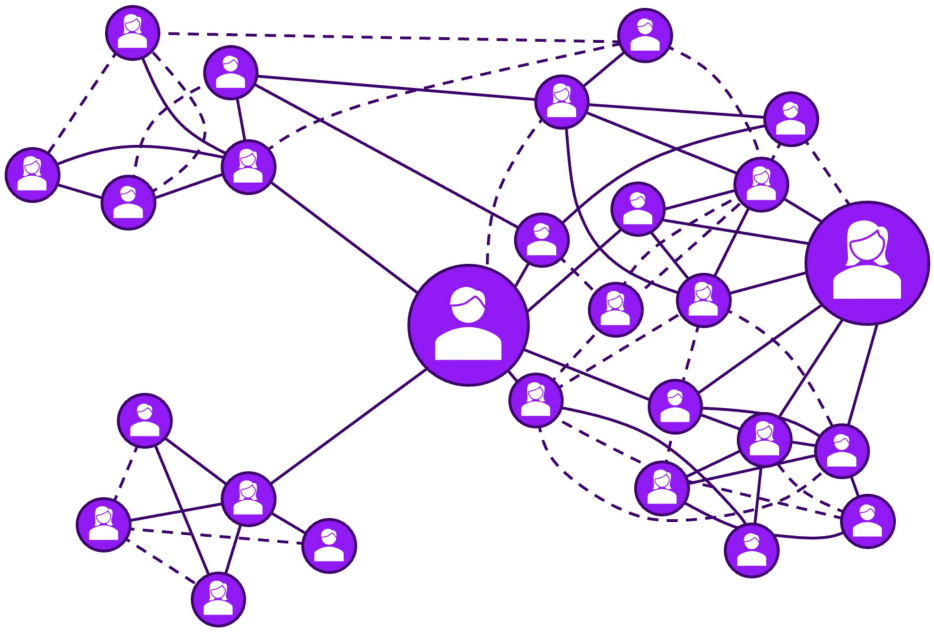

Relational Skills in a Large-Scale Agile Software Company

How the ability to build relationships affects collaboration across teams in an agile setting

Master's thesis in Quality and Operations Management

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CHALMERS UNIVERSITY OF TECHNOLOGY
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Cover: Network structure inspired by the work of Burt (1992).

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Abstract

This master's thesis has been carried out at Zenseact and investigated what relational skills is, what relational skills affect the interaction between teams, and how relational skills affect collaboration between teams in a large-scale agile software company. The study set out to answer three research questions and was conducted through 23 interviews and a survey for the engineering department at Zenseact with a 62% response rate, representing 290 people. The results of the study suggest that relational skills is the skills that enable one to create, maintain, utilise relationships. The study implies that relational skills positively affect the interaction between teams, where building trust and communication are the skills affecting the level of interaction the most. Furthermore, relational skills seem to have a positive effect on inter-team collaboration in an agile organisation, where awareness of others and relationships built on trust are important. Lastly, organisational structures seem to either enable or inhibit relational skills and the usability of specific relational skills depends on what situations demand.

Keywords: relational skills, interaction, collaboration, agile, trust, communication.

Acknowledgements

We are extremely happy and a little bit sentimental as we write these acknowledgements to celebrate the end of our academic journey in the Quality and Operations Management program at Chalmers. It brings us great joy and a touch of nostalgia to express our gratitude and look back on the achievements we've made throughout our studies, and it would have not been possible without the wonderful people who supported and guided us.

The completion of this master's thesis has been a truly enriching experience that has provided us with invaluable knowledge, insights, and a multitude of valuable lessons. However, our journey through this study would have been impossible without the invaluable support of numerous individuals who guided us every step of the way, and it is with immense gratitude that we extend our heartfelt thanks to these exceptional individuals. First and foremost, we would like to express our sincere gratitude to all the dedicated employees at Zenseact who actively participated in and supported our thesis. Especially, we would like to sincerely thank our industrial supervisors at Zenseact, Mehrnush Ostad and Christine Ottenborn. Without your assistance and trust in our abilities, the successful execution of this study would have been impossible. We would like to extend a special note of gratitude to our supervisor at Chalmers, Constantin Bremer, whose active involvement and expert guidance were crucial in steering us through the entire research process. His dedication and coaching have been invaluable, and we are sincerely thankful for his immense support.

In conclusion, we are genuinely grateful for the opportunity to research the great agile teams at Zenseact and make our contribution "Towards zero. Faster". We firmly believe that this experience will hold immense value as we move on to our future careers, and we are genuinely grateful for the invaluable lessons it has given us.

Simon Bengtsson & Albin Friedrichsen, Gothenburg, June 2023

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1

Introduction

Today's fast-paced and dynamic environment puts a considerable strain on companies in a turbulent competitive landscape. Sharing and creating new knowledge can therefore be a central area for creating a competitive advantage for companies (Grant, 1996; Argote and Ingram, 2000; Abrams et al., 2003; Nonaka and Takeuchi, 2007; Levin et al., 2016). One central part of knowledge sharing and creation is collaboration (Nonaka, 1994). Different organisational structures, such as agile, have been implemented to improve companies' level of collaboration (Rigby et al., 2016). Agile creates an organisation where relationships between employees seem to be less defined as there is a less defined hierarchy. While creating good working relationships can help improve the level of collaboration (McCallum and O'Connell, 2009) it may also help develop and share knowledge (Levin et al., 2016). When relationships are less defined by hierarchical structures relational skills seem particularly important for organisations to maintain efficient integration between functions and teams.

1.1 Background

Inkinen (2015) state that, a concept called intellectual capital is the combination of all the knowledge and competencies that organisations must possess to gain a competitive advantage. Developing software is a knowledge-intensive activity and it requires many different people in an organisation to interact (Wohlin et al., 2015). People are therefore a key element in software development (DeMarco and Lister, 2013). Software development largely depends on teamwork, where effective interaction among team members and complementary expertise is crucial for success (Wohlin et al., 2015). Similarly, Ghobadi and Mathiassen (2016) describe that shared knowledge and communication within agile teams have a positive effect on project success and failure rates. Moreover, to be able to leverage people's individual skills and combined value, the organisation that they work in must provide an infrastructure and environment fostering such an environment (Wohlin et al., 2015). Human interaction has become more of a focused area in business and management studies (Moran, 2005) as it can help individuals generate or access information through their social networks within their organisations (Levin et al., 2016). People's social relationships affect how well they communicate, where, for example, good relationships can simplify asking for help (Barksdale and McCrickard, 2012). Furthermore, Inkinen (2015) states that intellectual capital is one of the major drivers

for a firm's innovative capability and that social capital, in particular, seems to play a key role in transforming organisational knowledge into innovations. An element of social capital is relational skills, which are the skills used when interacting with others (McCallum and O'Connell, 2009). Therefore, social capital theory will be used to understand relational skills. Social capital includes developing trust and fostering collaboration (McCallum and O'Connell, 2009).

One main benefit of implementing agile has been to drive the level of collaboration in the organisation (Rigby et al., 2016). Agile organisations' strong emphasis on teams and low level of hierarchy creates an organisation with new relational norms where the team or informal leaders have an essential role in making decisions (Lee and Edmondson, 2017). However, ensuring that information flows efficiently when working according to agile methodologies and principles becomes more difficult as the organisation grows larger. One reason for this is that larger organisations have more cross-team dependencies (Dikert et al., 2016) making it interesting to understand cross-team research in large agile organisations. One success factor presented by Dikert et al. (2016) for large-scale agile transformations is to align the organisation to understand and strive for the same goals. Therefore, having continuous alignment and collaboration across teams is crucial for a large agile organisation to succeed.

Agile organisations' use of self-managing teams (Rigby et al., 2016) eliminates the traditional hierarchical roles and control of managers (Lee and Edmondson, 2017). This opens the question of how agile organisations can manage the lack of control due to the elimination of hierarchical reporting. Furthermore, Lee and Edmondson (2017) continues by mentioning that human psychology drives organisations towards hierarchy. As previously mentioned, collaboration across teams is a success factor for large-scale agile organisations. As social capital includes fostering collaboration, agile organisations should therefore require high levels of social capital to work. Current research does not have a general definition of relational skills and does not explicitly discuss how the development of the social capital element of relational skills could act as an organisational tool for organisations defined by less hierarchical structures. These gaps in existing literature indicate that further research on the subject could be of value to both academia and industry.

Information flow and generation are, as stated above, essential when discussing human interaction and are enabled through collaboration. For clarification, this thesis will view information and knowledge by the definition presented by Nonaka (1994, p. 15): *"[...] information is a flow of messages, while knowledge is created and organized by the very flow of information, anchored on the commitment and beliefs of its holder."* Therefore, investigating both information and knowledge is necessary to understand each. Abrams et al. (2003) present that informal networks and interpersonal relationships are often the primary sources for employees in organisations to learn and find information. Abrams et al. (2003) continue by presenting that knowledge sharing and development are primarily enabled by trust, both in a person's competence and in a person's benevolence, between the employees in the networks.

Consequently, one area of interest from both an academic and industrial perspective is therefore how relational skills affect collaboration in an agile organisation. Additionally, Burt (2000) mentions the performance of teams having more unique inter-team connections create more innovative and faster solutions. Thus, investigating how relational skills affect collaboration across teams in an agile organisation becomes interesting as it can improve the organisation's intellectual capital and create a competitive advantage.

1.2 Aim

The aim of this master thesis is to examine what relational skills is and the role and use of relational skills in an agile organisation. Further, it seeks to increase the understanding of how relational skills can affect collaboration among functions and teams in an agile organisation.

1.3 Specification of Issues under Investigation

To achieve the aim of the thesis, the research will set out to answer the following three research questions:

RQ1: *What are relational skills?*

After a more clear definition of relational skills has been defined, it becomes interesting to understand better what relational skills affect the interaction between teams. Hence, the second research question will be:

RQ2: *What relational skills affect the interaction between teams in an agile organisation?*

Interaction (how people communicate or react to each other) brings forward the question of collaboration (how people work together to create or achieve the same thing). As previously presented, collaboration can be a fundamental area for becoming more competitive. Therefore, to create possible usage and add to the knowledge of how agile companies can become more efficient, the thesis will investigate how relational skills affect collaboration. Therefore, the thesis will also set out to answer the following research question:

RQ3: *How do relational skills affect the collaboration between teams in an agile organisation?*

1.4 Delimitations

This study is a single case study which will therefore be based on one company. This company is defined by its own company culture but is also affected by the culture of Sweden, where the majority of the organisation is located. This study will not look into how the national culture may affect company culture and personal beliefs.

Furthermore, as there are employees in other countries of Sweden but the research will be focused on the Swedish parts, these branches and employees will not be part of the study. Lastly, this study will focus on the inter-team level of relations which will therefore make possible organisational and individual reasons out of scope.

2

Theoretical Background

This chapter provides an overview of the theoretical background needed to understand and grasp the concepts related to the thesis. The aim of the chapter is to explain the role of relational skills in a large-scale agile software development organisation, both in detail and from a broader perspective, and to act as a source of orientation for the discussion. In order to understand what factors are contributing to the organisational performance of a large-scale agile software company on a broader level, the concept of *Intellectual Capital* will first be presented in section 2.1. To more deeply understand the organisational capital of our case company, the concept of *Agile* will be presented in section 2.2. Following that, to better understand the role of networks of relationships and social mechanisms in organisations, as well as more comprehensively understand relational skills, the concept of *Social Capital* will be explained in section 2.3. Lastly, in order to establish a more detailed understanding of relational skills, which forms the foundation of the thesis, section 2.4, *Relational Skills*, will thoroughly explore the fundamental components of relational skills, encompassing effective communication and trust-building.

2.1 Intellectual Capital

In this section, the concept of intellectual capital and its relevance to organisations involved in software development will be introduced. The various components of intellectual capital will be presented, along with their interaction and their contributions to organisational performance. Additionally, the role of intellectual capital in the field of software engineering will be discussed.

2.1.1 Definition of Intellectual Capital

Intellectual capital is a concept based mainly on the theory of resources and capacities of organisations (Quintero-Quintero et al., 2021). The field of study appeared in the 1960s and it was established with the conviction of evaluating intangible assets in organisations. The key definitions and concepts of intellectual capital have been extensively discussed by researchers (Inkinen, 2015). In 1967, the term intellectual capital appeared for the first time when economist J.K. Galbraith described it as the result of an "intellectual action" rather than just knowledge, creating value as another asset (Galbraith, 2007). In the 1990s, with the consolidation of the study

of intellectual capital, Nonaka et al. (1995) defined it as the capacity of a company to create new knowledge, share it among members of the organisation, and transform it into tangible assets such as products, services, and systems. In a literature review on intellectual capital, Inkinen (2015) synthesises that intellectual capital is conceptualised as the combination of all the knowledge and competencies that organisations must possess to gain a competitive advantage. In other words, intellectual capital is comprised of information, intellectual property, knowledge, customer relationships, organisational technology, intellectual material, and experiences that contribute to a firm's competitiveness in the marketplace (Inkinen, 2015). Similarly, Quintero-Quintero et al. (2021) describes that intellectual capital encompasses the vital organisational knowledge and organisational processes essential for companies to remain competitive, emphasising that both components must be pursued simultaneously. Rastogi (2000) argues that knowledge management and intellectual capital are naturally connected in a two-way fashion. Inkinen (2015) further concludes that intellectual capital is one of the major drivers for a firm's innovative capability and that social capital, in particular, seems to play a key role in transforming organisational knowledge into innovations.

2.1.2 Dimensions of Intellectual Capital

It is evident from the literature that intellectual capital consists of several types of knowledge-based resources (Inkinen, 2015). Over time, the field of research has established a standard for constructing measurement models by categorising intellectual capital into three dimensions: human-centred, organisation-centred, and relationship-centred. The dimensions will be presented in more detail below presenting perspectives from different researchers. Henceforth, in this thesis, we will use Youndt et al. (2004) definition of the dimensions of intellectual capital components as depicted in Figure 2.1: human capital, social capital, and organisational capital.

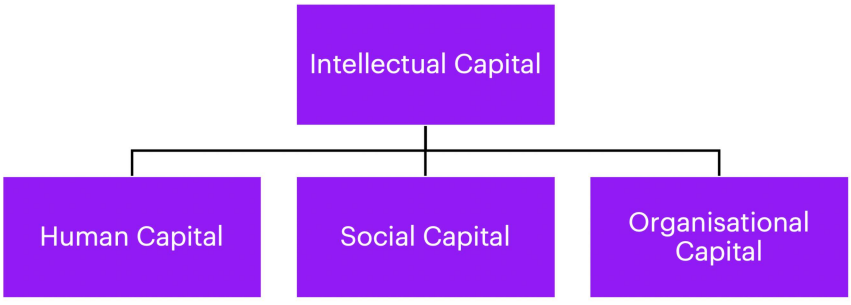

Figure 2.1: Intellectual capital and its three components. Source: Youndt et al. (2004).

Human Capital

Human capital can be defined as "the intelligence of the organizational member" (Bontis, 1998, p. 65). It is created by employees by their inherent and acquired knowledge, skills, talents, and competencies (Quintero-Quintero et al., 2021; Youndt

et al., 2004). According to Antosova and Csikosova (2011), human capital is seen as a dynamic measure and a crucial factor for an organisation's success nowadays. Furthermore, human capital can also be seen as the knowledge that people and groups possess and their ability to generate it for the strategic purpose of the organisation (Quintero-Quintero et al., 2021). Therefore, human capital is integrated by what people and groups know and learn and whether they share that knowledge with others. In a literature review on intellectual capital, Inkinen (2015) synthesises that human capital is comprised of features such as the employees' intelligence, values, attitudes, aptitudes, know-how, skills, capabilities, creativity, education, experience, qualifications, motivation, commitment, loyalty, expertise, leadership abilities, flexibility, learning capacity, behaviour, and risk-taking propensity.

Organisational Capital

Organisational capital, also called structural capital, constitutes the institutional knowledge created and owned by an organisation that is stored in manuals, databases, etc (Quintero-Quintero et al., 2021; Youndt et al., 2004). It can be seen as the organisational factors that support the human capital to perform (Inkinen, 2015). Organisational capital can also be seen to consist of work processes, organisational norms, technological processes, brands, etc. (Antosova and Csikosova, 2011). Similarly, Bueno et al. (2011) describes that organisational capital is the set of knowledge and intangible assets remaining in the organisation if the people are removed. In a literature review on intellectual capital, Inkinen (2015); Youndt et al. (2004) synthesises that organisational capital includes elements such as employee-supporting mechanisms and structures, organisational know-how, technological elements (such as information systems and databases), routines, procedures and processes, corporate culture, methods, business development plans, intellectual property, strategy, organisational charts, manuals and programmes.

Social Capital

Social capital, also known as relational capital, encompasses the collection of knowledge that emerges from relationships, both within and beyond an organisation, including networks and interactions (Quintero-Quintero et al., 2021; Youndt et al., 2004). It is characterised by the essential attributes of societal life, including relationships, norms, expectations, and responsibilities, which facilitate effective collaboration among participants in achieving common goals (Quintero-Quintero et al., 2021). According to Nahapiet and Ghoshal (1998, p. 243), social capital is *"the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit"*, and it concerns both the firm's external and internal relations (Inkinen, 2015; Youndt et al., 2004). Internal relations for an organisation are its employees, while the external relations is customers, suppliers, alliance partners, etc. (Youndt et al., 2004). In simple terms, social capital refers to the value that a firm derives from its social relationships (Reed et al., 2006). Since relational skills is an element of social capital (McCallum and O'Connell, 2009), social capital will be further elaborated upon in section 2.3.

2.1.3 Intellectual Capital & Organisational Performance

The relationship between intellectual capital and organisational performance has been extensively studied since the turn of the millennium, and it is challenging to definitively answer the question of whether intellectual capital influences organisational performance (Inkinen, 2015). In a comprehensive literature review of empirical research on the relationship between intellectual capital and firm performance, Inkinen (2015) concludes that intellectual capital has an impact on firm performance and stems from the dynamic interactions and synergies among different dimensions of intellectual capital.

Interactions of Intellectual Capital Dimensions

Jardon and Martos (2012) way of describing interactions between intellectual capital dimensions is that human capital is required to establish organisational capital, and that organisational capital is a prerequisite to building social capital. Similarly, Leitner (2011) describes that firms that are strong in human and organisational capital concurrently, have a higher probability of being innovative. Huang and Hsueh (2007) describes the interactions in a contrasting way, where they describe that the interaction of human and social capital, especially staff training and education levels, strongly influence organisational performance. In a similar fashion, Hsu and Fang (2009) concludes that the synergy between human and social capital enhances the organisational learning capability and improves performance in new product development. Tunc Bozbura (2004) presents a different way of looking at the interaction between the intellectual capital components. He concludes that organisational capital enables creativity within organisations and allows human and social capital to contribute to organisational performance. Furthermore, Burt (2000) explains that some people, or groups of people, tend to do better in the sense of receiving higher returns for their efforts. He continues to explain that social capital is the contextual complement to human capital, meaning that the people who do better are somehow better connected. Reed et al. (2006) on the other hand, concludes that there are no significant interaction effects between the intellectual capital dimensions.

Based on the different perspectives of interactions between the intellectual capital dimensions presented above, Inkinen (2015) concludes that the intellectual capital components may not individually enhance the organisational performance. However, being strong in each of them simultaneously will increase the potential of doing so. Youndt et al. (2004) reaches a similar conclusion where they have found that relatively few organisations are able to develop high levels of all three intellectual components. However, those who manage to do so outperform their competitors both in terms of financial and market performance (Youndt et al., 2004).

2.1.4 Intellectual Capital & Software Engineering

In practice, this is built up by processes, methods, techniques and tools that are being adopted in the work environment. With the use of Youndt et al. (2004) concept of intellectual capital, see Figure 2.1, Wohlin et al. (2015) has synthesised how

different areas and aspects in software engineering are related to the different components, see Table 2.1. Wohlin et al. (2015) conclude that the coexistence of the different components of intellectual capital is key to enabling the development of software. Furthermore, for businesses to be able to operate cost-efficiently and competitively, the different intellectual capital components must be balanced. Meaning, if an organisation lacks capital in a particular component, it must either improve that component or compensate for the loss by bolstering at least one of the other components of intellectual capital (Wohlin et al., 2015).

Table 2.1: Types of intellectual capital areas and different aspects related to software engineering. Source: Wohlin et al. (2015).

Intellectual capital		
Components	Categories	Example of aspects
Human capital	Skills and knowledge	Technical skills (programming and tools, patterns, basic computer science principles)
		Domain knowledge (including understanding of solutions to domain problems)
		Software product knowledge (program properties, existing software architecture, concept location within the code)
		Knowledge about ways of working (coding conventions, development tools etc.)
	Creativity	Development of new, innovative ideas
Social capital	The unit skills of working together	Solving problems together
		Making decisions together
		Shifting workload
		Common goals
		Performance of the unit
		Sharing knowledge within the unit
		Give each other feedback
		Knowing what others are doing
		Learning from experience
	External relations	Collaboration with other units
		Collaboration with experts
		Collaboration with customers
		Collaboration with product owners and program managers
		Networking through communities of practice
Organisational capital	Software	Software source code
		Software architecture
	Documentation	Documentation supporting understandability and maintainability of the software
		Process documentation
	Organisation's culture	Stories, rituals that contain valuable ideas, ways of working
	General infrastructure	Development environment
		Knowledge-based infrastructure

2.2 Agile Software Development

This section introduces concepts related to agile software development, starting with an overview of agile values and principles. Next, various agile methodologies will be explained, with a particular focus on scrum. Additionally, this section will address the characteristics of large-scale agile organisations, along with some common challenges and success factors that such organisations face. Following that the Scaled Agile Framework (SAFe), will be described, including the common challenges and success factors associated with this framework. Lastly, inter-team collaboration which is a significant challenge for large-scale agile organisations will be explained in greater detail.

2.2.1 Agile Values & Principles

The agile methods of working consists of guiding values and principles instead of a rigid methodology (Beck et al., 2001). Generally, the values and principles originate from the Agile Manifesto, which presents agile values and principles enabling teams to carry out development tasks with high quality (Hazzan, 2014). However, researchers have different points of view on the most important principles. Therefore the core principles sometimes vary in the literature (Björkholm and Brattberg, 2010). The agile values that were concluded in the Agile Manifesto are directly quoted from Beck et al. (2001) down below.

"We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:" (Beck et al., 2001)

Individuals and interactions *over processes and tools*
Working software *over comprehensive documentation*
Customer collaboration *over contract negotiation*
Responding to change *over following a plan*

"That is, while there is value in the items on the right, we value the items on the left more." (Beck et al., 2001)

Beck et al. (2001) also present the twelve agile principles that were founded for the Agile Manifesto, which can be seen in Figure 2.2 below:

Figure 2.2: The agile principles as presented in the Agile Manifesto. Source: Beck et al. (2001).

2.2.2 Agile Scrum Methodology

In 1986, Takeuchi and Nonaka (1986) first mentioned the term scrum and described it as a flexible, holistic product development strategy where a development team works as a unit to reach a common goal. The methodology was later formalised by Ken Schwaber and Dr. Jeff Sutherland, and is today by far the most popular agile method (Sutherland and Schwaber, 2007; Maximini et al., 2018). In accordance with the agile principles (Beck et al., 2001), Sutherland and Schwaber (2007) describe scrum as an iterative and incremental framework for developing projects, products, and applications. The development is structured around cycles of work called sprints, which are time-boxed iterations. Each sprint begins with a scrum team selecting items (customer requirements) from a prioritised list, which the team then commits to complete by the end of the sprint. The chosen items do not change during the sprint and the progress is briefly inspected each day to allow for adjustments needed for completing the remaining work. At the end of the sprint, the team together with stakeholders, review the sprint and demonstrates the completed work to collect feedback that can be incorporated into the next sprint. Scrum emphasise having a functioning product when the sprint is completed. Maximini et al. (2018) emphasise that Scrum by itself only is a framework which has to be filled with meaning by other complementing methods. Key roles, artefacts, and events are summarised in Figure 2.3 and further explained in the rest of subsection 2.2.2.

