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The present study was conducted at the Faculty of Science and Technology at the University of Stavanger during the spring of 2019 in cooperation with Tieto Oil and Gas. This thesis is a product of the knowledge I have acquired during my studies in industrial economics and work experience in Tieto Oil and Gas. As a junior with limited work experience, I quickly realized the importance for companies to establish efficient systems for project documentation and how important successful knowledge transfer and organizational learning are for organizations to succeed in the competitive market. This inspired me to choose organizational learning as the topic for my thesis, to provide information of possible measures Tieto Oil and Gas can take to promote organizational learning within the company.

I want to use this opportunity to thank all my colleagues that have contributed in my research by responding to the survey. I want to give a special thanks to Bente Helland and Liv-Janne Nergaard, whom I conducted the interviews with and who have provided me with valuable information regarding Tieto Oil and Gas's ways of practicing project management and organizational learning. I also want to thank the Tieto corporation for the flexibility they have provided in terms of extra studies outside work, something that have allowed me to write this thesis while working full-time in the company.

Finally, I would like to show my appreciation to my supervisor, Finn Harald Sandberg for providing valuable input to my research, and to my girlfriend, family, friends and fellow students for all their support, proofreading and patience during this master's study.

ABSTRACT

Organizational learning is the process of creating, storing and transferring knowledge throughout an organization. A learning organization is one that encourage the development of their employees, challenge their ways of thinking and continuously evolve. This thesis acknowledges that there are several barriers organizations need to overcome if they wish to become a learning organization and aims to study how organizational learning is promoted within Tieto Oil and Gas.

Data are gathered through two interviews conducted with the management in Tieto Oil and Gas and a survey distributed to the EC services department in Stavanger and the global project managers within the oil and gas division. Each question is divided into two parts. Part A consists of multiple-choice questions, which aims to provide a statistical distribution of how the employees experience the present situation, while part B allows the employees to provide suggestions for improvements within Tieto Oil and Gas. The response from the 23 respondents of the survey and the two interviews indicate that there is an agreement between the employees and the management. However, there are some deviating results regarding standardization, analyzation of project learning and preservation of knowledge when employees leave.

The findings suggest that there are multiple areas where Tieto Oil and Gas can improve to overcome the challenges of knowledge management, increase the success of knowledge transfer and promote organizational learning within the company. A good framework for knowledge management should be established, which can inhibit compartmentalization of knowledge and improve efficient knowledge sharing throughout the organization. Project knowledge should be stored in a structured and organized manner on a company-wide storage platform, and knowledge management tools should be implemented to promote efficient search of project knowledge. This information needs to be properly communicated to all oil and gas employees. Despite having standardized procedures and documentations to promote knowledge sharing and organizational learning in place, these are commonly not followed, and they only seem to be implemented on a local scale, hence inhibiting organizational learning globally. The process of preserving knowledge and experience when employees leave needs to be more closely monitored and regulated by the management to prevent loss of valuable knowledge. Tieto Oil and Gas should also continue to improve analyzation of project knowledge and institutionalize new knowledge within the organization through systems, workflows, processes etc.

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1. INTRODUCTION

1.1. Background

The Oil and Gas industry is evolving, and especially during the recent years, where the industry reached a bottom, a need for better and more cost-efficient solutions have arisen. This can be achieved through implementation of digital solutions, such as automation of manual processes and robotization, which may allow employees to pursue other more important tasks (Aamodt, 2017). When conducting IT projects, tasks are commonly not straight forwards, and a considerable amount of time may be used on examining how to proceed with the project. To increase the efficiency of operation in future implementations, it is important to generate, store and share project documentations such as final reports and technical documentations within the organization (Gholley & Venkatramani, 2018). Such documents should be stored in an organized and structured manner according to a company standard, and should be made easily accessible to all employees. In this way, other employees conducting similar projects can browse through these documents and learn from previous failures and success. Relevant and up to date project documentations can increase the degree of successful knowledge transfer and decrease the time and costs in future projects requiring similar solutions. However, project documentations may often be omitted as they are time-consuming and may also increase project costs in a short-term view (Schindler & Eppler, 2003). Nonetheless, evidence suggest that even though procedures for generation, review and storage of project learning are in place, there may still be limits to the extent of which they are used (Newell et al., 2006). Thus, how to properly manage project learning is an important step in every organization to promote organizational learning. This process is referred to as knowledge management (King, 2009; J. Matthews, 2019).

