that are most common in the organization. After transcribing, sorting and reducing the empirical material we found in total four recurrent patterns which describe the employees perceived action possibilities by the four information and communications technologies regarding knowledge sharing.

Learning refers to the formal, meaning structured, process of acquiring new knowledge. Through using video-conferences and desktop sharing, mostly Skype for Business affords the employees with the ability to learn new knowledge. Other tools mostly provided the possibility to acquire new knowledge based on information that is found in Emails, Connecticum or the intranet In. However, based on our empirical material, Skype for Business affords learning the most whereas Emails, Connecticum and In afford learning moderately. Along with Choi and Lee (2003) we argue that knowledge can only be transferred when applying it. In that sense, according to our empirical material the employees used mostly Skype in exactly that way. Thus, learning supports knowledge sharing in providing the perceived action possibility of ICT in order to acquire new information and knowledge in a structured, formal way.

Helping refers to the perceived action possibility of ICT to exchange information and knowledge informally to solve a work related problem. In contrast to *learning*, the employees used Skype for Business not only for the formal but much for the informal and ad-hoc exchange of mostly explicit knowledge. While Emails and the Intranet In were not mentioned in that regard,

Connecticum provided the employees with collective experience and thus supported knowledge sharing within the organization. The employees highly used the function to recursively exchange comments linked to a specific content and/or persons. In that sense, helping supported the employees sense-making of information and thus, knowledge sharing. We suggest that helping that is afforded by ICT has the potential to shift power relations in the organizations because knowledge is collectively shared. Yet, further research would need to invest that. Also the role of trust in the mentioned digital collectivism towards one another would be an interesting research field for further studies in the public sector.

We found *networking* to be furthermore afforded by ICT. The interviewed employees perceived the possibility to connect to co-workers for sending and receiving knowledge informally, once again specifically highly through Skype for Business. They furthermore, used Connecticum to link to certain people and groups. In establishing and keeping contacts, *networking* plays a crucial role in knowledge sharing. To know where to find knowledge, our empirical material shows that the employees made use of mostly Skype for Business and Connecticum. While other researchers have pointed out the significance of mapping experience for knowledge sharing, we have stressed its significance for knowledge sharing in the public sector. As we have argued in the previous chapter, especially due to environmental factors such as the lack of economic markets, networking has the potential to support knowledge sharing among public sector organizations.

Lastly, we have found the employees to perceive the usage of ICT in terms of *accessing* which is a formal, and structured, way of receiving information and knowledge. In contrast to the affordances above, accessing refers to the action possibility to search and browse existing information and knowledge. All four investigated ICT tools afforded accessing moderately. Yet, researchers such as Jonsson (2015) stresses the relevance of existing information and its accessibility to be a hygiene factor or condition in order for knowledge to be shared which we agree on.

Given the context of a public sector organization, we see implications for successful knowledge sharing especially in connecting the affordances with one another. Due to multiple often contrasting pressures, as we have stressed in our literature review, and that public sector organizations face, we conclude that learning in terms of acquiring new knowledge is essential in order to deal with those pressures. Due to the characteristically high level of process orientation (Rainey, 2014), a formal acquisition of knowledge is especially essential in public sector organizations. Networking, in that regard, has the potential to supplement the formally acquired knowledge with distributing it informally not only within but also among public sector organizations. As our study shows, the employees use Skype for Business much more diversely than the other ICT tools. We are well aware that the functions in Skype for Business differ significantly from the functions of Email, Connecticum or In. Yet, we found that employees actually use the fairly newly implemented ICT Skype for Business not only for actions that are different from other tools (e. g. videoconferencing), but also to replace action possibilities that are afforded by other tools. We found that Skype has already replaced and changed the way the public sector employees work and share knowledge. Thus, what we have learned from this study, is not only how the affordances of ICT support knowledge sharing in the public sector but also that their connection can imply successful knowledge sharing.

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APPENDIX

Interview questions

Basic information

1. What is your position in the organization? What do you mainly work with?
2. Under what department do you work?
3. How long have you worked in the organization?

Knowledge sharing

4. When you think about a normal working day? Whom do you mainly share your personal work knowledge with?
5. How do you share this knowledge?
6. What importance does it have in your daily work?
7. What does the organization do to manage/preserve knowledge? How would you do it? What would you improve?
8. What ICT tools do you use for knowledge sharing?
 - a. How do they differ?
 - a. Which ones do you use frequently?
 - b. Which ones do you use only sometimes?
 - c. Which one do you use the most and why?
 - d. How do you use them?
9. What do you think changed about knowledge sharing because of these tools?
10. What effect do you think have the tools on the knowledge sharing process? Do you think knowledge sharing has increased due to them?
11. What do you think is the major pro and the major con of the internal and external tools?