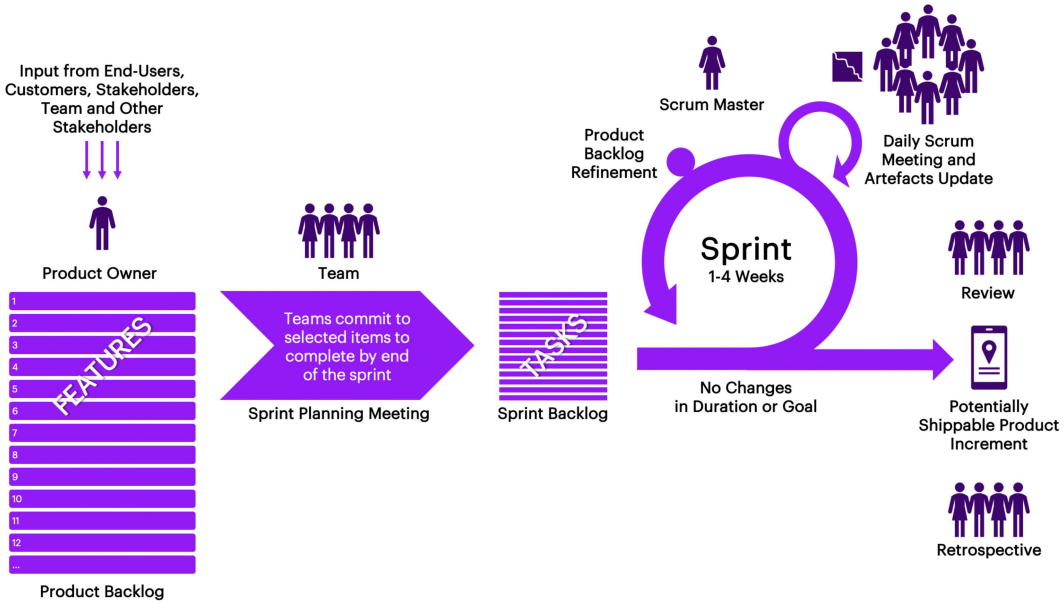

Figure 2.3: The scrum process. Source: Sutherland and Schwaber (2007).

Scrum Roles

Scrum only recognises three roles: the Product Owner, the Development Team, and the Scrum Master (Sutherland and Schwaber, 2007; Maximini et al., 2018). Together these are known as the Scrum Team.

The Product Owner is the most important role in Scrum (Maximini et al., 2018), and is responsible for maximising the return on investment (ROI) for the product being developed (Sutherland and Schwaber, 2007). This is done by identifying product features, translating them into a prioritised list, deciding which are the most important for the upcoming sprint, and continuously refining and re-prioritising the list. In practice, it can be challenging to maximise the ROI and value of the product. It depends a lot on the type of product being developed and if the customer is external or internal. The definition of value is therefore somewhat ambiguous and is affected by the desire to satisfy key customers, align with strategic objectives, attack risks, etc. The Product Owner is usually the person knowing the requirements from the customers' perspective best (Maximini et al., 2018). The customer and the Product Owner could be the same person, which is often the case in internal development projects (Sutherland and Schwaber, 2007). The Product Owner frequently interacts with the Development Team, offering the priorities and reviewing the results each sprint. In the Scrum framework, the Product Owner is a singular individual who holds ultimate authority and accountability for the value delivered by the team's work. The most critical skills for a Product Owner are effective communication and the ability to inspire and motivate team members (Sutherland and Schwaber, 2007).

The Development Team creates the product based on the guidance and requirements provided by the Product Owner (Sutherland and Schwaber, 2007). The team is characterised by its cross-functional nature, self-organising approach, and high

levels of autonomy and accountability. It composes all the competencies and expertise necessary to deliver a finished product each sprint (Maximini et al., 2018). Collaboratively, the team decides what to commit to and how to best accomplish it (Sutherland and Schwaber, 2007). Generally, the team consists of 5 to 9 people, and the specific product or feature to be developed determines which competencies to build the team around (Maximini et al., 2018). The term "developer" can be defined as anyone who can help develop the product and could therefore be a programmer, business analyst, UI designer, etc.

The Scrum Master serves as a guiding force, assisting the product group in mastering Scrum principles and practices to effectively deliver business value (Sutherland and Schwaber, 2007). The Scrum Master does not hold the position of a manager for the Team or a project manager. Instead, it actively supports the team, shields them from interference, and guides the Product Owner and Development Team. Since the Scrum Team is exposed to many obstacles and threats, it is important that the Scrum Master effectively addresses them, as these issues have the potential to hinder success. The Scrum Master can either be fully dedicated to their role or have a member of the Development Team take on the responsibilities while managing a lighter workload of regular tasks. Sutherland and Schwaber (2007) stress that the Scrum Master and Product Owner should not be the same individual. They further emphasise that the Scrum Master does not tell people what to do or assign tasks. Instead, they act as process facilitators supporting the team as it self-organises and self-manages.

Artefacts

Scrum only has three artefacts: The Product Backlog, the Sprint Backlog, and the Product Increment (Maximini et al., 2018). Their main objective is to reduce the amount of documentation and help optimise the process by constant inspection and adaptation. All artefacts should be transparent and easily accessible. At the end of each sprint, the Development Team delivers a Product Increment, which can be defined as a product functionality that is potentially shippable or useful to key stakeholders (Sutherland and Schwaber, 2007). It is considered done when the product could be implemented by the customer with no or little additional work (Maximini et al., 2018). The Product Backlog is a prioritised list of requirements, each with estimated time frames for converting them into functional product features (Sutherland and Schwaber, 2007). The higher up an item is, the more precise its estimations tend to be. To ensure a common understanding of the artefact continuous collaboration between the Product Owner and the Development Team has to be made (Maximini et al., 2018). The Sprint Backlog constitutes a list of tasks defining the work to be done in a sprint (Sutherland and Schwaber, 2007). Each task indicates who is responsible for completing the work and provides an estimate of the remaining workload on any given day during the sprint.

Events

In the Scrum framework, the meetings are called "events" (Maximini et al., 2018). Five events that are commonly included in the Scrum framework are the Sprint, the Sprint Planning Meeting, the Daily Scrum, the Sprint Review, and the Sprint Retrospective. The main goal of the events is to minimise the total time spent in meetings. All events have a time limit, which means they cannot exceed a predetermined maximum duration. One of the main events which Scrum is structured around is the Sprint (Sutherland and Schwaber, 2007). It is an iteration of work that aims to produce a potentially shippable Product Increment. It is usually between one week and one month in length. The duration stays the same throughout the entire sprint, and all teams working on the same system or product follow a uniform cycle length. Before the sprint starts, the Sprint Planning meeting takes place and it has two main goals (Maximini et al., 2018). The first goal is for the Product Owner and Development Team to collaboratively decide on what is wanted in the upcoming sprint. The second goal is for the Development Team to plan and create tasks for the upcoming sprint. The Scrum Team is usually the only one involved in this meeting, but subject matter experts could also be added if they can add value. The outcome of the meeting is the Sprint Backlog (Sutherland and Schwaber, 2007). Every day, the Scrum teams meet in the Daily Scrum (Maximini et al., 2018). It is a short meeting during which the team members inspect and synchronise their work, and provide updates on progress and obstacles for the Scrum Master to address (Sutherland and Schwaber, 2007). At the end of every sprint, the Scrum Team together with the project stakeholders, collaboratively discuss what happened in the so-called Sprint Review meeting (Sutherland and Schwaber, 2007). This usually starts with a demonstration of completed product backlog items, a discussion on opportunities, constraints, and findings, and a discussion on the best course of action moving forward, which could potentially result in changes to the Product Backlog. Lastly, in the Sprint Retrospective, a meeting led by the Scrum Master, the Development team comes together to discuss the recently-finished sprint and figure out areas of improvement for the next sprint.

2.2.3 Large-Scale Agile

Originally, agile methods were designed for use in small project teams (Boehm and Turner, 2005). This creates many challenges when agile is introduced at scale (Dikert et al., 2016). Despite the fact that agile is more difficult to implement in larger projects and companies, it has gained attraction outside the small project team context due to the shown benefits of the methodology (Dyba and Dingsoyr, 2009). Compared to small projects, which are ideal for agile development, larger projects need additional coordination, and a particular problem that can arise when applying agile in large projects is how to handle inter-team coordination. Larger organisations tend to have more dependencies between projects and teams, and as a result, the need for formal documentation increases which is contrary to the agile values and principles (Dikert et al., 2016). In addition to inter-team coordination, development teams also tend to interact more with other units in the organisation, which often do not adopt agile ways of working. Large-scale agile can be defined to denote software

development organisations having 50 or more people or at least six teams (Dikert et al., 2016).

One of the most prominent challenges for organisations attempting to adopt agile at a large scale is the challenge of coordinating the work of multiple agile teams (Dikert et al., 2016). While agile increases flexibility at the team level the surrounding teams may not be equally responsive. These inter-team dependencies thus make managing agile development difficult at large scale. The agile principle of working according to an autonomous team model may also bring some challenges. Teams need to find a balance between focusing on the broader goals of the organisation and their own, and teams often choose to focus on the latter. Therefore, coordination may be hindered by independent teams not respecting the larger context. Achieving technical consistency may also be a challenge when attempting to coordinate on an inter-team level. The strong focus on autonomous teams may, for instance, create a fragile architecture, divergence in coding style, and distrust between teams. Furthermore, the interpretation of agile may differ between teams. If there is a lack of consistent guidance of agile in a multi-team environment, friction and fragmentation may emerge. It is therefore desirable not having too different agile cultures of different teams.

Despite the fact that adopting agile methodologies at large comes with many challenges (Dikert et al., 2016), many organisations are doing it successfully and thus being able to capitalise on agile's potential (Rigby et al., 2016). An important success factor is recognising the importance of the product owner's role (Dikert et al., 2016). Teams having well-implemented product owners tend to perform better as a team and produce better working products. Another success factor is the importance of allowing teams to self-organise. When teams are given the authority to decide over work items productivity and work morale can increase as a result. Having an aligned organisation that works toward a common goal is also seen as a success factor for large-scale agile. It is important that teams and management are aligned in order to coordinate agile in a large context.

2.2.4 Scaled Agile Framework

There exist many frameworks for scaling agile and one of the most popularly employed is the Scaled Agile Framework, also called SAFe (Nilsson Tengstrand et al., 2021). It was designed by Dean Leffingwell to scale agile in large organisations and it is based on a combination of lean product development principles and agile principles (Scaled Agile INC, 2023). Practices such as Agile, Lean, and DevOps are therefore incorporated into a comprehensive framework (Putta et al., 2018). In the most extensive configuration of SAFe, there are four levels of the framework (Scaled Agile INC, 2023), see Figure 2.4: Essential SAFe, Large Solution SAFe, Portfolio SAFe, and Full SAFe.

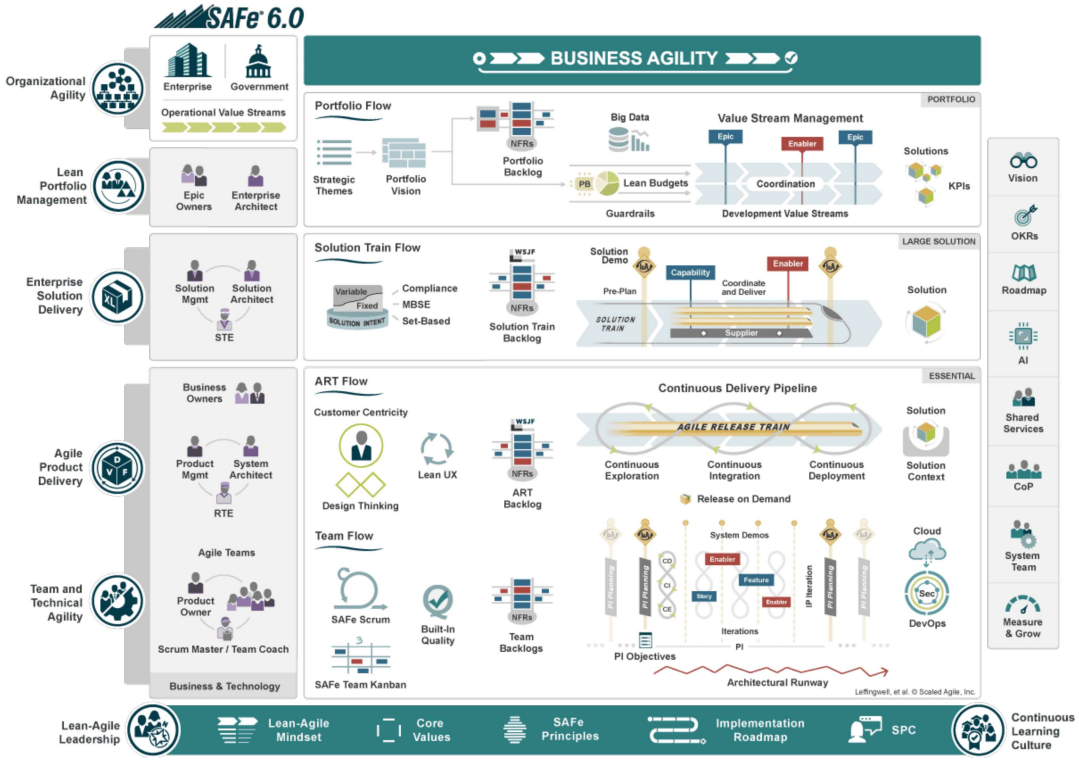

Figure 2.4: Large picture of the Full SAFe framework. Source: Scaled Agile INC (2023).

The Essential SAFe level comprises agile teams that power Agile Release Trains, also called ARTs (Scaled Agile INC, 2023), and where the development is primarily based on user stories and enabler stories (Nilsson Tengstrand et al., 2021). ARTs are composed of agile teams and key stakeholders that are aligned to a common business and technology objective (Scaled Agile INC, 2023). The ARTs form the fundamental organisational structure of the part of the organisation that employs SAFe. The ARTs further develop, deliver, or operate one or more solutions incrementally in a value stream, by for instance creating artefacts such as a vision, roadmaps, and features (Nilsson Tengstrand et al., 2021). The agile teams in an ART have a cross-functional collaboration with other agile teams in the ART to deliver solutions and a continuous flow of value to the customer (Putta et al., 2018). The Large Solution SAFe is suited for those organisations building large and complex solutions that require multiple ARTs and suppliers and where the large solution is the primary concern (Scaled Agile INC, 2023). It aims to facilitate the building of multidisciplinary software, hardware, cyber-physical, and complex IT systems on a large scale. At this level, release management roles work with economic frameworks to coordinate multiple ARTs and value streams (Nilsson Tengstrand et al., 2021). The Portfolio SAFe level aims to align portfolio execution to enterprise strategy by organising development around the flow of value through one or more value streams (Scaled Agile INC, 2023). At this level, the company work with Epics, which are initiatives that transcend all levels of the organisation (Nilsson Tengstrand et al., 2021). For

example, an Epic can start from an executive team vision to concrete development projects in the lower levels. Furthermore, the Portfolio SAFe level adds principles and practices to the framework for portfolio strategy and investment funding (Scaled Agile INC, 2023). The Full SAFe level is the most comprehensive configuration and is mainly used to maintain portfolios of large and complex solutions.

Challenges and Success-Factors for the Application of SAFe

Adopting large-scale agile methods such as SAFe has proven highly challenging with few successful cases to this date (Paasivaara, 2017). Edison et al. (2021) presents a set of challenges and success factors that are associated with the adoption of large-scale agile methods. The most prominent challenges when adopting SAFe in large-scale organisations can be divided into inter-team collaboration challenges, organisational structural challenges, architectural challenges, method adoption-related challenges, and team-related challenges (Edison et al., 2021). Regarding inter-team collaboration, it seems to be a challenge to synchronise across dynamic and fast-moving agile teams. When multiple agile layers grow, joint meetings take longer to cover necessary topics and teams may not receive important feedback or solutions to their issues. It is further challenging to strike a balance between being dedicated to your own team activities and participating in cross-team communication (Edison et al., 2021). Some organisations have tried to solve this challenge by limiting the collaboration within the agile teams, but this local optimisation has been done at the expense of the overall systems' expense. Organisational structural challenges that can arise when adopting SAFe is the emergence of various new roles which could lead to a complex organisational setup. This causes a large number of handovers as information to and from development teams has to go through many levels affecting the development speed negatively. This could potentially lead to a race condition where multiple teams compete for shared resources. The complex organisational setup could further lead to an inability to see the big picture at the program level (Edison et al., 2021). When work needs to be passed from one team to the other, it is difficult to keep an efficient flow as they find it difficult to understand the overall systems' behaviour. Furthermore, due to the many roles, events, artefacts, and practices that come with adopting SAFe, it seems to distract many organisations from achieving their business goals. It specifically seems to be a challenge being a PO since the many meetings can distract them from their other daily tasks, such as writing user stories. The adoption of SAFe could further lead to a lack of autonomy among agile teams, due to some decisions being made in meetings at higher levels (Edison et al., 2021).

As mentioned above, adopting large-scale agile development has proven challenging for companies and organisations with no clear consensus on how to adopt it successfully (Dikert et al., 2016; Kalenda et al., 2018). However, studies have been made on prevalent factors in successful cases of adoption. Edison et al. (2021) present several success-factors for the large-scale adoption of agile methods. The most prominent success-factors when adopting SAFe in large-scale organisations can be divided into management and organisational factors, process factors, people factors, and technology factors. The most important success-factor that is related to the management

and organisation is strong leadership support (Edison et al., 2021). Teams may not always see the benefits of adopting the SAFe framework and knowing that the management is committed to the framework and has a will to continuously solve impediments related to the method adoption, can highly improve teams' satisfaction towards SAFe. Regarding success-factors related to the process, having a dedicated team of release train engineers (RTE) can be beneficial to drive coordination among teams as well as continuous improvement. Furthermore, the physical proximity of teams has a positive impact on efficient coordination and knowledge sharing (Edison et al., 2021). When teams are sitting together, it allows for greater transparency and sharing of insights into other teams' work which reduces delays and a lack of communication. It can also help the sharing of a shared mental model allowing for easier interpretation of contextual cues and common goal setting. The increased transparency may also help reduce dependencies and increase the planning and coordination between teams. Regarding the factors related to people, trust among teams is reported as a key factor (Edison et al., 2021). Having trust among teams empowers them to take more responsibility, act, and deliver. Another important factor is related to the importance of having a common vision which allows for establishing a common ground and clarity of goals and direction (Edison et al., 2021). The technological success factors are related to having an adequate infrastructure that supports communication, knowledge sharing, and a community of practice, which has proven to contribute to the development of knowledge networks and social capital. In order to enable end-to-end development processes it is necessary that the right infrastructure is in place. This e.g. includes having joint development tools, a test environment, continuous integration, and automated tests.

2.2.5 Inter-Team Collaboration in Large-Scale Agile

As previously described, effective inter-team coordination remains a significant challenge for large-scale agile organisations (Dikert et al., 2016). Communicating in smaller projects can be challenging, but it becomes even more complex in larger organisations due to the impact of distance on software engineering communication (Grinter et al., 1999; Bjarnason et al., 2011; Bjarnason and Sharp, 2017). In order to successfully deliver a high-quality and often complex product, large-scale software engineering demands efficient coordination of inter-team communication (Bjarnason et al., 2022). In research, numerous factors that impact inter-team coordination in large-scale agile have been identified (Bjarnason et al., 2022; Bass, 2019). Bjarnason et al. (2022) explains that distances increase the risk of communication gaps. Furthermore, the impact of four different types of distances is described: geographical, organisational, psychological, and cognitive. Geographical distance refers to the physical distance between different actors and can have a negative effect on the frequency and ease of communication of requirements (Bjarnason et al., 2022). Organisational distance refers to the distance between the positions of actors within the hierarchical structure of an organisation, and it can impede decision-making processes by giving rise to conflicts and delays arising from different perspectives on requirements (Bjarnason et al., 2022). Psychological distance encompasses the perceived effort or discomfort that one actor may feel in communicating with another

actor, which can hinder agreement on requirements details (Bjarnason et al., 2022). Reluctance to ask for clarification may arise from the perception that seeking help is psychologically demanding, creating potential difficulties in effective communication. Cognitive distance refers to the varying levels of cognition among individuals or groups, encompassing knowledge, competence, and understanding (Bjarnason et al., 2022). Such differences can give rise to misunderstandings and ineffective communication.

Santos et al. (2015) has identified multiple factors that exert both positive and negative influences on the effectiveness of knowledge sharing between teams within agile software development, including organisational and physical structures, culture, management style, and communication flow. Additionally, they emphasise that the time pressure associated with rapid and frequent software delivery often results in teams prioritising their individual tasks over fostering inter-team collaboration and communication. Smite et al. (2019) mentions that knowledge-sharing can be enabled in a bottom-up fashion by utilising communities of interest, such as the guilds being employed by Spotify. This not only facilitates knowledge-sharing but also helps align development practices across teams. (Smite et al., 2019). Dingsøyr et al. (2018) study on coordinating knowledge work in large-scale agile development programs revealed that effective communication at the individual level was perceived as crucial for fostering collaboration. This was facilitated by various factors, such as physical co-location, a supportive culture, and opportunities for social interaction. Bjørnson et al. (2018) identified three effective mechanisms for enhancing communication between teams at the inter-team level: shared mental models, closed-loop communication, and trust. Shared mental models are fostered when teams develop a shared understanding of work processes, tasks, and awareness of each team member's knowledge (Bjørnson et al., 2018). Closed-loop communication can be facilitated through a blend of formal and informal communication methods, such as daily stand-ups. Developing trust is crucial in large-scale development and can be challenging to achieve (Bjørnson et al., 2018). Bjørnson et al. (2018) elaborates on how agile methods, with their emphasis on transparency, feedback loops, co-location, and frequent delivery, are highly effective in developing trust.

Begel et al. (2009) found that managing inter-team dependencies in large-scale software organisations is a challenging endeavour, requiring a substantial investment of time and effort into communicating with other teams. The primary communication strategy employed by teams is to foster and maintain personal connections with members of interdependent teams (Begel et al., 2009). Begel et al. (2009) further emphasises that communication is crucial in managing dependencies. Bick et al. (2017) elucidate that a lack of awareness regarding dependencies between teams is a significant factor contributing to misalignment and ineffective coordination within large-scale agile organisations. Furthermore, the researchers discovered that teams that exhibited efficient coordination within their own team faced significant challenges in communicating with other teams, as they lacked awareness of inter-team dependencies. Kiani et al. (2013) discovered that factors such as experience, team size, culture, and interaction frequency, affect awareness between teams. Teams comprised of highly experienced team members possessed a high level of awareness

towards other teams, even when separated by a geographical distance (Kiani et al., 2013). Furthermore, the study revealed a negative correlation between team size and awareness, indicating that smaller teams exhibited a higher degree of awareness towards others compared to larger teams. Additionally, a culture characterised by frequent interaction and knowledge-sharing, as exemplified in agile development, can significantly enhance awareness (Kiani et al., 2013).

Šmite et al. (2017) discovered that when development teams perform complex or unfamiliar tasks, they often depend on external networking and knowledge sharing with other teams to succeed. The study also found that the team's social network size was believed to be influenced by the collective company experience of its members. Furthermore, it was observed that active engagement in forums and communities of practice resulted in higher levels of interaction and communication among teams, leading to expanded networks in terms of size. The researchers also discovered that teams faced with complex and unfamiliar tasks are forced to actively seek out information and coordinate with other teams in order to succeed. The importance of coordinating roles, also called boundary spanners, was also confirmed through the utilisation of formal experts who facilitate the exchange of knowledge among teams. Lastly, the study also discovered that personality and team culture has a significant impact on the dynamics of team interaction and communication.

Bjarnason et al. (2022) studied inter-team communication in large-scale co-located software engineering organisations and found ten factors that affect inter-team communication which is presented in Table 2.2. These factors were divided into four main categories: *awareness of others*, the *frequency and extent of interaction between teams*, a team's *attitude towards other teams*, and various aspects of a *team's characteristics*. The study concluded that team members' level of awareness of other teams significantly influences their cognitive distance and communication with those teams, with both positive and negative effects. When team members have a good understanding of other teams, how they work, and what they work on, it fosters a positive attitude and facilitates communication. Conversely, inadequate awareness can lead to false assumptions and negatively impact inter-team communication. Their research further discovered that consistent and meaningful engagement with other teams, facilitated through work rotation, significantly contributes to fostering effective inter-team communication. Moreover, Bjarnason et al. (2022) findings suggest that team communication is greatly influenced by their attitudes towards one another and their respective work and that a team's awareness and knowledge of other teams can impact this dynamic. Specifically, maintaining a positive attitude towards other teams can facilitate effective communication, while an unappreciative or negative attitude can impede inter-team communication.

Table 2.2: An overview of factors that influence inter-team communication. Source: Bjarnason et al. (2022).