Knowledge management (KM) aims to improve organizational behaviors, decision-making, knowledge-related practices and organizational performance, and focuses on the knowledge processes of creating, refining, storing, transferring, sharing and utilizing knowledge (King, 2009). The term knowledge management is closely related to organizational learning, and the literature describes various ways of defining the relationship between knowledge management and organizational learning. King (2009) argues that for an organization to learn, it must first establish a good framework for knowledge management. Hence, through proper knowledge management, knowledge may be embedded into an organization’s processes to improve

practices and workflows, and pursue future goals (King, 2009). By improving their utilization of knowledge and organizational performance, an organization can achieve organizational learning (King, 2009).

According to Ipe (2013), knowledge is considered the most important strategic resource in organizations, and for organizations to be successful, it is critical how they manage knowledge. Informal channels are considered more effective than formal channels for knowledge sharing between individuals (Ipe, 2003), and to promote this kind of knowledge sharing, managers can contribute with for example social zones, rooms for brainstorming, arrange scrum meetings etc. This will trigger informal learning between individuals and promote organizational learning within the company.

1.2. Aim and objectives

The aim of this thesis is to analyze how organizational learning is practiced within Tieto Oil and Gas (TOG), how knowledge is transferred from project-to-project and how individual- and group knowledge from projects can be institutionalized within the organization. The goal is to identify shortcomings in the routines of TOG and propose solutions for how they can establish a good framework for knowledge management, obtaining successful knowledge transfer and become a *learning organization*. Proper change management is an important factor in achieving this, where leadership, including how the leaders manage change and employees' reluctance towards change stand out as important elements. The research will also uncover if there are deviations between the opinion of the employees versus those of the management regarding the presented topics. If there is poor correlation between their opinions, this may indicate lack of communication between the management and the employees.

This thesis is divided into six chapters. The first chapter gives a brief overview of background, along with the aim and objectives of the thesis and an introduction of TOG. The second chapter describes the relevant literature and theory needed to understand the content of this thesis. Chapter 3 presents the methodology and approach of the thesis regarding how data is collected and processed, along with information regarding the reliability and validity of the collected data. In chapter 4, the results from the survey and interviews are presented and compared. The quality of the survey is also briefly mentioned. In chapter 5, the results from the previous chapter are tied to relevant literature and discussed. Finally, in chapter 6, the main content and

findings of this thesis are summarized, and the most relevant areas for future improvements in TOG are presented.

1.3. Tieto Oil and Gas

TOG is a part of the Finnish based Tieto corporation, and with their approximately 15 000 employees in more than 20 countries, they are the largest IT-supplier in the Nordics (Tieto, 2018b). Of these 15 000 employees, around 300 are working in the oil and gas division. With offices in almost all major oil and gas areas in the world (Fig. 1.1), TOG can reach out to the customers on a global scale, allowing them to work more closely with the customers and establish a good flow of communication.

Fig. 1.1. Map of all Tieto Oil and Gas's offices worldwide as of April 2019 (Wable, 2019)

The headquarters of TOG is located in Stavanger, Forus with approximately 90 employees, and with ambitions of growing and acquiring new customers (Jensen, 2018). Forus is one of the biggest industrial areas in Norway today and headquarters for some of the largest oil and gas companies on the Norwegian continental shelf, housing around 2 500 enterprises and 40 000 employees (Jensen, 2018). This makes Forus an obvious location for the TOG headquarters, as it enables them to establish face-to-face communication with some of the biggest oil and gas companies in the world, build relations and have greater success at acquiring new customers and extending existing contracts. Even though skype meetings have been increasingly popular

as companies try to reduce travel cost, face-to-face communication is still considered the best form of communication to establish relations and reach agreements (Hiltz et al., 1986).