Overview of factors that influence inter-team communication	
Factors	Influence
Awareness of others	Team members' level of awareness of other teams significantly influences their cognitive distance and communication with those teams, with both positive and negative effects. When team members have a good understanding of other teams, how they work, and what they work on, it fosters a positive attitude and facilitates communication. Conversely, inadequate awareness can lead to false assumptions and negatively impact inter-team communication.
Interaction frequency and extent	Frequent interaction through work rotation contributes to good inter-team communication.
Culture	A culture of openness and helpfulness contributes to inter-team communication.
Similar attitudes and opinions	Inter-team communication and agreement are facilitated by similar attitudes and opinions.
Personality	Inter-team communication is facilitated by people with outgoing personalities.
Age of team	Inter-team communication is improved as teams age, due to previous contact with people, now in other teams.
Size of team	Small teams are easier to co-locate with others and may be open to communicating with others. Larger teams have a larger social network in total.
Seniority	A team with many senior members has access to a large social network.
Organisational belonging	The organisation of engineers into actual or virtual teams affects inter-team communication.
Work tasks	Working with similar work tasks including types of testing or dependent technology, can facilitate communication between teams.

Furthermore, Bjarnason et al. (2022) observed that company culture significantly impacts inter-team communication. Specifically, it was found that a culture that fosters openness and collaboration is positively associated with effective inter-team communication. The study further discovered that certain teams found it easier to communicate with teams that shared similar attitudes, opinions, and goals. An individual's personality was also seen to impact their ability to communicate with others. Specifically, individuals with outgoing personalities are often seen as better facilitators of inter-team communication. Moreover, the research findings revealed key team-related factors that can influence inter-team communication. These include the age and the size of a team, the number of senior team members, the sense of team belonging, and the work tasks for which the team is responsible. As teams mature and establish relationships with individuals who have transitioned to other teams, inter-team communication is enhanced through the continuity of previous contacts. Small teams are more favourable to co-locating with and communicating

effectively with others, whereas larger teams tend to have a larger social network in total. Teams comprised of many senior members were also seen having access to large social networks. The arrangement of engineers into physical or virtual teams was also observed to impact inter-team communication. Finally, collaborating on similar work tasks such as testing or related technologies can enhance communication among teams.

In their study on inter-team communication in large-scale co-located software engineering organisations, Bjarnason et al. (2022) also identified five strategies for supporting inter-team communication: awareness of cognitive distance, physical meeting points, job and office rotation, key people, and tool support for interaction, see Table 2.3. By being aware of cognitive distance, individuals can adjust their communication methods and prevent misunderstandings caused by discrepancies in implicit knowledge. This, in turn, helps bridge the gap of cognitive distance. Physical meeting points offer valuable opportunities for direct inter-team communication, which can be either prearranged or occur spontaneously. Cross-organisational events have the potential to foster social and work-related interactions among teams. Job and office rotation can greatly enhance inter-team communication and foster competency development. To minimise the potential loss of expertise within the original team, short-term rotation between teams or even simple office location rotations can be effective strategies. Key people are individuals who serve as formal or informal points of contact, possessing extensive social networks and awareness of various teams. They play a crucial role in bridging inter-team boundaries by facilitating connections among individuals and facilitating knowledge sharing. Enhanced tool support for interaction within large organisations can greatly facilitate communication across distances, through features such as providing up-to-date contact information, indicating availability status, and enabling seamless digital communication.

Table 2.3: An overview of strategies for facilitating inter-team communication. Source: Bjarnason et al. (2022).

Overview of strategies for facilitating inter-team communication	
Strategies	Effect
Awareness of Cognitive Distance	enables people to adapt their communication and avoid misunderstandings due to mismatches in tacit knowledge, and thereby bridge the cognitive distances.
Physical Meeting Points	provide forums for direct inter-team communication and can be either planned or spontaneous. Cross-organisational events can stimulate social and/or work-related interaction between teams.
Job and Office Rotation	can improve inter-team communication, and provide opportunities for competence development. The loss of competence for the original team may be reduced by allowing short-term rotation between teams or by simply just rotating office location.
Key People	are formal or informal contact persons, with a wide social network and good awareness of other teams. They can bridge inter-team boundaries by connecting people and knowledge.
Tool Support for Interaction	can facilitate communication over distances within large organisations by e.g. providing contact information, indicating availability status and by enabling digital communication.

2.3 Social Capital

In this section, the concept of social capital and its relevance to relationships and networks will be introduced. The different underlying concepts of social capital will be presented down below. Moreover, the three different dimensions of social capital, structural, cognitive, and relational (Nahapiet and Ghoshal, 1998; Claridge, 2018), will be introduced to better understand how relational skills are an element of social capital. Lastly, this section will present the social dimension of knowledge and the possible value of social capital.

2.3.1 General Social Capital Theory

The definition of social capital by Nahapiet and Ghoshal (1998, p. 243) *"the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit"* has its foundation in the ideas of Bourdieu (1986) and Burt (1992). Putnam (1993) defines social capital to include trust, norms, and networks and has this definition based on the work by Coleman (1988). The social capital definition by Putnam (1993, p. 167) is: *"Social capital here refers to features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated action."*. One general idea regarding social capital is that networks of relationships are a precious resource creating a collectively owned capital (Bourdieu, 1986). Bourdieu (1986) states that the volume of social capital an individual has depends on the size of the connections in the network the individual can rally. These connections have in turn other resources which will therefore be accessible for the individual through its network (see Figure 2.5 for a network illustration). Burt (2000) states the value of networks and that there is a consensus that social capital can generate competitive advantage for people as they are better connected. However, there is a disagreement on what it means to be better connected, due to which network mechanisms are used for the definition (Burt, 2000). Burt (2000) present four network mechanisms that describe social capital. The assumption that a person does not have all information available and therefore prior relationships can affect or even replace information underlies the two first network mechanisms, contagion and prominence (Burt, 2000). The contagion mechanism refers to how information may be lacking or ambiguous so one's behaviour is driven by observing others' behaviour and taking it as confirmation of appropriate behaviour. The prominence network mechanism refers to how information may be lacking or ambiguous so one's behaviour is driven by following those with high status as the status is seen as a stamp of approval (Burt, 2000). The other two network mechanisms, closure and brokerage follow the assumption that communication takes time and depending on who one knows, one will have access to the information at different times. These two mechanisms have been the basis for work in social capital (Burt, 2000) and will therefore be described in greater detail down below.

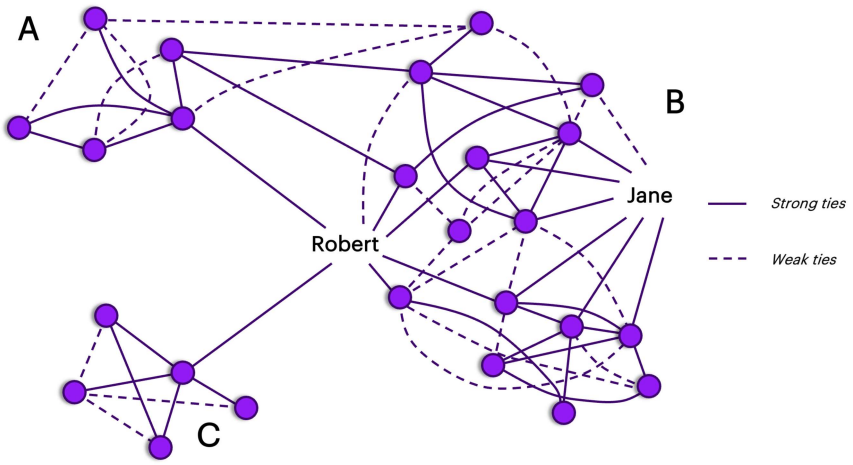

Figure 2.5: Network illustration. Source: Burt (2000, p. 349).

2.3.2 Network Closure

Burt (2000) declares that the view of Coleman (1988) focuses on risks that come with partial information, which Burt declares to be the view that network closure creates social capital. Networks with closure are those where everyone is connected to the extent that makes it impossible to go unnoticed. This type of network is dense and is argued to be a foundation of social capital (Burt, 2000). Networks with closure are argued to do two things to the people in the network. The first thing is that it may affect access to information in the way that information will be available through the network meaning that one does not have to seek it out. An example of this by Coleman (1988, p. S104) is: *"a person who is not greatly interested in current events but who is interested in being informed about important developments can save the time required to read a newspaper if he can get the information he wants from a friend who pays attention to such matters."* The second thing is that closure promotes sanctions that make it safer for people to trust each other, creating solidarity between the members of the network.

The argument that network closure creates social capital can be illustrated in Figure 2.5. This view would argue that Jane, with her strong relationships, has more social capital than Robert. These strong relationships will give Jane access to trustworthy communication channels and protect her against exploitation. This is because Jane and her contacts will be more capable to take collective actions against those who violate the group's norms of behaviour (Burt, 2000).

2.3.3 Structural Holes & Brokerage

"Participation in, and control of, information diffusion underlies the social capital of structural holes" is how Burt (2000, p. 353) defines the structural holes argument for the creation of social capital. The structural holes argument defines social capital in terms of brokerage opportunities and utilises network concepts. In Figure 2.5 there are weaker connections between groups and these are defined as holes in the

social structure. A person who spans these structural holes will have a competitive advantage. To be clear, a structural hole does not mean that the individuals in the groups are oblivious to each other but instead are not focused on activities in the other groups as they focus on their own (Burt, 2000). Therefore, one can view structural holes as buffers where individuals on either side of the structural holes engage in different flows of information, making structural holes an opportunity for individuals to broker the flow of information between people (Burt, 2000).

To clarify, *"Structural holes separate nonredundant sources of information, sources that are more additive than overlapping"* (Burt, 2000, p. 353). Hence, the level of redundancy needs to be low for a structural hole to exist and there are two indicators for redundancy in networks, cohesion and equivalence. Contacts that are strongly connected, cohesive contacts, are more likely than others to have the same information. People who connect a person to the same 3rd parties, structurally equivalent contacts, on the other hand, will have the same sources of information providing redundant information benefits (Burt, 2000). This can be illustrated by viewing the network in Figure 2.5. Both Jane and Robert have the same type of connections, six strong ties and one weak tie. However, Jane is through her seven contacts and their direct contacts only connected to group B while Robert is connected to groups A, B, and C directly making him a broker of this network. This position will give Robert an advantage as he will have access to a higher level of information because he reach more people indirectly and the variety of his contacts will reduce the level of information redundancy (Burt, 2000). Therefore, through the structural holes argument of social capital, Robert in Figure 2.5 possesses more social capital than Jane.

2.3.4 Tie Strength

One well-cited publication regarding networks is Granovetter (1973) and his discussion regarding the value of weak ties. Burt (1992) discusses the work of Granovetter (1973) and presents that the argument of the strength of weak ties is that it is where new ideas and opportunities come from. People with strong relations tend to create a cluster where information is flowing fast and freely and everyone knows what the others know. Hence, new ideas must come from weak relations, weak ties, that connect people from different groups/clusters. These weak ties are fundamental for the flow of information that merges two distant groups into a larger network (Burt, 1992).

Strong ties on the other hand tend to drive cohesion of groups but overall fragmentation of networks (Granovetter, 1973). This implies that strong ties are fundamental for network closure while weak ties are fundamental for brokerage of structural holes. However, there are discussions regarding this general view of how different tie strength is contributing to the value of networks. Krackhardt et al. (2003) show how depending on the level of change, different types of ties are necessary. For example. their study indicates that weak ties are fundamental when change is only dependent on new information while stronger ties are important when major change with resistance to the change as it is vital to trust the people driving the change.

Rost (2011) presents that weak ties leverage strong ties in the creation of innovation showing a dependent relationship between weak and strong ties in the creation of innovation. Interestingly, depending on the aim of a task, different network structures may be better. Hansen et al. (2001) argue that depending if the tasks of a team were exploratory (innovative/experimental) or exploitative (routine/continuous improvement) different network structures were preferred. Therefore, there seems to be no general theory over an optimal network structure and combination of relations and their tie strengths.

2.3.5 3 Dimensions of Social Capital

There are usually considered to be three dimensions of social capital: structural, cognitive, and relational (Nahapiet and Ghoshal, 1998; Claridge, 2018). These three dimensions are conceptual distinctions used to better analyse social capital but in reality, social capital involves the overlaps and interrelations between these dimensions (Claridge, 2018).

Structural Dimension

The structural dimension is considered to be mostly tangible as it includes the social structure, specifically network ties, roles, rules etc. It includes the social network of relations as a whole and focuses on the link between people or units, i.e., who an individual knows and can acquire information and assistance from (Claridge, 2018). It concerns the configuration, which includes density, connectivity, hierarchy, and appropriability, of a network of relationships (Davenport and Daellenbach, 2011). An important side of structural social capital is the number of ties a person has and how strong they are as well as to who the ties are connecting them with (Taylor, 2007). However, it is important to distinguish between the network of relationships and the quality of relationships, as the quality of relationships is part of the relational dimension. Thus, structural social capital relates to the network and types of relationships, i.e., the social system of networks (Claridge, 2018).

Cognitive Dimension

Cognitive social capital refers to the resources that enable people or groups to share and create common understandings, interpretations, and systems of meaning (Nahapiet and Ghoshal, 1998). It includes having a shared language, codes, and culture as well as shared values, attitudes, goals, vision, and beliefs (Tsai and Ghoshal, 1998; Inkpen and Tsang, 2005; Claridge, 2018). While structural social capital was considered mostly tangible, cognitive social capital is considered intangible as it involves shared interpretations of a common reality (Claridge, 2018). One example that can make this clearer is when groups use words or phrases in an organisation or group which outside of it has a different or no meaning. However, there is a disagreement about whether cognitive and relational social capital should be different dimensions or if they fundamentally are the same. Some articles only present two dimensions, where cognitive and relational social capital are merged, making the distinction in literature difficult. However, Claridge (2018) motivates the distinction between the

two dimensions by arguing that although both dimensions are intangible and therefore cognitive by creation, cognitive social capital describes a broader social context while relational social capital relates specifically to social relationships.

Relational Dimension

The dimension of social capital which is the least understood is the relational dimension (Moran, 2005; Levin et al., 2016; Gubbins and Dooley, 2021) as well as what way relationships affect information flow and learning (Borgatti and Cross, 2003). Relational social capital relates to the qualities and characteristics of relationships, therefore including trust, norms and sanctions, as well as obligations and expectations (Nahapiet and Ghoshal, 1998; Claridge, 2018). One fundamental aspect of relational social capital is associability, i.e., the willingness to put collective goals ahead of one's individual goals (Claridge, 2018). As mentioned, relational social capital is intangible and resides in the relationships between people and is enacted through, for example, trust, shared norms of behaviour, and obligations. Hence, it is dealing with the quality and nature of networks of relationships or single relationships (Claridge, 2018).

2.3.6 Social Dimension of Knowledge

A critical aspect of knowledge sharing in an organisation is that it is partially a socially constructed phenomenon shaped by relationships and people (Nonaka and Takeuchi, 2007; Gubbins and Dooley, 2021). Seeking knowledge, which is a phase initiated prior to knowledge sharing, is the decision to socially interact with others with the purpose to retrieve needed knowledge (Gubbins and Dooley, 2021). Previous research has identified that knowledge sharing heavily relies on trusting social relations (Gubbins and Dooley, 2021). Interestingly, Alexopoulos and Buckley (2013) identified that professional trust seems to be more important for knowledge sharing when the relationship is new and personal trust seems to only be important in well-established relationships. Furthermore, Andrews and Delahaye (2000) pointed out that people searching for knowledge decide who to go to for knowledge based on their perceived credibility, which indicates an importance of trust in competence while searching for knowledge. When it comes to knowledge-seeking behaviour, Gubbins and Dooley (2021) show that trust in competence is the first consideration by the knowledge seeker while trust in benevolence becomes relevant when the source of knowledge is not in the same "group" as the seeker. Since no knowledge has been shared before the seeker actually initiates interaction, the perceived trust in competence and benevolence is what will determine if the seeker initiates an interaction in the first place. When knowledge is shared openly, this is not the case. The perceived trust in competence and benevolence will be influenced by the knowledge shared and the recipient can after consideration determine if the knowledge shared should be acquired (Gubbins and Dooley, 2021).

2.3.7 Value of Social Capital

Tsai and Ghoshal (1998) state that social interaction and trust are related to interunit resource exchange which in turn significantly affect product innovation. Social interaction is described to be an expression of the structural dimension of social capital and trust is described to be an expression of the relational dimension of social capital (Tsai and Ghoshal, 1998). Furthermore, the relational dimension of social capital represented by trustworthiness is heavily connected with the other two dimensions, as well as that all three dimensions of social capital reinforce the creation of the other dimensions. Additionally, Tsai and Ghoshal (1998) present that informal social relations promote productive resource exchange between units and thereby support product innovation.

One direct benefit of social capital stated by Adler and Kwon (2002) is information as social capital helps individuals access wider sources of information. In addition, social capital also improves the quality and relevance of information (Adler and Kwon, 2002). Adler and Kwon (2002) also present Hansen's (1999) results that weak ties facilitate product development team's search for new information and that strong ties facilitate the transfer of complex information. Both of these are also stated to generate positive benefits for an organisation. Furthermore, frequent interactions between teams allow for faster conflict resolutions by creating a form of solidarity and therefore preventing friction between teams to build up (Adler and Kwon, 2002).

However, Adler and Kwon (2002) point out that much of the literature on social capital focuses on the benefits while there are much fewer studies on the risks. There is a potential risk that the solidarity benefit may backfire. One way is that the solidarity between members of the same group may create too much trust in each other reducing the flow of information into the group. Furthermore, Hansen (1999) shows that teams with strong ties to other teams often were slower in completing their tasks than those with weaker ties. Therefore, Adler and Kwon (2002) state that although strong ties have information benefits they may also be too costly to maintain.

Walker et al. (1997) present the proposition that structural holes are more important and valuable when there is no network (or it is in the early stages of creation), as the biggest need is information. As the network grows and becomes more established, it will become more densely connected making stable and cooperative relationships in the network more valuable than brokerage opportunities. This corresponds with the argument of Burt (1997) which states that the value of social capital is contingent on the number of people doing the same work. When a network becomes more established, more people are acting as brokers, therefore reducing the value of brokerage opportunities. Lastly, depending on the task different "roles" in the network may be of value. As an example, Krackhardt and Stern (1988) argue that if tasks require inter-team collaboration the value of intra-team social capital is reduced and may even become a liability. The value of social capital may therefore be seen as dependent on and created by the situation's needs.

2.4 Relational Skills

During turbulent times, it is hard to develop social capital and relationships (Prusak and Cohen, 2001), making it important to develop them when times are less volatile. McCallum and O'Connell (2009) present that relational skills is an element of social capital. However, there is no consensus in the literature on a universal classification of relational skills (Matteson et al., 2019). One may view relational skills as the ability to build relationships. Therefore, one may also view it as the ability to build a network of relationships, hence becoming an ability to build social capital. Researchers mention a cluster of soft skills such as building trust, communication, fostering collaboration, and shared norms (Nahapiet and Ghoshal, 1998; Claridge, 2018) when discussing social capital yet there is no general consensus on what constitutes relational skills.

2.4.1 Trust

Trust is commonly divided into two sub-categories, trust in competence and trust in benevolence (Nahapiet and Ghoshal, 1998; Abrams et al., 2003). Trust in competence refers to a person's trust in someone's ability and expertise so they can be trusted to know what they are talking about (Abrams et al., 2003). Trusting that someone has the ability and expertise includes feeling confident that someone has enough expertise and/or knowledge to provide solutions and that they are worth listening to and learning from (Abrams et al., 2003).

Trust in benevolence refers to a person's trust in someone's interest in one's well-being and goals (Abrams et al., 2003). Asking others for either information or advice can be a vulnerable thing which is what trust in benevolence covers. Trust in benevolence helps people ask for help without the fear of being ridiculed or damaging one's reputation (Abrams et al., 2003).

Abrams et al. (2003) present several trust-building acts and behaviours for managers in a knowledge-transfer context, which are presented in Table 2.4. Even though they are designed to be for managers there is little that supports that they can not still be important for everyone, especially in less-hierarchical structures. Furthermore, Prusak and Cohen (2001) point out that trust is self-reinforcing and cumulative, meaning that trust builds even more trust. Therefore, the behaviours and acts presented in Table 2.4 promote trust and future actions will possibly create even more trust. Furthermore, Nahapiet and Ghoshal (1998) argue that trust motivates people to deepen their relationships and pursue interactions since trust creates an anticipation of value through social interactions. Therefore, the trust-building acts and behaviours may also create a drive for more social interactions.

Abrams et al. (2003) point out that trust is an enabler for effective collaboration and knowledge sharing, making the case that building trust is one relational skill central in this study. Furthermore, other relational skills such as shared norms and communication may be acts driving the development of trust.

2.4.2 Communication

Klein et al. (2006) present interpersonal skills to be an umbrella term that includes communication and relationship-building competencies, which could be considered to be relational skills, where 12 specific skills are categorised under these terms. This work is interesting as it makes a difference between communication skills and relational skills. Communication is considered to be both human capital and social capital (McCallum and O'Connell, 2009) and as relational skills are considered to be an element of social capital, the lack of consensus if communication is a relational skill is reasonable. Bedwell et al. (2014) used and described each skill of the interpersonal skills in detail while also presenting related skills. This work can be seen in Table 2.5. Notably, communication is a related skill in the relationship-building skill of cooperation & coordination making the distinction between communication skills and relational skills even vaguer. Beyond this, trust is also here a relationship-building skill, not specifically divided into trust in competence and benevolence, but described to include both. Furthermore, engaging in collaborative communication is presented to be a trust-building act by Abrams et al. (2003) in Table 2.4, creating the proposition that trust and communication may have a symbiotic relationship.

Intra-organisational communication has been documented to be of importance for inter-team interaction in large multi-unit organisations (Tsai and Ghoshal, 1998). As collaborative communication is a trust-building behaviour in Table 2.4, trust and communication seem to be enabled by social interactions. Gupta and Govindarajan (1991) present that greater communication intensity leads to increased capacity for processing information which in turn suggests that collaborative interactions may build individuals' capacity to process information. As fostering collaboration is one proposed relational skill, relational skills seem to not only be able to drive collaboration but also improve relevant capabilities of employees.

Table 2.4: Managerial behaviours that promote trust. Source: Abrams et al. (2003).

Trustworthy behaviour		
Trust builders	Description	Trust promoted
Act with discretion	Keeping a secret means not exposing another person's vulnerability; thus, divulging a confidence makes a person seem malevolent and/or unprofessional.	Benevolence
Be consistent between word and deed	When people do not say one thing and do another, they are perceived as both caring about others (i.e., they do not mislead) and as being competent enough to follow through.	Benevolence Competence
Ensure frequent and rich communication	Frequent, close interactions typically lead to positive feelings of caring about each other and better understandings of each other's expertise.	Benevolence Competence
Engage in collaborative communication	People are more willing to trust someone who shows a willingness to listen and share; i.e., to get involved and talk things through. In contrast, people are wary of someone who seems closed and will only answer clear-cut questions or discuss complete solutions.	Benevolence Competence
Ensure that decisions are fair and transparent	People take their cues from the larger environment. As a result, there is a "trickle down" effect for trust, where the way management treats people leads to a situation where employees treat one another similarly. Thus, fair and transparent decisions on personnel matters translate into a more trusting environment among everyone.	Benevolence
Organisational factors		
Trust builders	Description	Trust promoted
Establish and ensure shared vision and language	People who have similar goals and who think alike find it easier to form a closer bond and to understand one another's communications and expertise.	Benevolence Competence
Hold people accountable for trust	To make trustworthy behaviour become "how we do things here," managers need to measure and reward it. Even if the measures are subjective, evaluating people's trustworthiness sends a strong signal to everyone that trust is critical.	Benevolence Competence
Relational factors		
Trust builders	Description	Trust promoted
Create personal connections	When two people share information about their personal lives, especially about similarities, then a stronger bond and greater trust develop. Nonwork connections make a person seem more "real" and human, and thus more trustworthy.	Benevolence
Give away something of value	Giving trust and good faith to someone makes that person want to be trusting, loyal, and generous in return.	Benevolence
Individual factors		
Trust builders	Description	Trust promoted
Disclose your expertise and limitations	Being candid about your limitations gives people confidence that they can trust what you say are your strengths. If you claim to know everything, then no one is sure when to believe you.	Competence

Table 2.5: Interpersonal skills. Source: Bedwell et al. (2014).

Communication skills		
Skill	Description	Related skill
Active listening	Paying close attention to what is being said; asking other party to explain exact meaning; requesting repetition of ambiguous ideas/statements	Listening with empathy and sympathy; listening for understanding
Oral communication	Sending verbal messages constructively	Enunciating; expressing clearly; communicating emotion; interpersonal communication
Written communication	Writing clearly/appropriately	Clarity; communicating intended meaning
Assertive communication	Directly expressing feelings, preferences, needs, opinions that are not threatening	Proposing ideas; social assertiveness; defence of rights; directive; asserting
Nonverbal communication	Reinforcing/replacing spoken communication with body language, gestures, voice, artefacts	Expression of feelings; perception/recognition of feelings; facial regard
Relationship-building skills		
Skill	Description	Related skill
Cooperation & Coordination	Understanding/working in groups, teams; offering help; pacing activities to team needs	Adaptability; shared situational awareness; performance monitoring/feedback; interpersonal relations; communication; decision making; cohesion; group problem solving; being team player
Trust	Individuals faith/belief in integrity or reliability of another person or thing; willing to be vulnerable to another's actions; expectations that actions important to trustor will be performed	Self-awareness; self-disclosure; swift trust
Intercultural sensitivity	Appreciating individual differences among people	Acceptance; openness to new ideas; sensitivity to others; cross-cultural relations
Service orientation	Basic individual predispositions; inclination to provide service, be courteous, helpful to customers, clients, associates	Customer satisfaction skills; ability to maintain positive client relationship; selling; building rapport
Self-presentation	Process where individuals try to influence reactions, images others have of them, their ideas; managing these impressions encompasses range of behaviours designed to create positive influence on work associates	Self expression; face-saving, impression management; managing perceptions; self-promotion
Social influence	Guiding people toward adoption of specific behaviours, beliefs, attitudes; influencing the distribution of advantages, disadvantages in organisation through one's actions	Business etiquette; reasoning; friendliness; coalition building; bargaining; appeals to authority; imposing sanctions; networking; persuasion, positive political skills
Conflict resolution & negotiation	Advocating position with an open mind, not taking personally other members' disagreements; following rational argument and avoiding premature evaluation; trying to synthesise best ideas from all viewpoints, perspectives	Conflict-handling style; conflict management; conflict prevention; compromising; problem solving; integrative bargaining; principled negotiation; cultural negotiation; mediation

3

Method

In the following chapter, the method used in the study is presented. First, the research strategy and design are outlined in section 3.1, *Research Strategy* and section 3.2, *Research Design*. Then, the case company in the study, Zenseact, is described in section 3.3, *Empirical Context*. Following, the methods used for collecting data in the study are presented in section 3.4, *Data Collection Methods*. This includes the methods of literature review, interviews, surveys, observations and other data. Thereafter, the methods used for analysing data are presented in section 3.5, *Data Analysis Methods*. This includes a thematic analysis as well as a statistical analysis. Finally, the quality criteria and the ethical, environmental, and societal aspects considered during the study are presented in the section 3.6, *Research Quality*, section 3.7, *Ethical Considerations*, and section 3.8, *Societal and Ecological Considerations*.

3.1 Research Strategy

This study employed a mixed-methods research strategy, combining quantitative and qualitative research methods (Bell et al., 2022). Further, it employed an exploratory sequential design (see Figure 3.1), meaning that qualitative data was collected prior to the quantitative data (Creswell et al., 2011; Bell et al., 2022). Qualitative research acted as preparation for quantitative research. In the qualitative research, patterns and interesting findings were identified based on which hunches were then created. The hunches could then be validated using quantitative research. The reason for choosing this approach was that it opened up the possibility for triangulation, meaning that findings deriving from the study could be enhanced by using several ways of measurement (Bell et al., 2022). The aim of the triangulation was to increase the credibility and validity of the research findings.

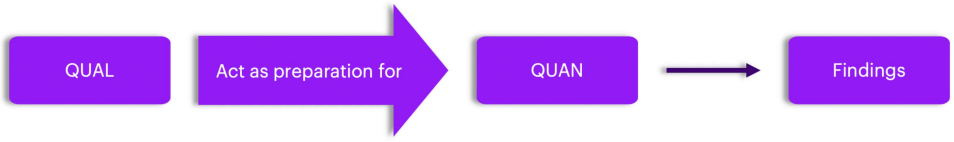

Figure 3.1: Illustration of the process of an exploratory sequential design (Bell et al., 2022).

3.2 Research Design

The research aimed to increase the understanding of what relational skills affect inter-team interaction in a large-scale agile organisation, as well as understand how relational skills affect inter-team collaboration and knowledge-sharing and development in a large-scale agile organisation. To better understand this phenomenon, a single organisation case study was chosen (Bell et al., 2022). The reason for choosing this approach was to explain, describe and explore relational skills in the everyday contexts in which it occurs. The company in question, Zenseact, will be presented in more detail in section 3.3, Empirical Context, below.

The research process was conducted in the following order: Firstly, theoretical data was collected from the field of research by reviewing the literature. The primary objective of the literature review was to establish a fundamental understanding of the subject matter in preparation for the forthcoming empirical study (Bell et al., 2022). Furthermore, it was also done in order to learn from other researchers' mistakes, as well as to learn about different theoretical and methodological approaches to the research area. Secondly, an exploratory sequential design has been employed. The qualitative data has therefore acted as preparation for the quantitative data. As a first step in the empirical data collection, interviews were conducted with employees working at the case organisation. To gain a comprehensive understanding of relational skills within an agile organisation, interviews were conducted with individuals representing diverse teams, functions, and roles throughout the organisation. Since the qualitative interviewing procedure tends to be very flexible with the aim to provide rich and detailed answers (Bell et al., 2022), a semi-structured approach has been followed. Thirdly, in order to test the findings from the qualitative research, a survey has been used with the employees from the Engineering function of Zenseact being the recipients. Lastly, to contextualise collected data and since the research intends to be conducted on the case organisation's premises, the researchers have been taking the role of observers during the research period. The employed research design can be seen in Figure 3.2. A more detailed explanation of the data collection methods is presented in section 3.4, Data Collection Methods.

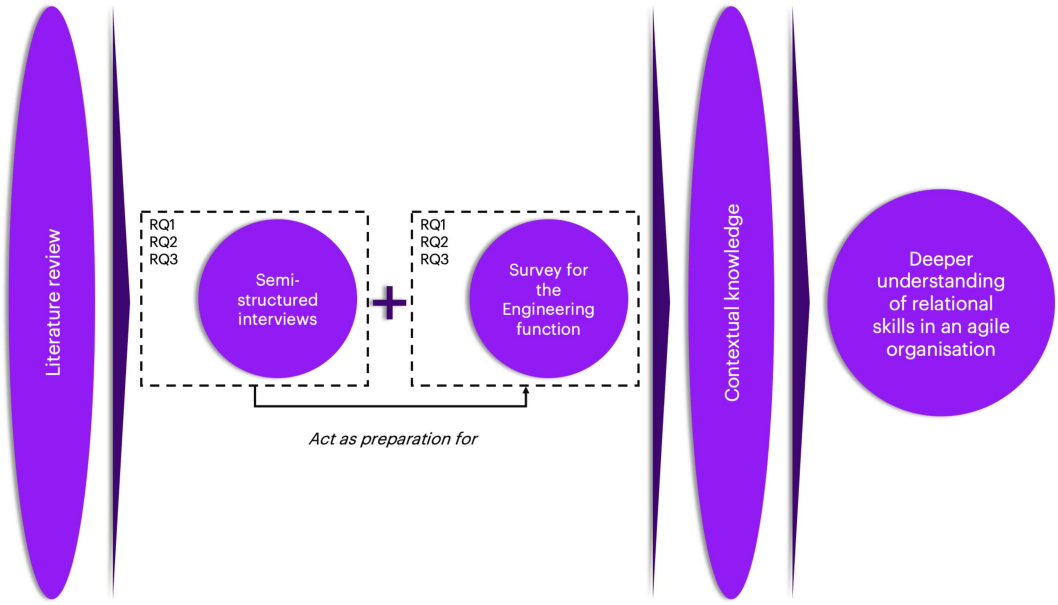

Figure 3.2: Illustration of the employed research design.

3.3 Empirical Context

The research was conducted at Zenseact, a company that works with software development in the automotive industry. They design and develop AI-powered software for autonomous driving and advanced driver assistance systems (Zenseact, 2023). Zenseact's vision is *"Towards zero. Faster."*, with the belief that automation will be a key enabler to accelerate towards zero deaths, injuries, and accidents in traffic.

Zenseact originates from its current owner Volvo Cars' development department, where it started as an activity aimed at increasing car safety in the 1990s. This department was broken out of Volvo Cars in 2017 and merged with car safety supplier Autoliv (now Veoneer) into a joint venture called Zenuity. In 2020, a portion of Zenuity was separated and became a subsidiary solely owned by Volvo Cars. In connection with this, the company was re-branded to its current name, Zenseact. As of July 2021, ECARX has been a minority shareholder in the company, but since December 2022, Zenseact is wholly owned by Volvo Cars AB again (Cision News, 2023). During the time that the research was done, Zenseact were in a situation where both due to its ownership situation and the fact that they have not yet delivered any of its products to the market, they do not yet have a requirement to generate profit. However, they plan to release their product OnePilot by the end of 2023. The OnePilot is planned to be featured in Volvo's new flagship SUV EX90 which is estimated to arrive at Volvo dealerships in early 2024, as well as the Polestar 3 which is estimated to be delivered to customers in the fourth quarter of 2023.

Zenseact employs over 500 people in their offices in Sweden and China, with the majority of the employees being located at the Swedish office. The company is built

around self-managing agile teams with a high degree of autonomy within the teams. On an organisational level, the company is divided into seven different functions and where six of which are referred to as business enablers: Product, People, Finance, Data Security and Digital, Customers, and the executive team. The Engineering function is the seventh function and the largest one, which is divided into five Agile Release Trains (ARTs), where each ART is a team consisting of agile teams which collaborate towards a common goal.

Furthermore, since the organisation has been growing to a large extent, they utilise terminologies and procedures from the Scaled Agile Framework SAFe (Scaled Agile INC, 2023). However, it should be noted that they do not fully apply the framework but instead see it as a source of inspiration. The use of SAFe started in 2021 in connection to the rebranding. Since this thesis aims to understand the role of relational skills in an agile organisation, the main part of the research was conducted within the engineering function and the People function. An illustration of how Zenseact's organisation has been interpreted can be seen in Figure 3.3.

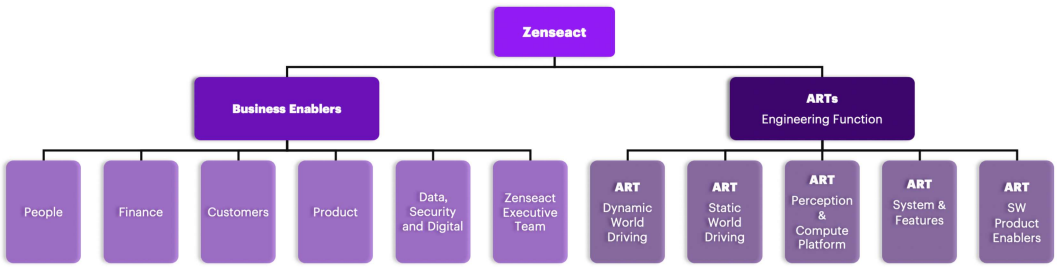

Figure 3.3: Illustration of Zenseact's organisational layout. Source: Authors

Since its founding in 2017, Zenseact has leveraged the use of agile methodologies and practices across the organisation. They identify itself as a company that puts people first, both in terms of its customers and its own employees. This is seen for example through their motto "People at heart", stating that all actions should be taken with the human in mind first. According to Zenseact's internal guidelines, they believe that high-performing teams are key to creating outstanding products for their clients. Furthermore, Zenseact utilises self-managing and cross-functional teams in order to increase involvement, reach faster and better decisions, have high efficiency, balance the utilisation of skills between team members, and develop mutual responsibility. As a result of the advanced development that the company is conducting, many of the employees are highly educated and/or experts in their respective fields. Given the characteristics of Zenseact, it is a highly suitable company for studying how relational skills affect the interaction between teams in an agile organisation mainly because of their focus on working according to agile methodologies and principles, and their emphasis on putting people first.

The researchers' supervisors from Zenseact hold the role of ART Engineering Manager for one of the ARTs, as well as a team member of the People function. The ART Engineering Manager has provided access to individuals on every level in other

ARTs. The team member from the People function has provided access to individuals residing in the People function. This has greatly benefited the study and made the research process more efficient.

3.4 Data Collection Methods

The following data collection methods have been used in the research: literature review, interviews, surveys, observations, and a data review from the case organisation. Each section further describes the methods in more detail.

3.4.1 Literature Review

In order to be able to determine what concepts and theories have been applied to the topic previously as well as determine what controversies may exist, a literature review was conducted (Bell et al., 2022). A narrative approach has been used since it, in contrast to the systematic literature review, is more suitable for interpretative research (Bell et al., 2022). Furthermore, a narrative approach is more flexible, and due to the inductive characteristics, it opens up the possibility to perform an initial review of the literature as a means of getting an initial understanding of the subject to be researched. The literature review was started at an early stage of the project with the aim of creating sufficiently focused research questions that justify the research. The reviewed literature has specifically been focused on keywords that align with the purpose of the paper: *relational skills, agile, scrum, software engineering, social capital, knowledge management, intellectual capital, brokerage, structural holes, etc.* The conducted literature review has relied on the accessibility to academic journals retrieved from different databases available through *Chalmers Library*. Some of the databases that have been used are *Google Scholar* and *Scopus*. Further, master theses corresponding to the subject have been retrieved from *Chalmers Open Digital Repository* with the purpose of gaining insights into the area as well as investigating what references that have been used in previous studies. After the relevant literature was found, it was filtered which means, for example, that duplicates as well as those articles not being pertinent to the scope of the research, were removed. The articles that remain after filtering were then selected for analysis. An illustration of the literature review process can be found in Figure 3.4. It should be noted that additional articles have been analysed in addition to those selected for analysis according to the process described above. These additional articles have either been added because the understanding of the topic has increased during the course of the study, or because the supervisor has provided articles that have been considered relevant to the study.

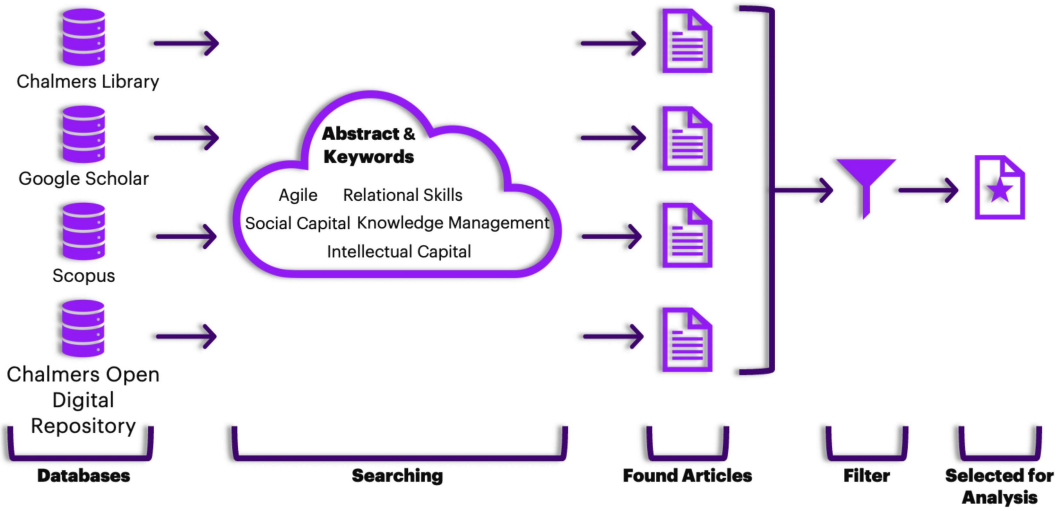

Figure 3.4: Illustration of the literature review process.

3.4.2 Interviews

Since the research is based on the participants' experiences, perspectives, and opinions on the role and use of relational skills in an agile organisation, interviews were chosen as the primary data collection method to answer the research questions. Accordingly, data from the interviews were used to define what relational skills affect the interaction between teams and how relational skills affect inter-team collaboration and knowledge sharing and development in a large-scale agile organisation. All interviews were conducted in a digital fashion using Microsoft Teams to enable greater flexibility for both the researchers and the interviewees, as well as to facilitate the recording and transcription of the interviews.

Sampling Strategy

To be able to both get a holistic and deep understanding of how relational skills affect the interaction between teams in an agile organisation, individuals from different teams in the engineering function as well as the People function were interviewed, see Figure 3.5. Since the agile teams at Zenseact are mostly made up of developers, the sampling strategy was chosen with the intention to reflect this reality. Furthermore, to even more deeply understand how relational skills affect the interaction between different teams, different types of teams were studied. More specifically, the interviews were conducted with five distinct teams, each exhibiting unique forms and levels of interaction within the organisation, varying in both frequency and team types. An illustration of the intended sampling strategy showing teams that were desired to be interviewed by the researchers can be seen in Figure 3.6. The reason for selecting these teams was to identify the differences between the teams having more or less frequent interaction with other teams. The teams were chosen in cooperation with the industrial supervisors.

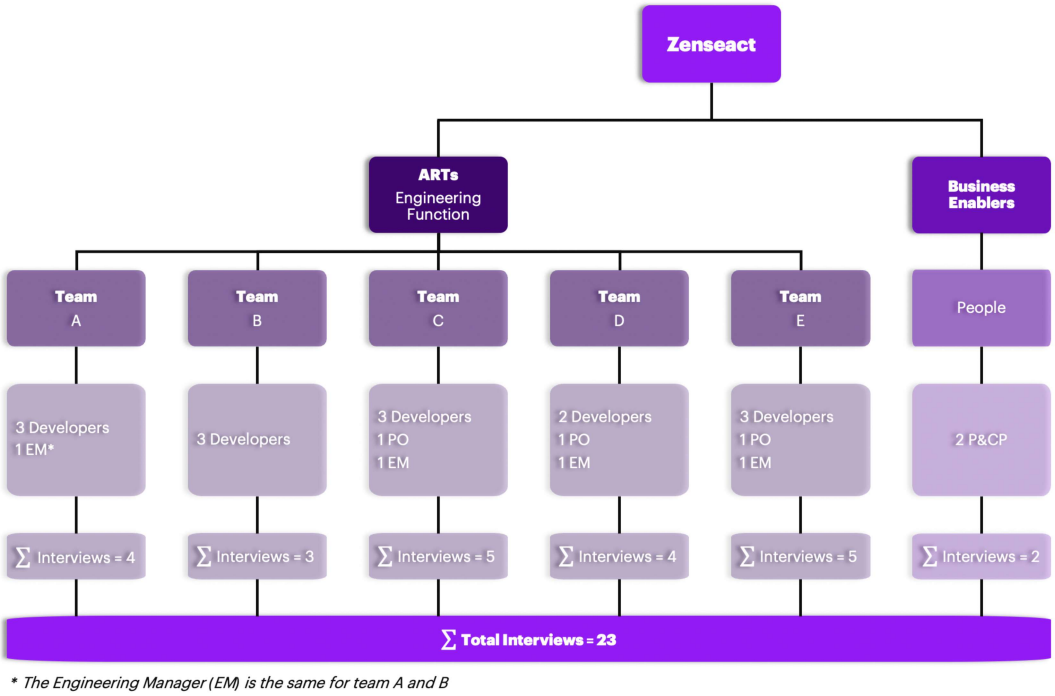

Figure 3.5: Overall illustration of the sampling strategy.

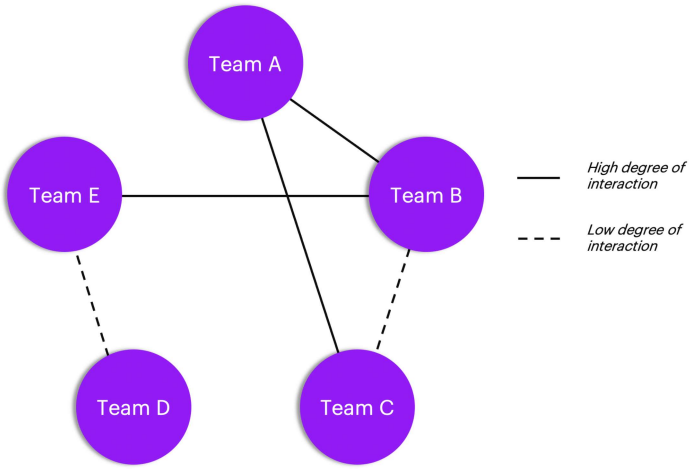

Figure 3.6: Detailed illustration of the intended sampling strategy.

In summary, a comprehensive range of interviews was conducted involving employees from five distinct teams, as well as representatives from the people organisation. In Team A, the interviewees included three developers and the Engineering Manager. Similarly, Team B, which is considered a sister team to Team A meaning that they work in the same ART developing similar things and share the same Engineering Manager, also had three developers and the Engineering Manager interviewed. Moving on to Team C, the interviews were conducted with three developers, one

Product Owner, and one Engineering Manager. Likewise, Team D had two developers, one Product Owner, and one Engineering Manager interviewed. In the case of Team E, three developers, one Product Owner, and one Engineering Manager were interviewed. Additionally, the People function included interviews with two people and culture partners. In total, 23 interviews were conducted and the length of the interviews was approximately 20-30 minutes. A summary of the distribution of roles from the conducted interviews can be seen in Table 3.1.

Table 3.1: Distribution of interviews according to roles.

Conducted interviews		
Role	# of interviews	% of interviews
Developer	14	61%
EM	4	17%
PO	3	13%
P&C Partner	2	9%

Semi-Structured Interviews

Semi-structured interviews were chosen to be conducted to give the participants greater freedom to share their opinions and experiences in the way they prefer (Longhurst, 2003). Furthermore, since there were two researchers participating in the thesis, semi-structured were considered appropriate to minimise the extent to which the interview guide changed depending on the researcher conducting the interview (Bell et al., 2022).

The choice of semi-structured interviews also provided the freedom to ask follow-up questions to understand the participants' experiences, perspectives, and opinions even further. All interviews were scheduled to be 25 minutes, and they were booked within a 30-minute time slot. This made it possible for the researchers to ask additional questions if needed and opened up the possibility for the interviewees to add further input or ask clarifying questions to the researchers. The length of the interviews was chosen with the aim to strike a balance between being short enough to encourage participation and collecting sufficient data.

To acquire comprehensive insights into the participants' perspectives on relational skills, the researchers strove to maintain a relaxed interview atmosphere. To establish this environment, at the beginning of each interview, the researchers explicitly informed the participants that there existed no definitive right or wrong responses to the questions posed. Additionally, the researchers emphasised the significance of having a natural conversational flow throughout the discussion. Furthermore, the researchers introduced themselves and gave an explanation of the purpose of the interview and explained how the data was going to be used to ensure that the interviewee understood that it would be treated with confidentiality. By adopting this approach, the researchers aimed to create a safe space where participants could freely express their thoughts and emotions on sensitive subjects such as conflicts, collaborations, communication, and relations.

During all interviews, both researchers were present to ensure interview quality and accurate data collection, each with distinct responsibilities. While one researcher took a leading role in conducting the interview and asking questions, the other researcher took notes and contributed by asking follow-up questions. This approach relieved some pressure on the lead interviewer, knowing that the note-taker could offer supplementary questions if necessary. Additionally, it instilled confidence in both researchers, as they had the assurance that the other would provide support if required throughout the interview.

Interview Guide

The interview questions were formulated with the specific purpose of investigating the impact of relational skills on interaction within a large-scale agile organisation. Appendix A contains the interview guide. Note that there are two different guides for the Engineers and the People functions that were interviewed. Independent of what function was being interviewed, the interview guide started with introductory questions where the interviewee was asked to answer simpler questions about their background. This was to, in accordance with what was described above, create a relaxed feeling for the interviewee so that he would feel safe in sharing his personal experiences later. Furthermore, the introductory questions also contributed to creating an understanding of what characterised the different interviewees' work tasks and what characterised the different teams. This information has been very useful in being able to understand and discuss the results of the study from a larger perspective.

The engineering team was then asked to deal with everyday situations that arise at work. This included questions about what everyday interactions they had, an occasion when they were faced with a complex problem and needed to ask for help from someone outside their team, examples of good or bad collaborations they had and what characterised these, and more questions. The questions were created with the aim of getting the respondent to tell a story to avoid the questions becoming leading, as well as to make it easier for the respondents to share their feelings and experiences. The questions in the interview guide were reviewed from top to bottom. In some interviews, it was chosen not to ask all the questions from the interview guide as the respondent had either answered the question before, or it was chosen to delve into another question instead. This was considered to be possible as the sample of respondents was large and each question could thus achieve saturation in the number of answers. Due to the semi-structured nature, sometimes other questions were also asked that were considered relevant to the study. All interviews ended with a question where the respondents had to define relational skills. This is to create an understanding of how the employees viewed relational skills and what they considered to be relational skills.

The questions that were asked to the people function, on the other hand, differed slightly compared to the questions asked to the engineering function. Since these respondents had a more comprehensive picture of how it looked in the various teams and across the organisation, the questions were therefore chosen to be at this level.