The vision of TOG is digitalizing of the oil and gas industry, making daily operations easier for their customers. They offer products and solutions within decision support and optimization, hydrocarbon accounting and oil and gas operations support (Tieto, 2018a). This include their software, Energy Components (EC), DaWinci and Pipe-It. However, EC, which is the global leading hydrocarbon accounting and management system is considered their main area of focus and covers the entire hydrocarbon value chain, tracking hydrocarbons from production, through transport, sales and revenue recognition (Fig. 1.2) (Tieto, 2018c). To put things into perspective, on a global scale, EC has almost 500 installations worldwide, each installation covering 5 – 40 000 wells, thus handling a large amount of highly valuable data (Tieto, 2018c).

Fig. 1.2. Illustration of some of the different functional areas in Energy Components (Tieto, 2019)

1.4. Digitalization

Industrial digitalization has been an ongoing process since the 1970s and accelerated around the 1990s with the introduction of the internet. However, especially during the last 10-15 years with the expansion of the internet and introduction of smartphone apps, the industrial digitalization has experienced an even larger development (Isaksson et al., 2018). Processes have been streamlined, manual processes have been automated and customer services have been increasingly robotized (e.g. chat-robots). Cloud solutions have also become more popular.

These digital solutions make it possible to store huge amount of data, easily accessible from different locations and computers (Isaksson et al., 2018). Cloud solutions make it easier to share knowledge internally in the company and externally with other companies. Internally, knowledge sharing can strengthen the relationship and trust between the knowledge sharer and receiver (Levin et al., 2002). Thus, managers that promote knowledge sharing can increase the company goodwill by strengthening the unity within the company. External knowledge sharing is possible when the value of what is received is greater than what is given away (Halfdan, 2018). As an example from the petroleum industry, external knowledge sharing can increase our understanding of the subsurface, allowing us to create well-ties and regional interpretations and predictions of the subsurface previously unavailable.

1.4.1. Consequences of digitalization

Although the benefits of digitalization are many, the journey towards digitalization is full of roadblocks and is accompanied by the risk of hacking, safety of private and other valuable information, need of high investments and complexity (Bhatnagar, 2017). Hacking is one of the major concerns today, and with the increasing amount of digital solutions and the ability to work remotely from outside the walls of the company, the risk of hacking increases (K. Matthews, 2019). The risk of hacking and leakage of highly valuable information and production data may be one of the reasons oil and gas companies have been reluctant towards digitalization, including online knowledge sharing (cloud solutions). However, due to the recent oil-crisis and the need for companies to become more robust and cost-efficient to sustain profitability, this is about to change (Aamodt, 2017). Therefore, as the oil and gas industry has started to recognize the value of data- and knowledge sharing, the risk of hacking and leakage of data increases. A measure that could be taken to compensate for this increased risk is hiring of red teams. A red team is a group of individuals which are hired to hack the employers system to test the security and detect problems and vulnerabilities (Peake, 2003). This allows the employer to fix possible vulnerabilities to prevent future system hacking.

1.4.2. Reluctance towards digitalization

While the acceleration of digitalization is rapid, the speed of which digital solutions are implemented are not always coinciding. This is because the speed of digitalization is a result of employees conservative thinking and reluctance towards digital solutions, as well as the company's ability to change (Mayville, 2018; Ross, 2018). How managers and leaders handle change, referred to as change management, is a crucial factor in the world of digitalization. An

example of human's reluctance towards change is self-driving cars. The main problem in this discussion is the ethical point of view, as a car cannot be equipped with decision making, allowing it to choose between running over a group of children or crashing to avoid the children and possibly killing its occupants (Himmelreich, 2018). Every year, more than 100 people die in the traffic in Norway without much media coverage. However, an accident caused by a self-driving car would cause a large debate in the media. Thus, people's reluctance towards new solutions provide a major constraint on digitalization.