First, a conversation was held about relational skills and what role they considered it to have in the company. As it was not completely clear before the interviews which areas the respondents would have the most experience to talk about, the semi-structured nature could really be used in these interviews. Therefore, if the topic discussed by the respondent was considered relevant to the study, many in-depth questions were asked. Note that the people team was not asked to define relational skills, but that it was instead discussed more broadly throughout the interview.

All interviews ended with a question asking if the interviews had something to add beyond what was already asked, or if there was something from the interview that they specifically wanted to highlight. This question was useful to ask because in several cases it gave us additional perspective on what had already been discussed in the interview. Ending an interview with such a question is also in line with Bell et al. (2022) recommendation for a concluding question in interviews.

Recording & Transcription

In this research, all interviews were recorded and transcribed, as it is crucial for qualitative studies to have a detailed record of interviews, enabling a thorough analysis of the collected data (Bell et al., 2022). Before each interview, permission to record the interview was always asked of the interviewee, and it was permitted in all interviews. The interviews were recorded on two devices in all cases to ensure a backup if something unexpected would happen. The recording was made both with the help of the recording function in Microsoft Teams, as well as with the audio recording function on one of the researchers' mobile devices.

The transcriptions were done by the researchers themselves using the speech-recognition function in Microsoft Word Online. The software was far from accurate in the automatic transcription, so the researchers had to manually go through each interview. However, the automatic transcription made it much more convenient, which made the transcription less time-consuming than if it had had to be done manually entirely. During the manual correction of the transcriptions, the recordings were listened through as it could provide another interpretation and open a more detailed analysis of what was said (Bell et al., 2022).

To mitigate bias and minimise the researcher's influence on the interviews, transcription duties were assigned to the researcher who did not lead the conversation. This approach allowed both researchers to evaluate each other's performance and provide constructive feedback for future interviews. The transcriptions were conducted continuously during the interview process, ensuring a consistent timeline. This method not only distributed the workload evenly but also prevented the need of having to transcribe many hours of interviews at the end of the interview period, reducing the potential mental strain on the researchers.

3.4.3 Survey

In accordance with the exploratory sequential design chosen for the research, a survey was conducted to test findings from the interviews. A self-completion question-

naire was employed due to its scalable characteristics and because it was convenient for the many participants (Bell et al., 2022).

Sampling

Since the main focus of the study was on trying to understand how relational skills affect interaction, collaboration, knowledge sharing, and knowledge development between teams in an agile organisation, the population was chosen solely to be the company's engineering function, which consisted of a total of 468 employees at the time the survey was sent out. The purpose of the study was explained at the beginning of the survey. Furthermore, it was also explained that the survey would deal with their relationships at the company and that the survey aimed to get answers to their personal thoughts and opinions about this. This was done to ensure that the participants understood the purpose of the survey as well as to put them in the correct mental state.

Distribution

The survey was distributed through the software &Frankly. Zenseact uses &Frankly for short employee surveys, and therefore using this software would make the circumstances as natural as possible. One advantage of using &Frankly was the rapid support and endorsement from Engineering Managers, which facilitated extensive company-wide accessibility to the researchers. Additionally, as employees were already familiar with the software, its utilisation fostered a sense of trust among respondents. Consequently, the researchers anticipated a significantly higher response rate by utilising &Frankly compared to an unfamiliar alternative. To further ensure a reasonable response rate, the researchers promoted the survey to all employees using Slack. In addition, the industrial supervisors assisted with promoting the survey and encouraged their employees to answer. The survey received a response rate of 62%, i.e. 290 responses, which was deemed sufficient to draw conclusions from the collected data. Table 3.2 shows an overview of how many received the survey and the response rate.

Table 3.2: Overview of survey recipients and response rates.

Response rate survey			
ART	Sent to	Response rate	Number of answers
ART Dynamic World Driving	93	64%	60
ART Perception & Compute Platform	78	67%	52
ART Static World Driving	109	56%	61
ART Software Product Enablers	110	57%	63
ART System & Features	78	68%	54
Total	**468**	**62%**	**290**

It must be highlighted that there were limitations with &Frankly as it is not specifically designed for scientific surveys. The first challenge was that it was not possible to ask the questions in a random order to the participants, which may have created

a bias in some of the questions, and which need to be considered in the analysis of the result. The second challenge was that there was no good way to explain the questions with text before answering them. The solution to this was to create a card with a yes/no question that explained the question or questions to come, see Figure 3.7. The third challenge was linked to the fact that it was impossible to directly access the raw data from the surveys, as the software used is only built to create ready-made analyses. The researchers could therefore not check for correlation between ARTs, teams, or roles, which was the idea of the survey from the very beginning. Although the result from the survey was not what the researchers had intended, it was nevertheless considered useful enough to be included in the result and analysis.

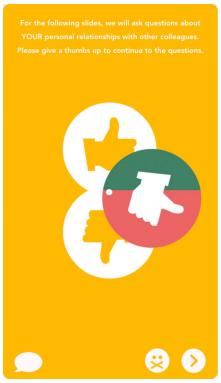

Figure 3.7: A screenshot from &Frankly, showing the yes/no question.

Survey Design

As previously mentioned, the purpose of the survey was to test findings from the interviews, which can be reflected in the design of the survey. The survey contained questions that concerned the participants' personal relationships at the company. The first questions dealt with their background. The idea with this was to, as described above, be able to check the correlation between different ARTs, teams, and roles. Furthermore, questions were asked about how dependent the individuals felt to be on other teams in the organisation and who they most often ask for help. These questions were asked in order to identify what drives interaction at the company and to understand to what extent personal relationships are used to ask for help. Afterwards, questions were asked about what the participants considered to be important when they collaborate with others at the company, this in order to understand which relational skills are important in a collaboration. Furthermore, questions were asked about what characterised the relationships that the participants had within their team, outside their team but in the same ART, and outside their team but in a different ART. These questions were asked with the aim of trying to understand if there were any differences in what characterised relationships depending on where in the organisation the relationship was located. Finally, a question was also asked where the participants had to, in one word, describe what characterised a well-functioning relationship with someone at the company. This

question was asked with the aim of first which relational skill is most important in a well-functioning relationship in an agile company. Appendix B shows the entire survey.

Survey Process

Throughout the survey design phase, both academic and company supervisors actively participated in reviewing and providing valuable input. Their valuable insights were taken into consideration, leading to necessary modifications in the survey.

Furthermore, a pilot survey was conducted with our industrial supervisors as well as a few selected employees who had participated in the interviews. This was done to ensure participants' clarity and to remove any uncertainties. In addition, the pilot survey served the purpose of assessing the feasibility of utilising &Frankly and ensuring that the resulting data could be analysed to meet the researchers' desired standards. The sample size was six people in total. The feedback from the pilot group primarily revolved around the limitations associated with using &Frankly, which the researchers were already aware of. Specifically, suggestions regarding the wording of certain questions were also contributed, resulting in the researchers making minor adjustments in accordance with the feedback provided.

The survey was administered with help from the industrial supervisors using the &Frankly platform, ensuring simultaneous distribution to all respondents. Additionally, &Frankly facilitated the process by sending an email to all participants, providing details about the survey along with a link to access the questionnaire. The survey was open for two weeks, during which both the researchers and the industrial supervisors actively promoted it across multiple communication channels within Zenseact.

3.4.4 Contextual Knowledge

We are aware of the fact that both interviews and questionnaires can sometimes generate incorrect answers that do not correspond to reality (Bell et al., 2022), partly for the reason that it can put the respondent in a position they are not usually used to, and partly also because the respondents can tend to answer what the researchers want to hear and not what they actually think. Therefore, observations have been made sporadically and continuously during the research process to create contextual knowledge. These observations have served as support for the other collected data. Observations have, among other things, been made at joint company presentations or events such as presentations held during the PI Planning week or cultural fika's. Furthermore, observations have also been made in various slack channels to see if the tool is used as described in the interviews. Since the purpose of the observations was primarily to identify so that the collected data from the interviews did not deviate from reality, this has primarily been the main focus. As the researchers did not detect any substantial deviations during early observations, it was decided that further data from observations were considered redundant, whereupon no notes were taken. Furthermore, no data from observations will therefore be presented in the result either.

Because the Master's thesis intends to make a contribution to academia and the case organisation, other data from the case organisation has further been analysed and reviewed. This has been helpful to gain contextual knowledge and to better be able giving recommendations to the case organisation. Other data that were analysed were values and guidelines, internal investigations and surveys.

3.5 Data Analysis Methods

The collected data has been analysed continuously throughout the research period. Two methods of analysis have primarily been used for the data. For the interviews, a thematic analysis has been conducted. For the survey, a statistical analysis has been conducted using Microsoft Excel. In addition to the collected data, theory from the literature has been used to provide background and compare data collected in the research to what had already been established in the research field.

3.5.1 Thematic Analysis

A difficulty when conducting research is that it normally generates a large amount of data which means it can be difficult to systematically and analytically look for patterns in it (Bell et al., 2022). Therefore, a thematic analysis has been utilised as a means to find repeating categories and patterns in the interview data. In the search for themes, the researchers have looked at repetitions, indigenous typologies or categories, metaphors and analogies, transitions, and much more (Bell et al., 2022). An emphasis has been put on repetition to identify patterns within the data warranted to be considered a theme. Repetition in this sense refers to recurrence within a data source (Bell et al., 2022). The themes have been built on codes identified in the empirical data. Coding entails reviewing transcripts and/or field notes and giving labels to component parts that seem to be of potential theoretical significance and/or that appear to be particularly salient to those who have performed the research (Bell et al., 2022). The goal of the data analysis was both to arrive at a result where general conclusions could be drawn from the research and also to be able to present what implications the research would have for both academia and industry.

All interviews were coded in Microsoft Word and thematised in Microsoft Excel where all the data and findings were synthesised. The coding process was conducted by going through all interview transcripts and highlighting interesting findings and quotes related to relational skills and how they affected inter-team interaction, inter-team collaboration and inter-team knowledge sharing and development, or other factors that were seen to have an effect on relational skills. To ensure a shared coding focus and minimise researcher bias, the first interview was coded collaboratively by both researchers. Subsequently, the remaining interviews were divided between the researchers, with each researcher coding the interviews transcribed by the other. This approach ensured that both researchers gained familiarity with the data, maintaining a comprehensive understanding of the material.

Once all the results and quotes had been synthesised in the Excel sheet, two types of

coding were then done. Firstly, to more easily be able to answer RQ1, the theory's explanation of relational skills was chosen to be used as words for coding, which can be seen in Table 2.4 and Table 2.5. The codes from these tables were then matched with the findings from the collected data. Secondly, to more easily be able to answer RQ3 themes were created and clustered for those findings that were seen to describe the effect of relational skills.

3.5.2 Statistical Analysis

The majority of the data from the survey were of quantitative nature, therefore it was statistically analysed using Microsoft Excel. The types of statistical analyses made were calculating means and standard deviations. This was done to get an overview of how the organisation viewed the questions on average and how large the discrepancy was between individuals in the organisation. This enabled the analyses to examine the importance of different relational skills as well as test whether hypotheses derived from findings from the interviews were true or false. Furthermore, since some data from the survey were of qualitative nature, Excel was used to code those answers which in turn made that data of quantitative nature, which then were analysed by frequency.

3.6 Research Quality

When designing a research project, all researchers are required to adhere to specific quality criteria (Bell et al., 2022). Isaksson et al. (2020) further stresses the importance of validating the research and describes that it is important to focus on what to validate. Consequently, in the design of the research methodology for this study, measures were taken to ensure research validity. To ensure a focused and comprehensive approach, the set of validation criteria known as trustworthiness was used (Bell et al., 2022). The trustworthiness framework constitutes four evaluation criteria to consider: *credibility*, *transferability*, *dependability*, and *confirmability* (Bell et al., 2022; Lincoln and Guba, 1985).

Credibility is concerned with how believable the findings from the study are (Bell et al., 2022). Thus it is dependent on the researchers' ability to understand and interpret the reality that has been studied. Triangulation was something the researchers chose to do with the aim to increase credibility. This was achieved by confirming findings from the interviews with survey data, or the other way around. In addition, the literature review was used as a means to validate the empirical findings with previous research. Furthermore, when conducting semi-structured interviews, a method that was applied in this research, there are some related risks (Alvesson, 2003). One related risk is that the answers from the interviewees might be influenced by the interviewers, or the company norms and culture. To take measures against those risks, and as described above, the interviewees were granted anonymity and the researchers strove to maintain a relaxed interview atmosphere to ensure the interviewees felt comfortable revealing their true opinions.

Transferability is referred to as the degree to which the results of a study can be

generalised to other contexts (Bell et al., 2022). To increase the ability to generalise the findings from this study, the process of the research has been described in high detail. The empirical context has further been described as detailed as permitted by the case company Zenseact. It should be noted that the industry in which Zenseact operates, i.e. the automated vehicle industry, is relatively new which might lower the generalisability of the study. However, the case company is very much also a software engineering company, hence the results might be generalised to these types of companies. It is, however, important to be aware of the fact that the research of this study is of qualitative nature, which according to Bell et al. (2022) has a limited possibility of generalising the results. Therefore, it is crucial to exercise caution when generalising the findings of this study.

Dependability in research concerns the transparency exhibited by the researchers regarding the research methodology and process (Bell et al., 2022). To ensure robust dependability, key measures were implemented, including a clearly stated problem formulation, preservation of fieldwork notes and transcripts until the end of the research, and thorough documentation of data analysis procedures.

Confirmability is concerned with objectivity, i.e. it addresses the need to minimise the subjectiveness elicited by the researchers (Bell et al., 2022). When conducting qualitative research, Bell et al. (2022) describes that it is difficult to fully avoid all kinds of subjectivity. However, some measures have been taken with the aim of minimising subjectivity. For the analysis of the data, the established method of thematic analysis was employed, see Figure 3.8. By following a comprehensive guide, correct and precise implementation of the method was ensured. Furthermore, as this study also underwent opposition from colleagues, which provided valuable feedback, this further strengthened the confirmability of the research (Bell et al., 2022).

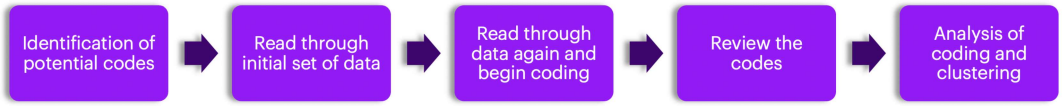

Figure 3.8: Illustration of the data analysis process.

3.7 Ethical Considerations

In order to ensure an ethical approach during the research study, the four most prominent aspects that need to be avoided during a research study according to Bell et al. (2022) have been taken into consideration. These aspects constitute *harm to participants*, *lack of informed consent*, *invasion of privacy*, and *deception*.

Harm to participants include several perspectives, where stress, physical harm, and harm related to future career opportunities (Bell et al., 2022). The researchers provided the interviewees with several interview timeslots to opt for, and by having the interviews in a hybrid format they were also given the option to conduct the interview wherever they wanted, ensuring a safe environment. Furthermore, substantial

measures have been taken in regard to anonymity, where, for example, it was chosen to name all respondents with the designation "interviewee" and not "interviewee X with role Y". The researchers are aware that the latter type of designation would have led to a more accurate presentation of the findings, but the decision was made that this designation entailed a risk of revealing the identity of the participants. Thus, the first-mentioned designation was chosen instead to ensure the anonymity of the participants. Collectively, these actions have reduced the risk of harm in this case study.

Lack of informed consent was ensured by informing the participants of their rights both when inviting them to the interview, and before the interview was conducted. This was ensured by explicitly informing the participants of their autonomy regarding transcription, recording, and storing of the interview data until the end of the project, emphasising their right to decline these actions. Furthermore, they were granted the right to decline to answer specific questions if they felt uncomfortable doing so.

Invasion of privacy was especially important to ensure when conducting the interviews. According to Bell et al. (2022), this is related to avoidance of harm and anonymity, by for instance ensuring that no information can be traced back to a specific interviewee and that unauthorised access to the data is prevented. By securely storing information with access rights strictly controlled to only the researchers, and by ensuring anonymity in the presentation of the findings as described above, the risk of privacy intrusion was mitigated.

Deception concerns the importance of not misleading the participants by not being open and honest about the purpose of the study (Bell et al., 2022). Throughout the process of observations and interviews, the researchers maintained an open role, openly disclosing to project participants that their involvement was part of a master's thesis project. While this approach ensured transparency, there was a potential risk that participants might not be wanting to share relevant information. However, it was deemed appropriate by the researchers to prioritise ethical considerations over research quality.

3.8 Societal & Ecological Considerations

In the process of designing the research method for this research study, several measures have been taken to minimise negative impacts on ecological and societal aspects. To minimise the ecological impact of this research, the study has been conducted with a hybrid approach, and where the majority of the activities in the project have been chosen to be done virtually if the opportunity existed. This has, for example, been made possible through digital platforms such as Microsoft Teams or Slack. However, the researchers are aware of the fact that the software used consumes energy in the form of electricity. To minimise the societal aspects, the researchers showed great respect for the time that the participants chose to spend on the study, in order to minimise the risk of the participants being overloaded. This was ensured by taking measures to prevent excessively long interviews, and

survey participants were provided with clear information regarding the anticipated duration of the survey. To further show respect for the participants' time, they were sincerely thanked after each interview and were invited to a company presentation to take part in the final results of the study.

4

Results

This chapter will present the result of the conducted interviews, and survey. It will showcase the empirical data generated for this thesis with the aim of better answering the research questions at hand as well as further findings that were generated during the work. The results will be presented in chronological order, with the interviews being presented first and the survey being presented last. In section 4.1 , *Interviews*, a thematic and frequency analysis will be presented, which has been done with the aim of identifying which relational skills were mentioned in the interviews. Furthermore, for readability and clarification purposes, the context of the relational skills mentioned has been synthesised with the aim of highlighting the most relevant insights from the interviews. Followed by that, the different teams are described with the aim of gaining a deep and comprehensive understanding of how relational skills interplay within the teams' diverse collaborations and knowledge exchanges. Furthermore, in section 4.2, *Survey*, the results from the survey will be presented.

4.1 Interviews

The following section presents the empirical data collected from the interviews conducted at Zenseact, focusing on exploring the influence of relational skills on interaction within a large-scale agile organisation.

4.1.1 Thematic & Frequency Analysis

Every interview has been thematically categorised according to the interpersonal skills by Bedwell et al. (2014) and trust-building behaviours by Abrams et al. (2003) previously presented in section 2.4. The result of this thematic categorisation can be seen in Figure 4.1 below.

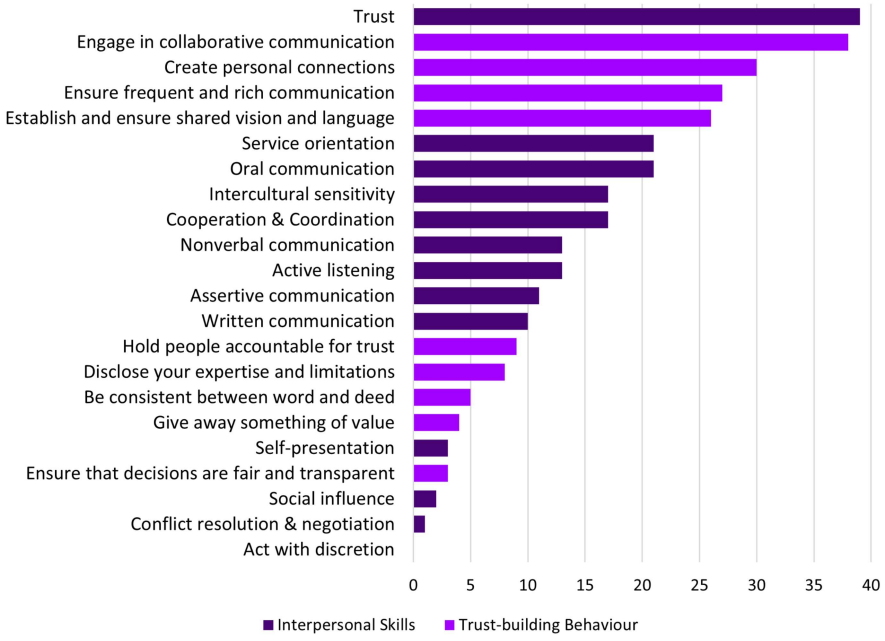

Figure 4.1: Frequency visualisation of themes mentioned during interviews.

Figure 4.1 shows that trust seems to be a fundamental interpersonal skill (Bedwell et al., 2014) when discussing relational skills, collaboration, knowledge sharing, and relationships. It is the most frequently mentioned theme and the following four themes are also trust-building behaviour (Abrams et al., 2003). Out of those four, three of them are directly connected to communication and several interpersonal skills connected with communication are also highly mentioned. This frequency graph helps one understand which skills seem to be the most important when discussing the previously presented themes. This section will therefore be structured to first present the general view of relational skills, to continue discussing the areas of inter-team collaboration and knowledge sharing to understand relational skills in those fields, and will end with specific sections showing detailed results connected to trust and communication, as they were frequently brought up.

Relational Skills

During the interviews, each interviewee was asked to describe how they would define relational skills. This yielded a diverse set of answers that ranged from discussing the usage of networks, the need for trust, and how important communication is. One interviewee expressed specifically that relational skills are how one may use one's relationships, which is close to the definition of social capital presented earlier in this thesis. The interviewee defined relational skills as:

> *"[Relational skills is] the ability to get something out of one's social ability."*

When asked to be clear about what the interviewee thought was the most important

thing to get out of the relationship they said:

> *"I think the most important thing is to create relationships so that you want to cooperate and help each other."*

Furthermore, other interviewees mentioned relational skills to relate to the ability to get something out of other people but put more focus on the actual interaction between them. One interviewee defined relational skills as:

> *"The ability to get what you want out of the interactions at work both to create a good atmosphere in the team, but also with other teams and organisations."*

This interviewee pointed out the need to understand others, especially since other organisations or even distant teams may have different requirements. The interviewee also stated that relational skills are even more important in agile organisations compared to traditional ones, due to the fact that you must be able to adapt to changing environments and be able to take conversations with people you do not necessarily agree with.

Other interviewees mentioned the more specific skills such as building trust and being able to understand other people's level of knowledge in order to have a good conversation. One interviewee defined relational skills as:

> *"Being able to have a feeling for the level of knowledge of the recipient [...] so they gain trust in you."*

The last three definitions do however have the need to understand others to better work together in common. Therefore, more specific results and a more detailed analysis of inter-team collaboration will be presented below.

Inter-Team Collaboration

Engage in collaborative communication was the second most frequent theme mentioned during the interviews, which can be seen in Figure 4.1. Inter-team collaboration in an agile setting does have some clear ways of how communication regarding collaboration should be done. One interviewee stated that small issues can go directly between the individuals of the development team but that there is a more standardised flow when it comes to larger issues. The interviewee said:

> *"If a team has to talk to another team about some important/larger job, it goes through the PO."*

It is an interesting quote as it seems to present two different flows of communication for inter-team collaboration, one formal that goes through the PO and one informal that goes between employees in need of help. The agile setting demands a flow through the PO but less important or smaller jobs can be dependent on interpersonal communication without a handler. One interviewee mentioned that it is crucial to have inter-team collaboration when working in a component-oriented organisation to not create misunderstandings between the components. The different flows are therefore hard to define since a small issue for one team may be a large

issue for another team in the organisation making it important that both flows of communication are upheld and prioritised accordingly.

Considering collaboration, it is seen as a two-way exchange by a lot of the interviewees. Help is usually initially asked of colleagues one has an existing good relationship with. However, one interviewee specified that good relationships are not synonymous with knowing the colleague well but instead about a mutual interest in each other's work. The interviewee said:

> *"[...] you don't need to know the person very well. Sometimes it's just that they have interest in what your team have been developing."*

Furthermore, the interviewee points out that there is a reciprocal tendency to care for the other employees by helping with issues one has had before. This is a motivation to why asking for help or collaborating is not related to knowing a person well but instead about working together to solve an issue. The interviewee said:

> *"[...] you have the same issue. We suffer the same issues and you want the next person to suffer less."*

Helping each other can be seen as a part of collaboration as all help of this type is collaborative but all collaborations are not done to help. The will of sharing solutions to issues with other employees is a foundation for good knowledge sharing. Results corresponding in great detail with knowledge sharing will be presented in detail below.

Knowledge Sharing & Development

Knowledge sharing and development seem to be a big part of inter-team collaboration from the results of the interviews and it seems to exist a willingness to help and share knowledge with those one collaborates with. Furthermore, formal agile events seem to aid in the process of getting a holistic perspective of the issues at hand while informal meetings help with partial and detailed knowledge sharing. One interviewee stated:

> *"It's about the structure of sharing knowledge. When it's informal you get bits of information. [...] When it's structured in meetings, then you will get the whole picture of the topic."*

In addition, interest in the whole picture of the product can be a foundation for knowledge sharing and development. One interviewee stated that the willingness to understand what other colleagues are working on can be an initiator of knowledge sharing and development. However, there are also some things that may make an employee unwilling to share knowledge. One interviewee said that things such as not feeling confident in one's solution, fear of someone taking one's place, and afraid of not being relevant may perhaps affect the willingness to share knowledge. The interviewee continued by saying that being humble when sharing knowledge is a vital step as it creates an environment where other solutions are seen to perhaps be even better.

One interviewee stated that informal contacts are vital for employees to know where to go and find new knowledge. The interviewee stated that these informal contacts are more interesting as they are created and maintained by the individuals themselves, making them more valuable. The interviewee said:

> *"Informal [contacts] are good to have because then one can easily ask questions. [...] I think they are important because they are run by the people themselves. Formal contacts are presented to you, while the informal contacts you create yourself and those you create yourself are often a little more interesting, a little more valuable."*

One interesting aspect is that all of the things that can make an employee not willing to share knowledge may be interpreted as a low level of trust in the relationship. Furthermore, relationships seem to be central when discussing knowledge sharing and development as well as creating informal relationships and having trust in one's relationships seems to be important. Therefore, trust from the perspective of relational skills will be presented below.

Trust

Initially, it is interesting to notice how trust is the most frequently presented theme in the interviews. Trust is shown to be the most crucial factor for employees when discussing relationships and how collaboration and knowledge sharing can work in a large-scale agile setting. More importantly, the following four most important themes, *engage in collaborative communication*, *create personal connections*, *ensure frequent and rich communication*, and *establish and ensure shared vision and language*, are trust-building behaviour (Abrams et al., 2003). This shows how dominant the focus on trust seems to be while discussing relational skills in an agile setting. One interviewee expressed themselves in the following way while asked to describe relational skills:

> *"Relational skills is [...] the ability to create networks and make other people feel that they can trust you."*

One fascinating aspect of trust is that the interviewees mentioned the importance of having initial relations before collaborating. One interviewee mentioned that people that tend to work great together usually have worked together before and people that work worse together haven't worked together before usually. The interviewee said:

> *"[...] there are misunderstandings, not in any way intentional on anyone's part, but more that you don't know each other."*

The interviewee continues by stressing the need for team-building activities to solve this issue. The interviewee states that these activities help build initial trust between the employees which will aid the future collaboration greatly.

Furthermore, *ensure frequent and rich communication*, *engage in collaborative communication*, and *establish and ensure shared vision and language* are trust-building behaviours that promote trust in competence and benevolence while *create personal*

connections only promote trust in benevolence, providing initial evidence that both types of trust are important while discussing working in agile settings in general. One interviewee expressed themselves in the following way when asked to explain what trust between different people actually covers:

> *"Trust between people is about genuinely listening and trying to understand."*

This quote shows the importance of communication when discussing trust. Therefore, results regarding communication will be discussed in more detail down below.

Communication

One aspect of the data in Figure 4.1 is that communication, in all its different forms, seems to be a main factor for the employees while discussing relationships, collaboration, and knowledge sharing and development. For example, *engage in collaborative communication* and *ensure frequent and rich communication* are in the top 5 while *oral communication* and *nonverbal communication* are in the top 10 of most frequently mentioned factors. This seems to show that communication skills are a vital area when discussing relational skills and it is important to better understand if communication is a relational skill or if it is only facilitating trust. One thing that points to communication being a relational skill is how communication was mentioned several times when asking interviews about what they view as relational skills. One interviewee answered:

> *"Relational skills are about how [one] interacts with other people so there is good communication, clear communication [...] that works for everyone."*

Additionally, it is interesting to notice how all factors relating to communication were mentioned at least 10 times during the interviews which puts all of them in the top 15. Communication shows, therefore, tendencies to be a broad skill in the sense that it includes multiple factors that are of importance for relationships.

One interesting result regarding communication, which can be seen in Figure 4.1, is that oral communication and nonverbal communication were more frequently mentioned than other types of communication. These types of communication are more dominant/used in either face-to-face communication or video calls than, for example, writing on Slack. One interviewee mentioned how sending a message on Slack was great to initiate a discussion but not the preferred way of having deeper discussions. The interviewee states that the lack of facial expressions and other nonverbal communication limits communication when discussing difficult subjects. The interviewee said the following about why having a call is better when discussing something complex:

> *"Even if you have a very good technical background and no matter how smart you are, you don't keep up, but if you meet someone who has done it that day or worked a little with it, it goes very quickly for them [to explain it]."*

This result shows the importance of face-to-face communication, especially how oral communication and the more ”subtle” ways of communication, such as body language, facial expressions, and gestures, can give more information to the receiver than written communication when discussing more complex subjects. Hence, different types of discussions seem to favour different types of communication and therefore also different mediums.

4.1.2 Relational Skills in Different Teams

The interviews were conducted with employees from five different teams, each exhibiting unique forms and levels of interaction within the organisation, varying in both frequency and team types. Figure 4.2 shows an illustration of how the researchers have interpreted the interactions of the different teams based on the interviews. As can be seen in the illustration, Team A, B, and C operate within the same ART. Furthermore, it is seen that Team D and Team E are in different ARTs. Also note that Team A and Team B are sister teams, which means that they work in the same ART developing similar things. For this reason, it is illustrated with a solid line that these teams have a high degree of interaction with each other. Other interactions are perceived to take place more sporadically, which is why these are illustrated with a dashed line. The green circles are intended to illustrate other teams within an ART in addition to the specified teams. This, for instance, means that it can be presumed from the illustration that Team E interacts with an unspecified number of teams from all ARTs, including its own.

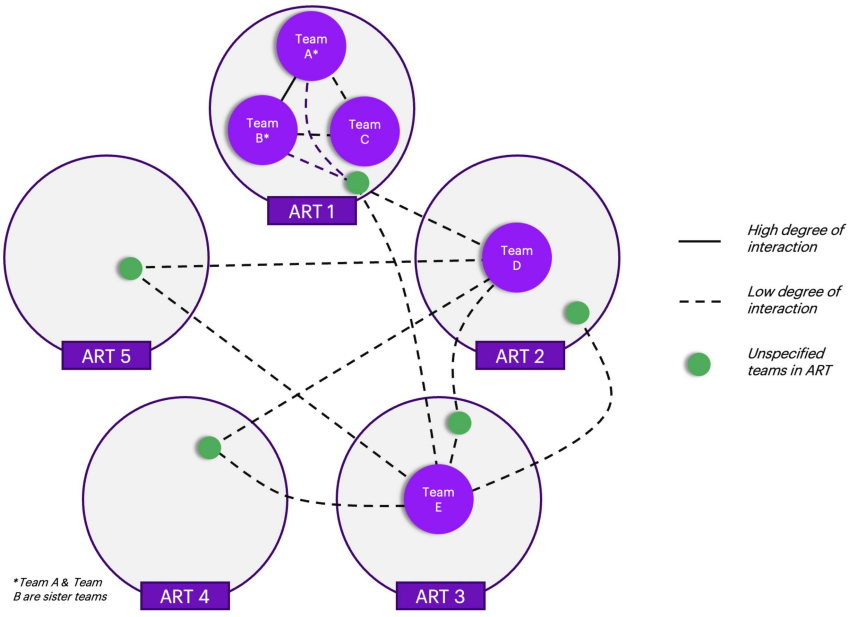

Figure 4.2: Detailed illustration of the interviewed teams. Source: Authors

To even further describe the teams, each of them has been categorised according to the factors (Bjarnason et al., 2022) presented in Table 2.2 and this categorisation

is presented in Table 4.1 below. Furthermore, in this section, a comprehensive picture of how relational skills are utilised in different teams will be presented. The dynamics of how relational skills interplay within the teams' diverse collaborations and knowledge exchanges will also be described.

Table 4.1: Characterisation of the interviewed teams.

Characteristics of interviewed teams					
Factors	Team A	Team B	Team C	Team D	Team E
Roles	EM PO Developers	EM PO Developers	EM PO Developers	EM PO Developers	EM PO Developers
Work tasks	Work with integration. Develops a framework and platform on which many teams are dependent.	Work with integration. Develops a platform on which many teams are dependent.	Work with integrating cameras and sensors with the software	Work with feature development, feature realisation, feature verification, and requirement definitions.	Work with data collection which the entire organisation use.
Average # years at company (PO & EM)	2	2	4.3	4.8	3.8
Average # years at company (development team)	1.5	5.0	0.8	3.5	4.0
Level of seniority of team	High	High	Medium	High	Medium
# people in development team	4	4	9	6	3
Interaction frequency and extent	High	High	Low	Medium	High
Main interaction	Teams inside ART	Teams inside ART	Teams inside ART	Teams outside ART	Teams outside and inside ART
Team culture	Helpful and open	Helpful and open	Helpful and open	Helpful and open	Helpful and open
Organisational belonging	Hybrid	Hybrid	Virtual	Hybrid	Hybrid

To enable an analysis of how relational skills are utilised across the different teams, as well as describe how relational skills interplay within the different teams, a summary has been made with the three most mentioned interpersonal skills and trust-building behaviours from each team, which can be seen in Table 4.2. Note that the table starts with the most mentioned skills and behaviours and continues in descending order. An interesting observation is that showing *trust* to other individuals is regarded as the most important interpersonal skill for all teams. Furthermore, it's worth acknowledging that the other relational skills differ somewhat across the various teams. As a result, the researchers will delve into the specific meaning of these

skills within each team and explore how team members demonstrate them in their respective contexts in the sections below.

Table 4.2: Most mentioned interpersonal skills and trust-building behaviours of the different teams.

	Relational skills of interviewed teams				
	Team A	Team B	Team C	Team D	Team E
Interpersonal	Trust	Trust	Trust	Trust	Trust
	Cooperation & Coordination	Service orientation	Oral communication	Oral communication	Service orientation
	Oral communication	Oral communication	Cooperation & Coordination	Nonverbal communication	Intercultural sensitivity
Trust-building	Engage in collaborative communication	Create personal connections	Engage in collaborative communication	Engage in collaborative communication	Engage in collaborative communication
	Ensure frequent and rich communication	Engage in collaborative communication	Ensure frequent and rich communication	Create personal connections	Establish and ensure shared vision and language
	Establish and ensure shared vision and language	Establish and ensure shared vision and language	Create personal connections	Ensure frequent and rich communication	Create personal connections

Team A

Team A is mainly characterised by being a small team consisting of senior people. They mainly work with integration, where they develop a framework and platform on which many teams are dependent. The dynamic between the development team and the PO and EM is characterised by the team having great autonomy and where interaction both within the team as well as outside the team is encouraged by the PO and EM. Their purpose is to make it easier for feature developers to be able to verify their product in hardware. *Cooperation and coordination* and *engage in collaborative communication* are some of the most mentioned relational skills for the team, see Table 4.2, and this is mainly due to the team's work tasks. They have a lot of dependencies with other teams, which is a driving factor for much of the team's various inter-team interactions, as can be seen in Figure 4.2. One interviewee describes the team's interactions in the following way:

> *"[...] since we are building a platform and a framework there are many who use it, and often many use it without being very familiar with how it works and this requires a lot of teaching and support from us."*

Notable for the team was that all members seemed to be good at utilising their relational skills, and all interviewees talked about the importance of *trust* when collaborating or sharing knowledge. Their high possession of relational skills was partly shown through their communicative adaptability and through how they actively initiated new relationships, as well as utilised previous relationships to solve problems. One interviewee talked about the importance of preparations when reaching out to

someone in a team that you do not know that well. Specifically, the interviewee mentioned that it is important to clearly communicate your intentions for initiating contact and that you should already have some info beforehand. The main reason for the importance of preparations was to make sure to respect the other individual's time, showing signs of trustworthy behaviour and communicative skills, and thus high relational skills. When talking about a recurring meeting that the team had with a distant organisation, one interviewee mentioned that they often talk to someone they have an established relationship within that team before going into the meeting. This meant that they could more easily get information about what that team was doing and that the focus could thus be placed on the right things during the meeting. This shows signs of the interviewee having high relational skills through the utilisation of established relationships and how it is used to improve inter-team collaboration between the teams. When talking about asking colleagues for help, one interviewee described that when they were new at Zenseact, they utilised relationships from their previous company who works at Zenseact now. This behaviour shows how the individual effectively utilises their established relationships in order to absorb new information and knowledge, thus showing signs of having levels of relational skills. The interviewee explained the scenario in the following way:

> *"So if it's something, I go directly to someone I've worked with before at Company X or with whom I've worked for a long time here [at Zenseact] now. So it could be that you have this more informally, that you first ask a little about how the family is doing and then, by the way [reason for interacting]."*

Furthermore, many of the interviewees express dissatisfaction with the SAFe framework and that it automatically divides the organisation into silos. This seems to create difficulties when working cross-functionally in the organisation, indicating that SAFe creates barriers to inter-team collaboration. It is further described that there is a component-based division of teams and ARTs in the organisation. This creates challenges for Team A when working with teams working at the feature level, indicating that the way the organisation is divided also creates barriers to inter-team collaboration. A common challenge is to ensure that there is no misunderstanding between the components, which can be difficult when some teams have a more holistic perspective of the product and some a more narrow one. This challenge is the driving factor to why *establish and ensure shared vision and language* is one of the most mentioned relational skills, and thus shows sings that this specific relational skill is important when teams having different focus areas collaborate. One interviewee describes it in the following way:

> *"[...] some teams only work with their components and then some other teams will take over and magically make it work together."*

Team B

Team B is a sister team to Team A, i.e. they work in the same ART developing similar things, which means they have similar characteristics. The dynamic between the development team and the PO and EM is similar to Team A since they share

the same PO and EM. Team B specialises in integration and is currently developing a platform that multiple teams depend on. Due to the development of an integration environment widely utilised by developers within the company, a majority of the team's interactions revolve around providing assistance and support to users. Figure 4.2 intends to illustrate a simplified view of the team's interactions. The team's work tasks partly explain why *service orientation* and *engage in collaborative communication* are some of the most mentioned relational skills, as can be seen in Table 4.2. The team's general interactions, as described by one of the interviewees, are as follows:

> *"We develop a platform [...] so we have a lot of interaction with a number of different teams because most of them are dependent on what we do, and their questions vary a lot"*

Notable is that the team seemed to possess high levels of relational skills. It can be observed from the interviews that *create personal connections* is the most mentioned trust-building behaviour. The reason for this was mainly that the interviewees were efficient in using previously established relationships at the company when collaborating with other teams or searching for new knowledge. One interviewee mentions that they utilise previous contacts in their collaborations with other teams if it is possible because it facilitates communication, showing signs of possessing high relational skills. In a similar fashion, another interviewee mentions that it is easier to ask someone for help when you have an established relationship since you can skip formal communication procedures and go directly to the point instead. On the contrary, when you don't have an established relationship, the interviewee explains that you have to think more when communicating to make sure that the information is interpreted correctly by the recipient. This shows signs of the individual utilising relationships efficiently, thus using relational skills, to facilitate inter-team collaboration. A question that all interviewees were asked was whether they could describe a good collaboration they had with another team in the organisation. From the interviewees' different answers to this question, a clear pattern emerged that the interviewees showed signs of having good relational skills. An answer that clearly exhibits such signs was the answer from one of the interviewees from the same morning that the interview was held and read as follows:

> *"I was contacted on Slack, and based on the fact that I knew who contacted me, I didn't have to think about how to communicate, which I would have needed if I didn't know the person. I also knew what he knew [his knowledge background] [...] and when we looked at it, we solved it in about two minutes."*

Notable is that the team members have been at the company since it was founded in 2017. In addition, all team members said that they had rotated within different types of teams since they started. Those observations might explain the possession of high relational skills within the team. It could also be observed that the members had established large networks of relations, which also could be explained by their experience from having worked at the company a long time and having worked in different teams. Furthermore, it is evident that all members possess a

solid grasp of the product, demonstrating both a good understanding and a comprehensive perspective on its development. Another interesting finding was that even though the team seemed to possess high relational skills, they still found it difficult to collaborate with teams that were further away from them organisationally. The interviewees characterised the dynamic as one where individuals exhibit a strong inclination towards assistance and problem-solving, but the presence of divergent priorities and goals frequently poses obstacles to reaching a shared solution. This explains why *establish and ensure shared vision and language* is one of the more frequently mentioned trust-building behaviours. This further shows signs that this specific relational skill is important when you collaborate with organisationally distant teams.

Team C

Team C is characterised by being a relatively large team compared to the other teams, and the seniority of the team is also lower. The dynamic between the development team and the PO and EM is characterised by having a more internally focused PO where much focus is on building trust within the team. They primarily work on tasks that are based on quite specific competence in the platform. The team mostly seems to interact with other teams within their ART, but the majority of the team's interactions seem to take place within the team itself, as seen in Figure 4.2. Seemingly, the primary teams they collaborate with are those working on the component adjacent to the one they are working with. One interviewee describes the team's most common interaction in the following way:

> *"We make sure that the video stream is passed on to our customers and to their queue vision, that is, the next component that comes, and that is the team that we have the most cooperation with."*

Something that was particularly interesting about this team was that it was characterised by being a relatively closed team, and where the relational skills of the team members varied. Having *trust* in other individuals was something that all team members mentioned as important when collaborating with others. One interviewee said that casual meetings such as coffee-breaks, and more formal meetings such as the daily, was important for building trust within the team. This demonstrates that the individual has an awareness that trust is important for cooperation. Furthermore the individual stresses that it is important that the camera is turned on during meetings so that the team members can see each other, showing signs of high communication skills. The interviewee gives their view on the matter as follows:

> *"What is important is that those casual meetings are conducted with the camera on so we can see each other. Because most of the meetings online are with turned-off cameras. Sadly, that's my experience and if you know the people, that's not a problem. If you don't know them there's a challenge to create a bond."*

Interestingly, this quote also shows that the reason you want to see someone is because it facilitates relationship building. It also shows that it is less problematic

if you already know the individual from before, which shows signs that established relationships facilitate communication. Furthermore, it can also be inferred from the quote that the interviewee shows a desire to build relationships, which shows signs of high levels of relational skills. It is also interesting that there seems to be a tendency to not want to have the camera on, which shows that the team also exhibits lower levels of relational skills. Something that further confirms this tendency is a response from another interviewee who mentions that they prefer to communicate via Slack because they consider themselves to be a bit shy. One interesting point to mention is that the trust-building behaviour *create personal connections* is mentioned a lot, which might be considered contradictory because the team show signs of having relatively lower levels of relational skills compared to the other teams. The main reason why it is frequently mentioned is that the EM and PO emphasised it a lot and that it was relational skills that they aimed to build within the team. Online activities such as quizzes and coffee breaks were encouraged in order to build relationships within the team says one interviewee. Furthermore, another interviewee also expressed that they try to encourage the team to go out and meet the other teams.

Within the team, unlike the other teams, they seem to work a lot with the MOB programming method. The interviewees expressed that the method builds trust within the team and that it is favourable for knowledge sharing within the team. When talking about working in MOBs compared to working more back and forth with other teams, one interviewee expressed that they preferred to work in MOB, since it was more difficult working back and forth with teams, showing signs of an unwillingness to interact with others, and thus indicating lower levels of relational skills. Furthermore, a characteristic that stands out in this team is that they work virtually, and where the team members are spread out in different locations in Europe. It is described that it entails both advantages and disadvantages. A challenge that seems to arise is, for example, when the team is to have workshops, which require a lot of preparation from the team's leaders. Workshops that are held remotely also seem to lack an important component which is the team-building component.

Team D

Team D is characterised by being a medium-sized team compared to the other teams and the seniority is relatively high. The dynamic between the development team and the PO and EM is characterised by the PO being very engaged and active, and that allows the team to be very autonomous. They primarily work with feature implementation and requirement definition. In terms of inter-team interactions, they mainly seem to be working with teams outside of their ART, and in seldom cases, they work with teams inside their own ART, as illustrated in Figure 4.2. One interviewee explains that because they are last in the value chain, they become very dependent on other teams in their work, but also adds that these teams also are dependent on the feedback from them to know the next steps. Another interviewee describes a common interaction in the following fashion:

"In many of our interactions with other teams, it is that they [other

teams] notify us of something that doesn't quite work as it should [...] but it could also be that we have developed a tool and they need help so then they often come and talk to us."

Notable for this team was that it showed signs of varying levels of relational skills, but that despite this the team was effective in collaborating with others. This was mainly shown in the fact that many of the team members seemed to be good at adapting their communication according to the medium of communication and that they showed efficiency in the early stages of building relationships in order to then be able to benefit from the new relationships in their team collaborations. Furthermore, they were especially good at utilising existing relationships with people at the company. An act that shows signs of good relational skills is the response from one of the interviewees that describes that they often take less in-depth conversations on Slack and more in-depth conversations in person. The interviewee's main reason for this was that it is easier to understand what someone tries to say when you also can see their facial expressions, and that it is easier to know at what level the conversation should be, showing.

In an interview with one of the other team members, the impression was given that the individual was good at using their relational skills to cooperate with others, specifically their communicative abilities, but initiating new relationships did not seem as important to the individual. However, the interviewee was very aware of the importance of relationships and its benefits. When talking about trusting others at work, the interviewee mentioned that it was important. However, the interviewee interestingly continued to describe that when working at a large company you have contact with so many on a daily basis and thus the importance of trusting one individual specifically was not so important. The interesting thing about this is that the individual shows signs of considering it more important to trust a group of people rather than a single individual, which indicates that the company culture at Zenseact creates a feeling of trust in the individuals and which also facilitates cooperation between individuals.

A character trait of Team D that stands out is the seniority of the members of the team and how it facilitates its inter-team collaborations. Many of the team members have worked in other parts of the organisation in the past together with individuals who are currently in teams that Team D has a lot of cooperation. One of the interviewees describes that those established contacts from previous collaborations are incredibly valuable when you are in a new team and collaborate with other teams since you then can benefit from those contacts and friends you have from before. This indicates that the individual possesses good relational skills. Based on the interactions where the collaborating teams have a previous relationship that one of the interviewees has seen, the dynamics are described as follows:

"[...] those times when things work without friction and when there is flow in the work, it is very much connected to the fact that these people have worked with each other in a different context before."

Because of the experience from having previous relationships as described above,

it can also be noted in the interviews how the team has effectively utilised team-building activities when initiating new collaborations with other teams. One interviewee described a scenario where they had an inefficient collaboration with another team and explained that if they had initiated contact earlier, they would have understood that they depended on each other and they would have helped each other better at the early stage of the project. This scenario shows signs that effective collaboration between teams can work better if the individuals between the teams are allowed to initiate a relationship with each other beforehand, and that the team possesses high levels of relational skills because they use team-building, i.e. relationship building, to improve their collaborations.

Team E

Team E is mainly characterised by being a small team where the majority of the team members have been at the company from its beginning. The dynamic between the development team and the PO and EM is characterised by the team having great autonomy and where interaction both within the team as well as outside the team is encouraged by the PO and EM. The team serves the purpose of collecting data which the entire company uses, and they are the only team working with it. This means that almost all development teams throughout the company depend on them because the data is critical to being able to train the data models that are developed, as illustrated in Figure 4.2. One interviewee describes a very common interaction for the team in the following manner:

> *"[...] they get in touch and say they have a need for data or a large-scale collection and ask: Is this possible, could you plan this in?"*

From the interviews, it can be observed that the team seems to possess high levels of relational skills. This is primarily evident through the fact that the team has succeeded in building trusting relationships at the company, which shows signs of facilitating inter-team collaboration and knowledge exchange. It is also shown by the fact that the individuals are both good at utilising both their formal and informal networks that they have developed at the company, and by the fact that they demonstrate high communication skills. Furthermore, the individuals show a willingness to acquire new relationships at the company. One interviewee that has been at the company from the beginning mentions that they have several "go-to" individuals they have developed strong relationships with and that they frequently reach out to when they need help, showing signs of good relational skills and that it can facilitate inter-team collaboration. Another scenario that shows signs that the team possesses good relational skills is one where one of the interviewees describes how they use their informal network at the company. They described it in the following way and how they utilised their informal network to solve a complex problem that they had encountered:

> *"I went to the team that I know has expertise in this area, and then I asked the person with whom I have been in contact as well as with whom I have come to know."*

When speaking about *trust* between teams it was evident that the team members felt highly trusted by other teams. As previously mentioned, most of the team members have worked in the company since it was founded. It appears from the interviews that this seems to have benefited many of the team members in building relationships with others at the company, which explains why *create personal connections* is one of the more mentioned trust-building behaviours. One of the team members expresses pride in the experience they have built up within the team and that they truly feel that other teams trust their ability to solve the problems they come to them with. Furthermore, they elaborate that the contact network they have built up over a long period of time is probably a contributing factor to the fact that many appreciate working with them and that they feel pride in the fact that people turn to them trusting that they will solve their problems. The description indicates that the team possesses high levels of relational skills in the form of having built trusting relationships. It is also interesting that this characteristic of relationships seems to highly facilitate inter-team collaboration.