2. THEORY

2.1. Organizational learning

When talking about learning, two separate terms, *"organizational learning"* and *"learning organizations"* need to be explained, a distinction clearly described by Tsang (1997). *"Organizational learning"* refers to the study of the process of learning from within the organization to understand what is taking place. *"Learning organizations"* can be seen as an ideal type of organization, having the capacity to learn efficiently, transfer knowledge and prosper as an organization (Tsang, 1997). The two terms *"organizational knowledge"* and *"knowledge management"* have a similar distinction, however, learning refers to the process of acquiring the content, while knowledge refers to the content (Easterby-Smith & Lyles, 2011). Fig. 2.1 explains the relationship between the four terms.

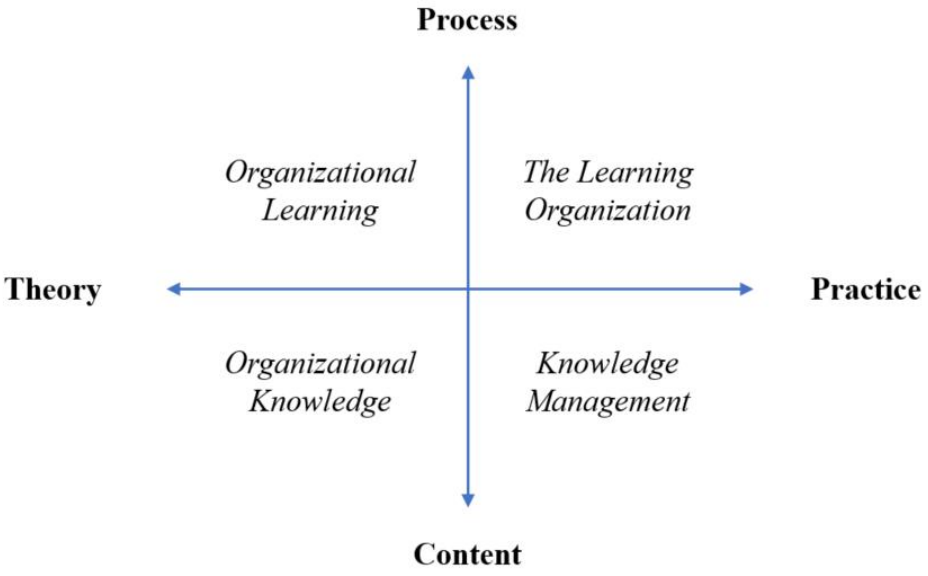

Fig. 2.1. Distinction between the four described terms (from Easterby-Smith & Lyles, 2011)

There exists extensive literature on the term organizational learning (Bierly III et al., 2000; Easterby-Smith & Lyles, 2011; Levitt & March, 1988; Tippins & Sohi, 2003). However, researchers agree that the term lacks consistent terminology (Simon, 1991; Vera & Crossan, 2003), and organizational learning has therefore been applied to different domains. Organizational learning is an important part of the company strategy and according to Crossan et al. (1999), organizational learning is conceived as a necessary part of strategy renewal. To achieve strategic renewal, organizations need to explore, acquire new information and learn new ways by breaking out of existing routines while simultaneously exploiting current learnings

and solutions (Crossan et al., 1999; Huber, 1991; Sirén et al., 2012). An important requirement in organizational learning is managing and recognizing the tension between exploitation and exploration (Crossan et al., 1999).

In 1999, Crossan et al. developed their model, the 4I framework of organizational learning (Fig. 2.2) to establish the connection between strategy and organizational learning. The model tries to illustrate the processes though which learning occurs in a company. According to their model, learning occurs in three distinct levels, the *individual*-, *group*- and *organizational* level. At the individual level, *intuition* triggers individual learning before *interpreting* the elements of the individual learning and sharing it at the group level. Next is the *integration* phase where group learnings and common understandings are made available to the whole organization. Lastly, *institutionalizing* assimilates the learning throughout the organization by implementing it into structures, systems and routines (Crossan et al., 1999; Vera & Crossan, 2004). The feed-forward and feed-backward flows in the model illustrates the relationship between explorative- and exploitative learning, where feed-forward processes explore for new opportunities and innovation, while the feed-backward process exploits learning that the company already has acquired (Vera & Crossan, 2004). Sometimes, especially in the IT industry, it may be tempting to focus solely on innovation (feed-forward) to try to gain a competitive edge in the market. However, by doing so, one fail to recognize the value of learning and may limit exploitation of acquired knowledge and learnings (Crossan et al., 1999).

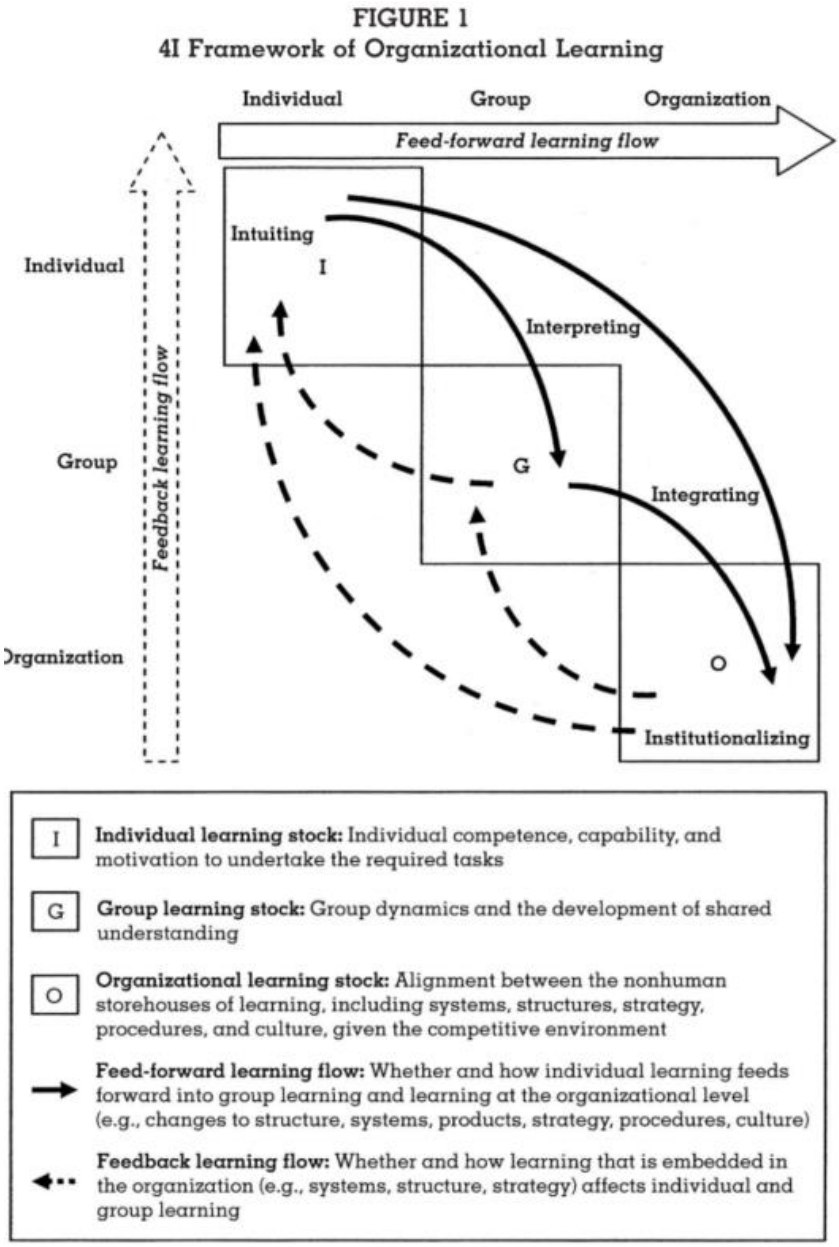

Fig. 2.2. The 4I framework model of organizational learning (from Crossan et al., 1999)