Something that is unique to Team E and that differs from the other teams is that they work more operationally. The majority of the interviewees mentioned that because of that, working with agile methodologies did not serve any purpose for them. One interviewee mention that the team has adopted some parts from Scrum that work for them, but that many parts have been omitted to allow for greater flexibility. Furthermore, several of the interviewees mention that there is a limit to how much data can be collected during a work week and that it requires a lot of planning in order to meet the needs of as many teams as possible. One interviewee describes that the main purpose of the team is to serve other teams and that an important individual attribute to have is a mindset of wanting to help other teams. Another interviewee mentions that collaborative and frequent communication is crucial and that it is specifically important to ask the right questions to understand the demands of the other teams. This explains why *service orientation* and *engage in collaborative communication* are some of the more frequently mentioned relational skills. When trying to explain the dynamics of an interaction that the team has one interviewee frames it in the following way:

> *"The absolutely most important thing is to, first of all, understand [what they want] [...] we want to ask them questions so that they have a sufficient understanding themselves of what it is they are looking for"*

One interesting thing to highlight from this quote and from the observations about collaborative communication above is that shows signs of good communication skills and thus high levels of relational skills.

4.2 Survey

The survey was conducted through an internal tool and was available to answer over two weeks. The survey had a response rate of 62% which corresponds to 290 out of 468 people, see Table 3.2 in subsection 3.4.3. The survey investigated how the employees defined their relationships and what they believe is important in

relationships described in terms of relational skills, as well as how they would define well-working relationships. All survey questions can be seen in Appendix B.

One question of the survey asked how people would rate the importance of different aspects of relationships, corresponding with relational skills, for collaboration. As mentioned in the method's chapter, all questions were constructed using insights gained from the interviews. The rating system was done on a scale with 5 being the highest and 1 being the lowest. The average rating and the standard deviation for all relational skills can be seen in Table 4.3.

Table 4.3: Relational skills importance for collaboration.

Reported importance		
Relational skill	Average rating	Standard deviation
Trust in competence	4.44	0.71
Trust in benevolence	4.37	0.77
Communication	4.37	0.76
Shared language	4.07	0.86
Shared goals	3.97	0.97
Shared team culture	3.40	1.00
Dependency	3.10	1.10

The result shows that trust, both in benevolence and competence, and communication was the relational skills with the highest importance. All other relational skills had considerably smaller averages as well as larger standard deviations implying a lower level of consensus of the importance. Hence, trust and communication seem to be major factors regarding collaboration and the relational skills developing trust for example seems to be of great importance.

Furthermore, the survey asked the employees to characterise their relationships by rating (same scale from 1 to 5) different aspects of their relationships, corresponding to different relational skills. This was done by asking about their relationships inside their teams, outside their teams but in the same ART, and outside of their ART. The results can be seen in Figure 4.3 below.

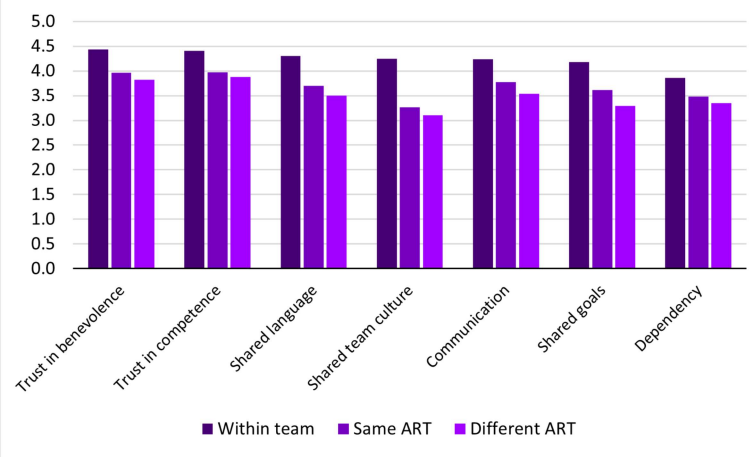

Figure 4.3: Survey averages of relational skills characterising relationships.

The results imply that employees characterise their relationships mostly on trust, both in competence and benevolence. Interestingly, the result shows that communication seems to not be as dominant as it was when asking about importance. Furthermore, the result shows a decline in how different relational skills characterise their relationships the further away from them as individuals. This suggests that it is harder to characterise one's relationships the further away they are in the organisation.

The survey also asked the employees to describe their well-working relationships in one word, with the aim to categorise the answers to see if relational skills may be a distinctive factor. The results of the thematic categorisation of this question can be seen in Figure 4.4.

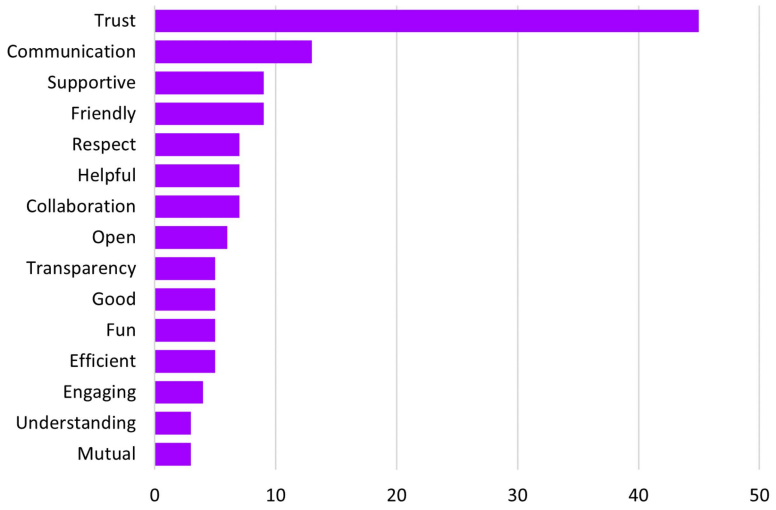

Figure 4.4: Distribution of themes of single words used to describe well-working relationships.

The result of this question shows how important trust seems to be for developing and maintaining well-working relationships. Communication is also second in frequency here but trust is the utmost used theme when describing well-working relationships.

5

Discussion & Analysis

This chapter seeks to analyse and discuss the empirical data in relation to the theoretical background presented. Firstly, in section 5.1, *Defining Relational Skills*, a discussion will be held to define relational skills, which seeks to find an answer to RQ1. Secondly, in section 5.2, *Inter-team Interaction*, a discussion is held about what relational skills affect the interaction between teams in an agile organisation, thus seeking to elaborate on an answer to RQ2. Finally, in section 5.3, *Inter-team Collaboration*, a discussion is held about how relational skills affect collaboration between teams in an agile organisation, which seeks to find an answer to RQ3.

5.1 Defining Relational Skills

The aim of this master thesis was to investigate and understand what relational skills is since there is seldom consensus in the literature on a universal definition of relational skills (Matteson et al., 2019). The relational dimension of social capital includes a cluster of soft skills such as building trust, communication, fostering collaboration, and shared norms (Nahapiet and Ghoshal, 1998; Claridge, 2018). However, there is no general consensus on what relational skills is and what it is comprised of. Each interviewee was therefore asked the question to describe how they would define relational skills.

One description of relational skills was the ability to get something out of one's social ability which is consistent with already existing theory from social capital. Other interviewees view it as the ability to get something out of other people but put more focus on the actual interaction between them. The need to understand others was emphasised, especially since organisations or distant teams may have different requirements, which is consistent with the associability aspect of relational social capital (Claridge, 2018). Furthermore, interviewees described relational skills as an ability to build trust and be able to understand other people's level of knowledge in order to have a good conversation, which is consistent with the description of the relational dimensions of social capital (Claridge, 2018). Something that the data from the interviews consider to be relational skills, but which are not as prominent in theory is the initial creation of relationships and networks. Interviewees also emphasise that one of the drivers of creating these networks of relationships is better being able to cooperate with others. Hence, relational skills seem to focus on creating, maintaining, and utilising relationships. Furthermore, the interviewees also

add more emphasis to adaptable communication being a relational skill, especially related to interactions. Communication is also the second most mentioned word when describing well-working relationships further indicating that communication is a relational skill.

To conclude, the data collected from the interviews as well as the literature indicate that relational skills encompass the usage of networks, the need for trust, and the importance of communication. Hence it can be concluded that relational skills is *"The skills that enable one to create, maintain, and utilise relationships"*, encompassing the skills of being able to build trust and communicate adaptively.

5.2 Inter-Team Interaction

The second research question for this thesis was regarding what relational skills affect the interaction between teams in an agile organisation. The data collected shows that several teams and their work are dependent on other teams in the organisation. These dependencies are a driving factor for interactions with other teams, creating an environment where relational skills may be useful. One interesting thing is that the organisation has chosen to let smaller jobs be managed on a personal level while larger jobs go through the PO and into the backlog. Hence, depending on the type of job, different types of interactions, formal for larger jobs and informal for smaller jobs, will happen. These two different flows also create dependencies between teams as employees will be dependent on others to help them without it being shown as work done, i.e. trusting their willingness to help. However, this does correspond with the solutions presented in existing literature (Begel et al., 2009). Creating personal connections and ensuring good communication seems to be a working solution to managing dependencies.

Furthermore, the idea that larger and more complex jobs go through the PO and are integrated into the backlog is an interesting idea that seems to work well. Using a more formal flow of communication may act as a speaker to ensure that the full network of teams at Zenseact can be utilised to solve the issue. This needs to be further investigated to ensure that it is the case but it seems reasonable as an individual's or team's networks are very unlikely to span the entire company. The idea that utilising a larger network to solve more complex jobs is supported in the current literature (Šmite et al., 2017) as a valid solution to managing dependencies, since the knowledge needed may reside further away in the organisation than that needed for simpler jobs.

However, one interesting part of the data collected is that dependency is the least important element for collaboration when asking the employees, see Table 4.3, and consistently one of the lowest ranked elements characterising relationships in the organisation regardless of where the relationship resides, see Figure 4.3. This discrepancy may still be explained by the fact that dependencies may drive interactions but are not considered by the employees to be important for collaboration and not characterise their relationships. It does however imply that there may be a lack of awareness of dependencies, especially on the effect it has on relationships and

collaborations, which may explain the data regarding misalignment and misunderstandings.

The fact that different teams have a more internal as well as external focus may explain the data regarding teams finding it sometimes hard to work together due to misalignment and misunderstandings. It is evident from both the interviews and existing literature that teams with a more external focus, i.e. a higher level of awareness, work better with other teams and interact with more people (Kiani et al., 2013; Bick et al., 2017). Hence, personal connections seem to be a fundamental part that affects the interaction between teams. Creating these personal connections will foster better communication between the teams (Begel et al., 2009) and build trust (Abrams et al., 2003), see Table 2.4. The interviews both mention the need to create a bond and that previous interactions aid the ability to work together. Furthermore, the survey also states the importance of personal connections, see Figure 4.1, showing that the collected data and existing literature seem to agree on the importance of personal connections.

The action of creating personal connections is a behaviour that promotes trust in benevolence, indicating that building trust is a relational skill that seems to affect interactions between teams. This coincides with the existing literature on SAFe, social capital, and relational skills. Hence, building trust in benevolence appears to be the first relational skill this study can identify that affects the interaction between teams in an agile setting.

Furthermore, the data seem to also point to trust in competence being the fundamental consideration when reaching out to fellow employees when requesting help with smaller jobs. Several times during the interviews the employees mentioned that they knew the person they contacted was competent in the area they needed help with when asked why they chose to contact a specific employee. This corresponds with the findings in current literature (Alexopoulos and Buckley, 2013; Gubbins and Dooley, 2021). As a result, building trust in competence is the second relational skill that this study can identify that affects the interaction between teams in an agile setting.

There is no consensus in the current literature on whether or not communication is a relational skill or if it is building trust, hence a tool for the relational skill of building trust. However, the data does seem to imply that communication has more implications than just building trust which indicates that communication should be seen as a relational skill. The data does suggest that communication builds trust, which aligns with current literature (Abrams et al., 2003), but it does also suggest that trust improves communication. As the relationship between trust and communication does indeed seem to be symbiotic but communication has more effects than just building trust, this thesis proposes that communication should be considered a relational skill.

Additionally, different types of communication were mentioned during the interviews where *engaging in collaborative communication* was prevalent. One example in the data is one interviewee who specifically mentioned that one's previous knowledge

has little to no meaning if it is compared with having a conversation to try and solve an issue together. This indicates that collaborative communication does seem to drive interactions that take place in more collaborative mediums, such as video calls and in-person meetings, as these are requirements stated by interviewees for collaborative communication to work.

Continuing regarding communication, oral and nonverbal communication seem to be types of communication aiding the interaction between employees. Interviewees stated that those they had a good collaboration with earlier were the first ones they contacted the next time they had an issue, indicating that good collaborative communications may ignite further interactions between employees. Oral and nonverbal communication were the types of communication mentioned that made communication easier. Hence, good oral and nonverbal communication skills may affect future interactions between a set of employees. Since oral and nonverbal communication seems to be even more important for good communication when working on complex issues, these communication skills may be very important for companies working on developing complex innovative products and solutions, such as Zenseact.

Similarly, interactions between employees in an agile setting seem to be heavily driven by the individuals themselves and encouraged by the organisation. Due to this, the simplicity of interacting may affect who employees interact with. One thing that was mentioned to simplify the interaction and communication between employees was a shared language, which is also supported by current literature (Cohen and Levinthal, 1990; Tortoriello et al., 2012). A shared language seems to aid communication by reducing misunderstandings and miscommunication, therefore making the interaction easier and more rewarding, incentivising the employees to interact again when similar issues arise.

To conclude, building trust and communication seem to be the relational skills affecting the interaction between teams the most in an agile setting. There is definitely possible that other relational skills affect the interaction as well but through the data collected, with support from the existing literature, building trust and communication seem to be the most dominating relational skills, where several actions such as a shared language, for example, seems to be effective sub-skills. Beyond this, it is important to understand that building trust and communication are ”umbrella” skills in the sense that they include multiple different skills and behaviours. What relational skills affect the interaction between teams in an agile setting can be even better understood in the future by either researching what other relational skills affect interaction as well as researching what more specific behaviours when building trust and communicating affect the interaction between teams.

5.3 Inter-Team Collaboration

Both from the collected data and existing literature, it is evident that relational skills are something that has an effect on the collaboration between teams in an agile organisation. However, it is complex to describe exactly how it affects because it depends on many other factors such as organisational factors and individual dif-

ferences in humans. As seen in the theory, relational skills are an element of social capital (McCallum and O'Connell, 2009), which in turn is an element of intellectual capital (Youndt et al., 2004). Furthermore, it is also described in the theory how the different dimensions of intellectual capital depend on each other (Inkinen, 2015) where it is shown that different dimensions must be prioritised to achieve organisational performance. Similar dynamics between the different intellectual capital components have also been identified at Zenseact which gives rise to the discussion of how relational skills are affected by different intellectual capital components in order to better understand how relational skills affect inter-team collaboration in a large-scale agile organisation.

From the collected data, it is evident that the organisational context, i.e. the organisational capital, is affecting relational skills. It can be seen in the interviews that culture, being and organisational capital (Inkinen, 2015), have an effect. Bjarnason et al. (2022) describes that a culture of openness and helpfulness contributes positively to inter-team communication, and it is observed that Zenseact promotes such a culture. Furthermore, the collected data confirms that the employees at Zenseact exhibit such characteristics. It is observed in the majority of the interviews that individuals in teams are generally positive about collaborating with others, which indicates that the culture at Zenseact seems to build the trust-building behaviours *establish and ensure shared vision and language* and *engage in collaborative communication*, and thus the inter-personal skills *trust* and *cooperation and coordination*. This phenomenon could be explained by the contagion mechanism as explained by Burt (2000). Taken together, it can be argued that possessing relational skills related to openness and helpfulness contributes positively to inter-team collaboration, and having a strong company culture that promotes and drives those behaviours, can help build those relational skills.

Furthermore, it is observed in the collected data that Zenseact has challenges related to inter-team collaboration. Since individuals generally seem open to collaborating and helping others, it can be argued that a driving factor to the problems with inter-team collaboration at Zenseact is caused by the organisational design. From the interviews, it is observed that the adoption of SAFe is creating silos at the company which creates difficulties for teams when working cross-functionally. Also, it indicates that it creates geographical, organisational, and cognitive distances among the teams due to the ARTs being located in different locations at the office and due to the teams being divided into either being more component/feature-focused or integration-focused. The existence of silos has been observed to hinder individuals from seeing the broader scope of their own work, a challenge that is also supported by the theory (Edison et al., 2021). Moreover, the theory also indicates that large-scale agile organisations commonly face this difficulty (Dikert et al., 2016). From the interviews, it is evident that the trust-building behaviours *create personal connections*, *ensure frequent and rich communications*, and *establish and ensure shared vision and language* seem to be important for building trust at Zenseact. The theory suggests that the distances introduced by SAFe have a negative effect on these trust-building behaviours. This notion is supported by insights gained from interviews, where individuals expressed difficulties in collaborating with teams that were

organisationally distant. Furthermore, the survey results confirm this claim, revealing a clear trend of diminishing trust as one moves further away from their team within the organisation. Taken together, the findings suggest that the implementation of SAFe hampers the establishment of trust among teams, particularly those that are organisationally distant, consequently impeding inter-team collaboration. Having observed in section 5.1 that trust is an important relational skill for fostering effective interactions, it becomes imperative for organisations to develop trust among organisationally distant teams. With a long-term perspective in mind, the organisation can employ various strategies outlined in Table 2.3 to enhance trust among teams throughout the organisation, and thus improve collaboration. In the short term, facilitating direct collaboration between teams in need can be achieved through effective workshops, which have proven to be an efficient strategy for rapidly establishing trust between teams.

As previously mentioned, the teams at Zenseact are shown to be either more component /feature-focused or integration-focused. It is indicated from the interviews that this creates difficulties when teams having different focus areas have to collaborate. Teams being more focused on integration seem to be more able at understanding the bigger picture while teams being more focused on features seem to be less able to. Consequentially, and as discussed in section 5.1, this seems to create a lack of awareness of other teams, which seems to be reflected in the team's priorities. Furthermore, it emerges from the interviews that awareness of others is important for good communication and collaboration, where it for instance is mentioned that being able to have a feeling for the level of knowledge of the recipient is important when communicating and building trust. Also, it is evident that good examples of collaborations often is characterised by a high level of awareness of others, and that less good examples of collaborations often is characterised by a low level of awareness of others. Similar dynamics are described in the theory where it is described that when team members have a good understanding of other teams it facilitates inter-team collaboration, and conversely inadequate awareness has a negative impact (Edison et al., 2021). Furthermore, a related interpersonal skill being used when collaborating is the interpersonal skill *cooperation and coordination*, which includes the ability of an individual to have a shared situational awareness (Bedwell et al., 2014). The theory, therefore, confirms that being aware of others is important for inter-team collaboration. This implies that relational skills related to awareness of others are necessary to possess in order to facilitate inter-team collaboration.

As previously discussed in section 5.1 dependencies seem to be a driving factor for interaction for many teams. This includes teams that for instance are working with integration such as Team A and Team B, or those teams being later in the value chain such as Team D, or teams working with data collection such as Team E. Driven by the dependencies to other teams, all these teams seem to be characterised by having relatively many interactions on a daily basis. Furthermore, it can be noted that all these teams show signs of collectively possessing high levels of relations skills which they effectively use when collaborating with other teams in the organisation. Based on that, it can be argued that individuals working in such teams must possess high relational skills in order to favour inter-team collaboration.

Furthermore, it is observed that the type of interactions varies a lot and that the teams that often contact these teams usually have a lower degree of understanding of what they are working with. Interestingly, it can be seen in the collected data that those individuals who showed good collaboration attributes were particularly good at *engaging in collaborative communication* as well as being *service oriented*, *active listeners* and good at *cooperating and coordinating*. This emphasises the importance that individuals working in these teams must possess such relational skills in order to favour inter-team collaboration.

It can also be observed that Team C is characterised by having fewer inter-team interactions compared to the other teams. Similar to Burt (2000) description of network closure, the team is also perceived to be more closed compared to the other teams. One possible explanation for why they are perceived as more closed could be their work tasks and their approach to working in MOBs. They have willingly chosen to work in MOBs, aligning with their autonomous decision-making based on agile values and principles (Beck et al., 2001). This seems to have facilitated trust-building within the team. While it generally can be seen in both the collected data and the theory that autonomous teams build trust within the teams, it can also be seen that too much autonomy in teams may create a fragile architecture and distrust between teams (Dikert et al., 2016). One interesting thing to highlight from the interviews is that several interviewees have mentioned that they find it more challenging to collaborate with teams being perceived as closed. Similar dynamics have also been shown in the theory (Dikert et al., 2016). It is important to point out that teams that are more closed are often characterised by having fairly high trust within the team and that they work effectively together, which both collected data and theory confirm. However, it seems to be done at the expense of being more efficient at collaborating with other teams, which in turn can affect the overall performance of the organisation. Therefore, for effective collaboration between more closed and open teams to be achieved, it is important that team members have self-awareness of this characteristic and that it can influence other teams negatively, which for example is dependent on their cooperation. Possessing this awareness is especially important for Product Owners and Engineering Managers. Taken together, it can therefore be concluded that teams that are characterised by being more closed should actively work on building *trust* with other teams, and become more open to *cooperation and coordination*.

A noteworthy finding from the study is that individuals with high levels of relational skills demonstrate a higher level of effectiveness in collaborating with individuals from other teams. These individuals distinguished themselves in various ways, notably through their adaptability in communication, effectively adapting to diverse situations and mediums. Moreover, they demonstrated a genuine enthusiasm for establishing new relations within the company, accompanied by an ability to foster relationships built on trust. Their ability to utilise these relationships in their daily work was also evident. They utilised the large networks they had created to better associate with others and reach out to the right people. Overall, these actions had a significant positive impact on fostering collaboration between teams. In terms of organisational distance, while some instances showcased seamless cooperation among

these individuals, there were situations where they encountered challenges in working with teams that were organisationally distant. In these cases, it became apparent that conflicting organisational priorities emerged as the primary hinder to successful collaboration. Notably, several of these individuals possessed characteristics that, according to the theory, are considered advantageous for fostering collaboration between teams (Bjarnason et al., 2022). These attributes encompassed a significant level of seniority gained through prior experiences or an extensive tenure within the company, and a high awareness of others. From an organisational standpoint, these individuals were typically part of teams that necessitated substantial interaction with other teams due to their work tasks. Furthermore, these teams tended to be relatively smaller in size and consistently comprised members with extensive seniority. In conclusion, the findings suggest that fostering strong relational skills at both the individual and team levels promotes successful inter-team collaboration, highlighting the potential for these skills to mitigate the negative impact of barriers to inter-team collaboration arising from the organisational design.

To conclude, the findings from both the collected data and existing literature highlight the significance of relational skills in influencing inter-team collaboration within an agile organisation. Most interestingly, it can be seen that individuals with high relational skills demonstrated effectiveness in collaborating with other teams, adaptability in communication, and the ability to establish and utilise relationships built on trust. Since high levels of relational skills seem to affect collaboration positively, promoting strong relational skills at both the individual and team levels can mitigate barriers to inter-team collaboration imposed by organisational design. As can be seen in this study, the organisational context significantly affects relational skills' effect on inter-team collaboration. A culture of openness and helpfulness can for instance contribute positively to inter-team communication. Nevertheless, the adoption of SAFe has been seen to introduce silos and increase geographical, organisational, and cognitive distances among teams, hindering collaboration. Trust-building behaviours and relational skills, essential for inter-team collaboration, were found to be impeded by these distances. Furthermore, it can be concluded that it is imperative for organisations to proactively cultivate trust among organisationally distant teams. Additionally, teams' different focus areas, such as component/feature-focused or integration-focused, create challenges in collaboration, emphasising the importance of awareness of others and cooperation and coordination skills. Moreover, dependencies among teams drive interactions and require high relational skills on the team level.

6

Conclusion

In this chapter, the conclusions of the study are summarised and presented. In today's fast-paced and competitive business environment, companies face significant challenges. To gain a competitive advantage, sharing and creating new knowledge play a vital role. Collaboration is a key aspect of knowledge sharing, and organisational structures like agile have been implemented to enhance collaboration. Agile promotes a less defined hierarchy and emphasises the importance of strong working relationships, which can lead to improved collaboration. In such environments, relational skills become crucial for efficient integration between functions and teams. Current research does not explicitly discuss what relational skills is and how the development of relational skills affect interaction between functions and teams.