2.1.1. Explorative vs. Exploitative learning

The two terms *explorative-* and *exploitative learning* were described in the previous chapter and are both necessary to achieve organizational learning. *Exploration* refers to an organization's innovational behavior such as searching for new alternatives, risk taking and experimenting. *Exploitation* refers to improvement and optimization of a firms routine behavior, thus improving performance of existing solutions (March, 1991). According to March (1991), companies that focus too much on exploitation at the cost of exploration will suffer from sub-optimal operation. In contrast, those that focus too much on exploration at the cost of exploitation will suffer great costs of experimentation while limiting the possible benefits. This

statement is supported by Sirèn et al. (2012) who states that organizations that focus too much on exploitation may find themselves in the *"exploitation trap"* as the firm's limited strategic learning resources are consumed by exploitation, weakening the firm's ability for innovation. Research suggests that for organizations to be successful, prosper and ensure long-term survival, it is important to maintain a balance between exploration and exploitation (Crossan et al., 1999; He & Wong, 2004). March (1991) claimed that explorative and exploitative organizational learning are incompatible, while later studies (Tushman & O'Reilly III, 1996) explains that some firms are indeed able to combine the two, an ability they refer to as *ambidexterity*.

A study by Sirèn et al. (2012) suggest that exploration strategies does not directly affect profit performance. However, the effect can be realized through strategic learning, as knowledge generated from exploration strategies are absorbed into the organization. This suggests that organizations need to acquire strategic learning to utilize marked information and new technology. Thus, strategic learning contributes to how exploration strategies can improve firm performance (Sirén et al., 2012). Their results suggest that both exploitation- and exploration strategies have a positive impact on strategic learning, increasing firm performance (Sirén et al., 2012). In addition, as strategic learning increases firm performance, it has been suggested that firms can acquire competitive advantages in the market (Levinthal & March, 1993).

The trade-off between exploration and exploitation has been considered, but how should resources be divided between the two terms? In contrast to exploration, returns from exploitation are generally more certain, near in future and more easily adaptable for the organization (March, 1991). However, this does not mean that exploration should be neglected. Innovation is the key to maintaining and expanding operations. How organizations should divide their resources between exploration and exploitation is something they learn from experience (March, 1991).

In their project capability-building (PCB) model (Fig. 2.3), Brady and Davis (2004) present organizational learning that occurs as companies moves into new market bases and/or technology. These two types of organizational learning are *business-led learning* and *project-led learning*. *Business-led learning* refers to the organizational knowledge a company uses when strategic decisions are made to focus on new project business activities (Brady & Davies, 2004). *Project-led learning* occurs when organizations move into a new market base or new

technology and develops new project capabilities as they move through the three phases of *project-led learning*. (Brady & Davies, 2004). These three phases are; (1) *Vanguard project(s)*, (2) *project-to-project*, and (3) *project-to-organization* (Brady & Davies, 2004). The PCB model attempts to identify the transition from exploration to exploitation as companies transition through the three phases. In phase one, the company aims to explore new strategic opportunities and expand into new markets and technology or adopt to changes in the market (explorative learning). In phase two, companies try to capture project learning and transfer gained knowledge and experience to project teams that may benefit from the knowledge. In phase three, attempts are made to consolidate knowledge and learnings from multiple projects and spread the knowledge throughout the organizations (exploitative learning) (Brady & Davies, 2004). Brady and Davis (2004) explains that as firms move through these phases, *explorative learning* is transferred to the company and gradually replaced by *exploitative learning*. This conflicts with previous research by March (1991) who claims that there is a trade-off between explorative- and exploitative learning.

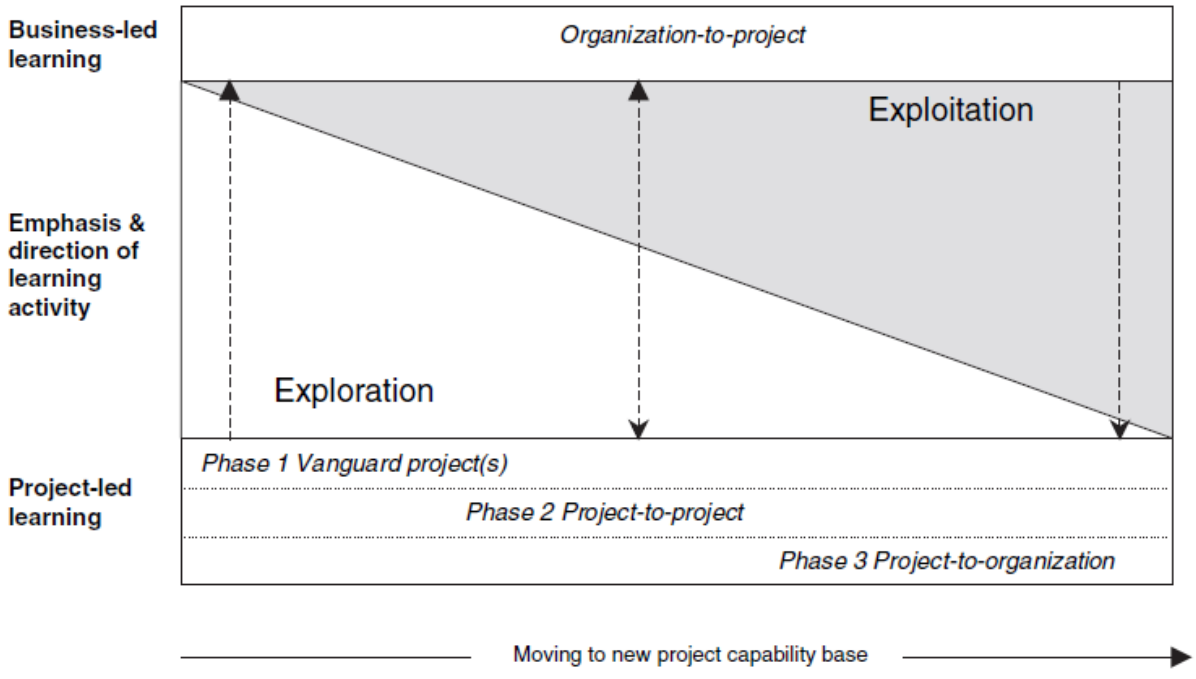

Fig. 2.3. Project Capability Building model (from Brady and Davis, 2004)

2.1.2. Single-loop vs Double-loop learning

The concept of *single-loop learning* and *double-loop learning* (Fig. 2.4) was developed by Argyris and Schön (1976) and is a tool used for change management and behavior change. Within a company, change is not always considered positive and may be met with resistance from employees. Single-loop and double-loop learning may therefore be applied as a useful tool to improve employees' understanding of the cause of problems and how to solve them (Argyris, 1977; Van Vliet, 2012).

Single-loop learning is the most common learning style and aims to solve problems that have occurred because of changes but does not go deeper into the problem. Only the initial plan is adjusted before a new plan is executed. Through single-loop learning we make better use of established ways of thinking. In contrast, double-loop learning provides a deeper understanding of the problem. The entire plan is revised and new assumptions are made before a new plan is constructed and executed (Argyris, 1976; Greenwood, 1998). This is a more complex way of processing information. Double-loop learning not only search for other alternatives to achieve the same results, but involves reflection on the norms and values within an organization (Greenwood, 1998). Single-loop learning can be thought of learning by "following the rules" while double-loop learning implies "changing the rules".