The aim of this master thesis was to examine what relational skills is and the role and use of relational skills in an agile organisation. Further, it sought to increase the understanding of how relational skills can affect collaboration among functions and teams in an agile organisation. In order to fulfil the study's aim, three research questions were formulated. These questions served as a guiding framework throughout the study, providing a clear sense of direction. The structure of this chapter thus revolves around the answering of these three research questions:

RQ1: *What are relational skills?*

RQ2: *What relational skills affect the interaction between teams in an agile organisation?*

RQ3: *How do relational skills affect the collaboration between teams in an agile organisation?*

6.1 Answering RQ1

The first question this thesis set out to answer was *"What is relational skills?"*. After analysing existing literature regarding relational skills and social capital as well as the data collected for this thesis, we propose the following definition for relational skills: *"The skills that enable one to create, maintain, and utilise relationships"*. This will hopefully better integrate relational skills as an element of social capital while also more clearly defining the subject so future research may have a better understanding of what relational skills are.

6.2 Answering RQ2

The second question this thesis set out to answer was *"What relational skills affect the interaction between teams in an agile organisation?"*. The data collected through interviews and a survey together with previous research indicates that relational skills affect the interaction between teams. Building trust and communication are skills specifically identified to have a distinct effect on the interactions, where specific behaviours and skills residing under these terms, such as a shared language, are how the skills were identified.

6.3 Answering RQ3

The third research question was *"How do relational skills affect the collaboration between teams in an agile organisation?"*. To answer this research question, interviews have been conducted with employees from five different teams each exhibiting unique forms and levels of interaction within the organisation, data has been collected through a survey about relationships, and previous research has been investigated. As a result, it can be concluded that relational skills have an effect on the collaboration between teams in an agile organisation. Specifically, it can be seen that individuals possessing high levels of relational skills demonstrate effectiveness in collaborating with other teams, adaptability in communication, and the ability to establish and utilise relationships built on trust. It can also be concluded that the organisational context either creates opportunities for relational skills to develop in the organisation, which leads to opportunities for improved collaboration between teams, or that it creates obstacles for the use of relational skills, which has a negative impact on cooperation between teams. Specifically, it can be seen that strong company culture characterised by openness and helpfulness can help build relational skills, thus contributing positively to inter-team collaboration. Silos created by the organisational design are also seen to impede relational skills, thus hindering inter-team collaboration.

6.4 Implications

In this section, implications and recommendations, for both academia and managers, will be presented. These recommendations are the researchers' recommendations that are based on the data collected and existing literature.

6.4.1 Academic Implications

The first academic implication this thesis is providing is filling the gap in literature of what relational skills actually is. This thesis propose a clear definition of what relational skills entails that positions relational skills more clearly as an element of social capital. Considering the lack of consensus in literature of a universal definition, this thesis' proposed definition may help future research be more focused and clear regarding relational skills.

The second academic implication this thesis will propose is that communication is defined as a relational skill and all related skills are considered as underlying skills. This will improve the discussion regarding the possible actions and specific training that will improve relational skills. Considering that some literature defines communication as a trust-building behaviour there are different perspectives. However, as there are several different types of communication and they are more usable in different mediums, as well as some types of communication is not building trust but still improves the relationship, communication should be considered as a separate relational skill that has a symbiotic relationship with trust.

6.4.2 Managerial Implications

Firstly, organisations should start putting a greater focus on relational skills during the recruitment process as it is shown what a large effect they may have on collaboration and knowledge sharing in the organisation, and in turn future competitiveness. Organisations should especially put a greater emphasis on relational skills when recruiting for roles which interact with a lot of people and where there is a benefit of having a large network. More specifically, this encompasses roles such as Product Owners and Engineering Managers, as well as team members who engage in extensive interactions due to dependencies resulting from their respective work tasks. A good example of this can be observed in teams involved in integration or data collection, as discussed in section 5.2. By having a greater focus on the more soft skills in employees when recruiting for specific roles, organisations may recruit individuals that will more easily fit into their new roles. This may be done by creating specific checks during the recruitment process to evaluate possible new employees' current level of relational skills. One currently used check is having problem-solving tests also done in a group environment. The focus should however be more on how each individual acts and what "role" they take in a group environment. By including the relational and group dimension in the recruitment process, companies create the possibility to evaluate candidates on both their currently used dimensions and on the relational dimension, making the evaluation more holistic.

Secondly, relational skills may also be more important to consider organisations' structure themselves since some structures seem to affect relational skills. When discussing implementing structures inhibiting relational skills, organisations should therefore consider the level of relational skills in the employees and if the proposed structure may inhibit relational skills to the level where interactions and collaborations are affected in a largely negative way. Furthermore, in structures inhibiting relational skills one way to counteract the structures' effect would be to actively create arenas for inter-team collaboration. This could possibly be a solution to drive the creation of relationships by enabling the employees to utilise their relational skills. Furthermore, it is also important to consider structures that enable relational skills. Structures which break the organisation into different parts with little to no cross-functionality seem to inhibit relational skills whereas the reverse appears to enable them. Therefore, relational skills and organisational structure seem to have a reciprocal relationship as relational skills seem to be of more importance in organisations that utilise an organisational structure that inhibits relational skills.

This is the case as those structures that enable it creates arenas where relationships are easier to build, therefore not requiring as high a level of relational skills as when there is resistance to building relationships.

Thirdly and lastly, since relational skills that affect knowledge sharing and development are dependent on the needs of the situations, training of relational skills that correspond with the current needs of the work tasks may be needed. By training the employees in a continuous effort, organisations can better develop their workforce to adapt to the current and future needs of the organisation. One way this can be done is through workshops with multiple teams at the same time. This is shown in the results to improve collaboration between the specific employees that take part in the workshop as it builds trust and creates better communication. Likewise, by doing this continuously with different combinations of teams a larger network is created and the ability to work with others should increase as it becomes a more common thing to do than it previously was. As working in a collaborative group and creating new relationships becomes a part of everyday work, employees' ability of it should improve.

6.5 Limitations & Future Research

While this research provided answers to the stated research questions, it is imperative for the researchers to acknowledge and address the limitations of the study. It should be observed that the research design chosen has a limitation in the results of the study. The research design that was chosen was a case study at a single case organisation. This choice in itself creates a limitation on how well the results can be generalised to other companies. An interesting thing to note is also that Zenseact is currently in a situation where they have not yet delivered a finished product, which means that the results of the study could potentially have been different if the company had been in the production stage instead. Another interesting thing to note about Zenseact is that they are in both a unique and new industry. Therefore, it is recommended in future studies in the research field to also study companies that have come further in their product development, or which operate in other industries in order to create a greater breadth in the research area.

To continue commenting on the limitations of the research design on the results, it should also be noted that the selected sampling strategy in combination with the questions that were asked at the interviews creates a limitation in the results that the study has found. Since there was a time limit in the number of teams that could be studied, only a few teams were selected to find answers to the phenomenon the researchers intended to study, which is why it cannot be said with certainty that the results from the study can be generalised for the entire company. However, it should be noted that the teams that were chosen are diversified in terms of many different parameters, which can be seen in Table 4.1, which is why it can still be claimed that the study's results are good enough to be applied in other contexts, both for the studied case company, but also for other companies with a similar character. It is therefore recommended in future studies to increase the number of teams in order

to validate the results of this study.

From the researcher's perspective, the study also lacks sufficient detail regarding the inter-team interactions within all ARTs. In an ultimate scenario, this could have been done by characterising all teams within the organisation according to similar parameters that have been used in this study. This would have facilitated the identification of silos in the organisation so that targeted efforts linked to relational skills could have been made. Furthermore, it is also recommended to study teams that have a different character compared to the teams that have been studied in this study in order to see if the results are similar in these contexts as well. This could for instance be teams that have other work tasks within the same organisation and in other ARTs, or agile teams in other organisations.

Additionally, it is important to acknowledge that the researchers encountered limitations in their ability to extract data from the survey due to access complications with the non-academic software, &Frankly, and its design. While the survey data provided valuable insights about relational skills, the restricted data access hindered the researchers from conducting more extensive statistical analyses, which was planned in the beginning. It would have, for instance, been interesting to see what results correlational analyses on the data from the study would have yielded. Specifically in this study, it would have been interesting to see what differences there are in the results depending on, for instance, type of team, seniority of employees, role at the company, etc. Furthermore, the limitations of the &Frankly software included the inability to randomise questions, which could have influenced respondent behaviour. For instance, respondents may have provided more detailed answers to the initial questions, potentially leaving out relevant information in the latter questions. Furthermore, regarding the questions about characterising one's relationships in different parts of the organisation, a bias might have influenced the result. Additionally, the software lacked the capability to generate purely explanatory text cards to provide clear instructions to respondents, potentially leading to confusion among certain participants.

During the course of the research process, several interesting areas that are out of the scope of this thesis have been identified. The first area that it would have been interesting to know more about is related to which relational skills are better to use dependent on the type of relationship wanting to be initiated. More specifically, it would have been interesting to know which relational skills are better to use to start weak-tie relationships and which relational skills are better to create strong-tie relationships. Based on the learnings from this study, potential methodologies for future research could be to conduct interviews and surveys. Interviews could therefore enable a more in-depth analysis of the phenomenon while the surveys could be used for validating and confirming the results.

The second area that would have been interesting to conduct further research on would have been to study which relational skills are important in a hybrid work model and how relational skills are affected by a hybrid work model. It has been noted in this work that teams that work virtually seem to have more challenges collaborating both within and outside their team. Since the hybrid work model has

partly begun to be applied by many companies, and will probably continue to be applied by companies for a long time to come (Germain and McGuire, 2022), this is a very interesting area of research. The researchers also believe that this could form a topic for a master's thesis in the future. Such research would have been both interesting to do for a general organisation, but also specifically for software companies that possess similar characteristics as Zenseact. Based on the insights gained from this study, it is conceivable that comparable methodologies utilised in this research could potentially be employed in future investigations on virtual teams.

The third area that would have been interesting to conduct further research on would have been to study which relational skills are better in different situations. It has been noted in this work that relational skills seem to be situation dependent as different situations, due to roles or challenges at hand, demand different types of knowledge. Therefore, the general relational skills mentioned are relevant for knowledge development and sharing but the networks of relationships needed for individuals to search for knowledge may differ. Hence, depending on the needs of future work, different relational skills may become even more important making the answer to this question possibly ever-changing.

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A

Interview Template

Following are the interview template that was used in the research. The questions that were asked to the employees residing in the engineering function can be seen under the heading *Engineering* below. Moreover, the questions that were asked to the employees working in the people and culture function can be seen under the heading *People & Culture* below.

Engineering

- Tell me about yourself
  - What is your role?
  - How long have you been in your role?
  - Do you have any previous experiences for your current role?
  - What team do you belong to?
  - How many are you in your team?
- Tell me about an interaction with the team you interact with the most here at Zenseact.
- Tell me about the last time you interacted with another team.
  - Who?
  - How?
  - Why?
- Tell me about a time when you had a complex problem and you asked a coworker outside your team for help.
  - Who?
  - How?
  - Why?
- Tell me about the last time a coworker shared their knowledge with you.

  - What relation do you have to that coworker?
  - Is the learning reciprocal?
- Can you give an example of a successful/unsuccessful collaboration between teams? What made it successful/unsuccessful?
  - What characterises the best/worst relations that you have with those team members?
- How would you define relational skills?

People & Culture

- Tell me about yourself
  - What is your role?
  - How long have you been in your role?
  - Do you have any previous experiences for your current role?
  - What team do you belong to?
  - How many are you in your team?
- How would you define:
  - Relational skills
  - Trust
  - Communication
  - Accountability
  - How important do you see these?
  - Is there enough ”trust” at Zenseact?
- What role do relational skills play in Zenseact’s:
  - Organisational culture
  - Onboarding
  - Training and development
- Do you know any individuals that have left Zenseact because of dissatisfaction with their work?
  - What were the reasons for that?
- Tell me about the last time you heard about an interaction between different engineering teams.

  - Who?
  - How?
  - Why?
- Tell me about a time when you heard about a complex problem and someone in an engineering team asked a coworker outside their team for help.
  - Who?
  - How?
  - Why?
- Tell me about a time when you heard about a developer that learned something from another coworker.
  - What relation did they have?
  - Is the learning reciprocal?
- Can you give an example of a successful/unsuccessful collaboration between teams? What made it successful/unsuccessful?

B

Survey Questions

Figure B.1 to Figure B.6 shows the survey used for this research. The questions are presented in the order they were asked.

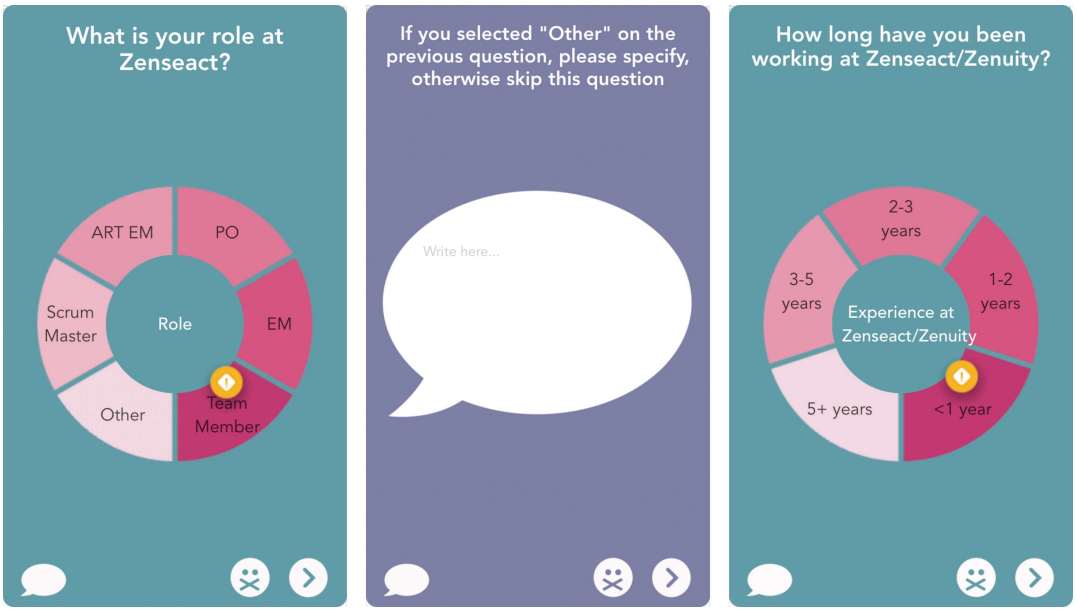

Figure B.1: Survey questions 1-3

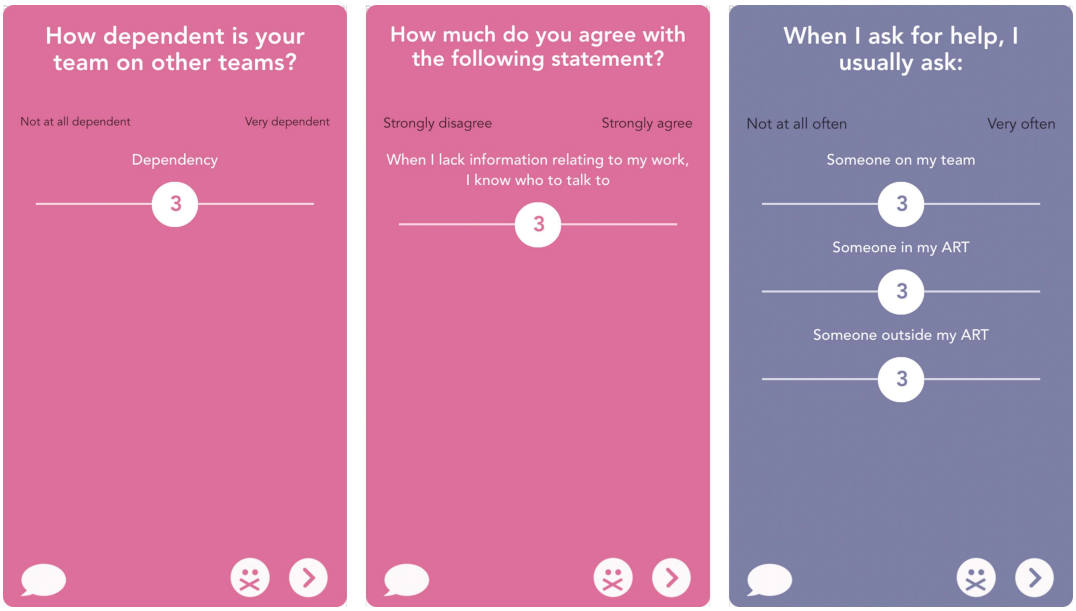

Figure B.2: Survey questions 4-6

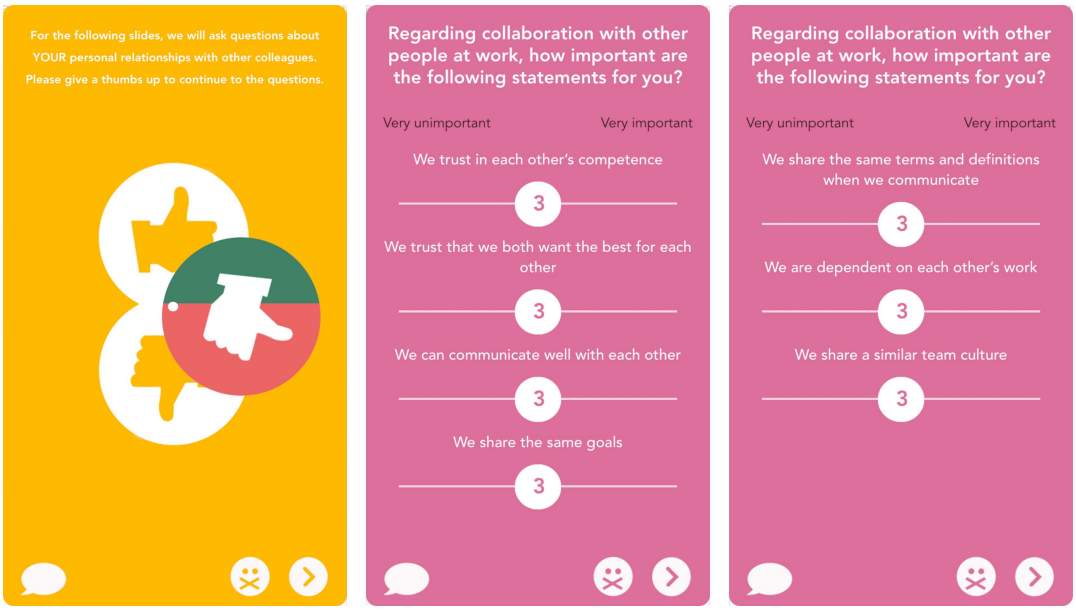

Figure B.3: Survey questions 7-9

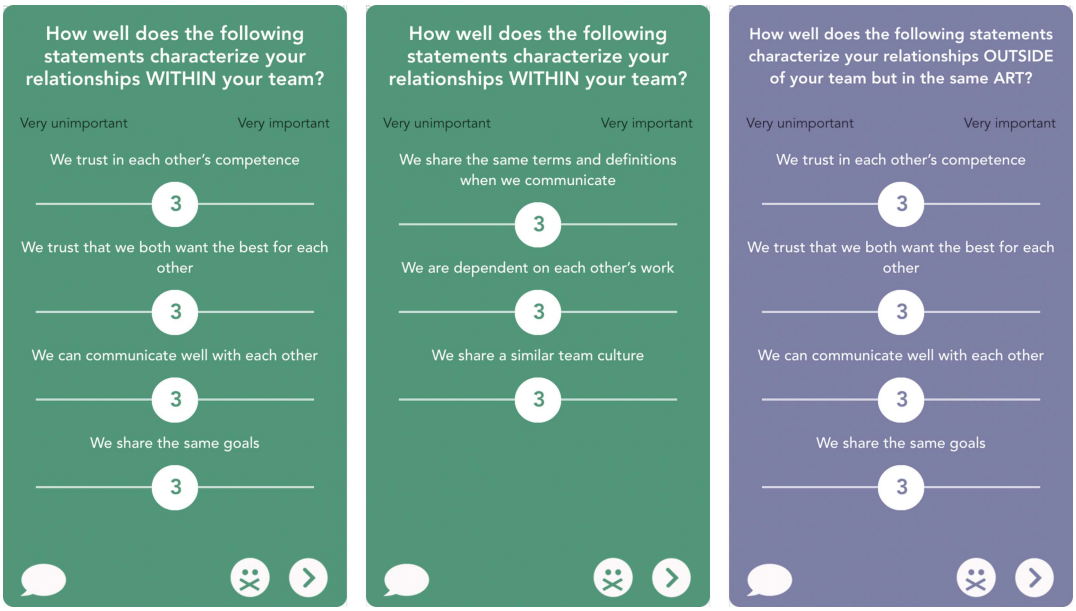

Figure B.4: Survey questions 10-12

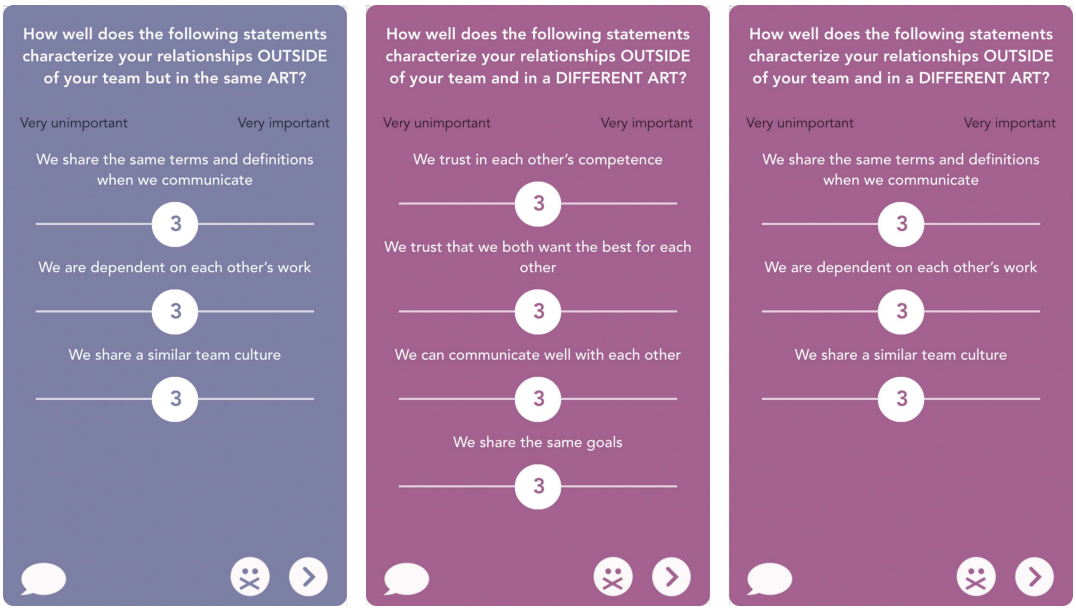

Figure B.5: Survey questions 13-15

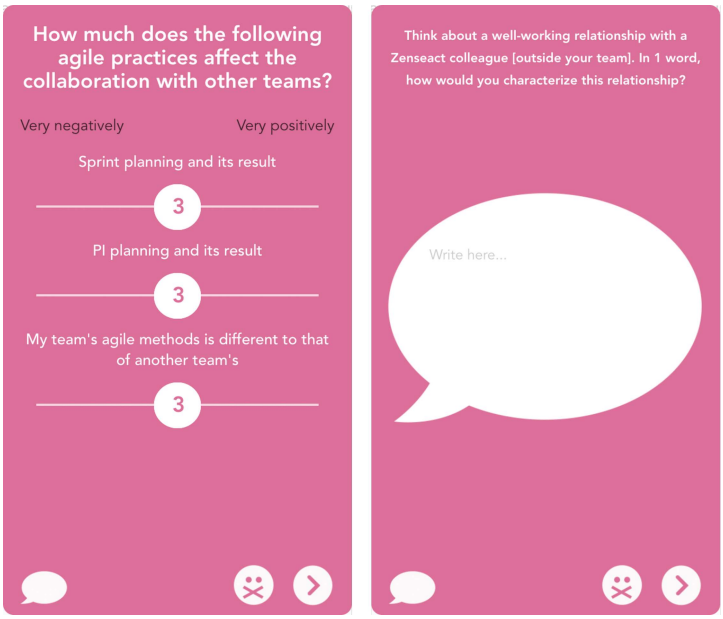

Figure B.6: Survey questions 16-17

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