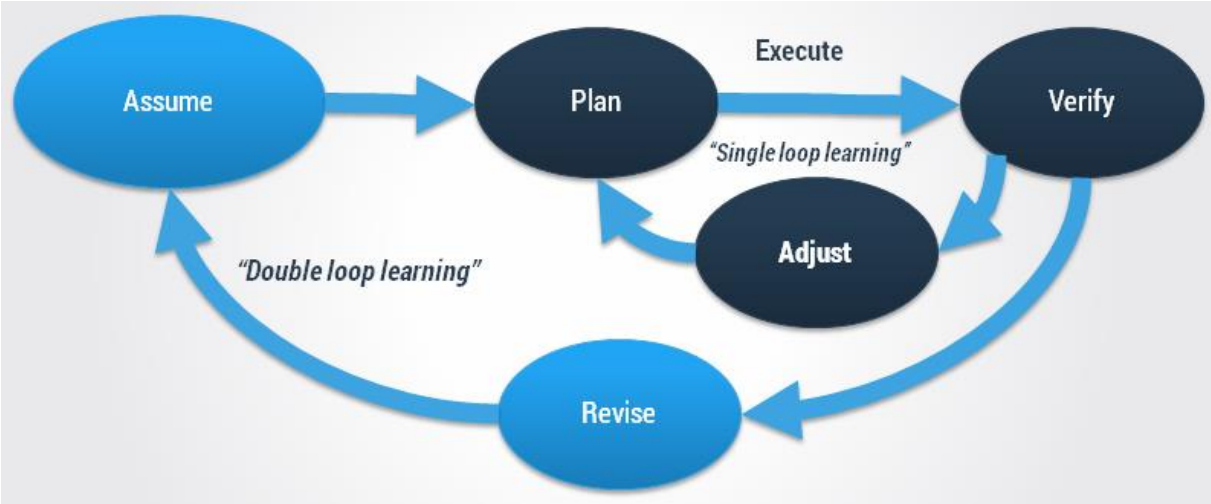

Fig. 2.4. Illustration of single-loop and double-loop learning (from Van Vliet, 2012)

2.1.3. Establishing and managing learning organizations

The concept of *learning organizations* has become an increasingly important topic during the last decades as the industry has experienced tougher competition and advances in technology (Garvin et al., 2008). A learning organization will respond to new challenges with creativity and innovation, learn from past experience and other organizations, and transfer knowledge throughout the organization to optimize operations and stay ahead of competitors (Garvin, 1993). The concept was first popularized by Peter Senge (1994) with his book *"The Fifth Discipline"*, where he suggested the following five characteristics of learning organizations; (1) *system thinking*, (2) *personal mastery*, (3) *mental models*, (4) *shared vision* and (5) *team learning*. Later research has suggested that establishing an adaptive culture and transformational leadership are crucial factors that influence the development of learning organizations (Barrett, 1995; Garvin, 1993; Marquardt, 1996; Prewitt, 2003).

For firms to be successful and survive in the changing environment of the digital industry, it is imperative that the organizational culture is flexible, adaptive and innovative. A company that does not focus on innovation would put themselves at a disadvantage. That is why some firms, like Google, encourage innovation and creativity by allowing employees to use 20 % of their working hours on own ideas and projects, something that resulted in e.g. Gmail and AdSense (Mims, 2013). In this case, the management shapes the organizational culture by encouraging innovation and creativity, a connection which has previously been described in the literature (Rijal, 2010). His results indicated that both the organizational culture and transformational leadership had a positive impact on the development of learning organizations. However, although there is an implicit assumption that management plays a large contribution to organizational learning and the development of learning organizations, researchers have not been able to highlight specific mechanisms or behaviors through which leaders impact learning (Vera & Crossan, 2004).

2.2. Knowledge transfer

Knowledge is defined by Webster (1961) as *"a clear and certain perception of something; the act, fact, or state of understanding"*. As organizations learn, knowledge is acquired, but even though potentially valuable knowledge and assets are located within the organization, this does not imply that the knowledge is shared to the benefit of other parts of the organization (Szulanski, 2000). This is largely because knowledge transfer is often found difficult to achieve due to the need for labor, resources and extra costs, and consequently, knowledge transfer has

received negligible attention (Szulanski, 2000). However, even though firms suffer extra cost as a consequence of knowledge sharing, knowledge sharing is considered an important factor in problem-solving activities (Nickerson & Zenger, 2004) and may contribute as a competitive advantage (Foss et al., 2010).

2.2.1. Project-based knowledge transfer

Knowledge can be transferred from individual-to-individual or group-to-group within the organization or externally by means of social interaction. Managers may also encourage knowledge transfer by creating social zones and brainstorming areas as explained previously. However, project knowledge transfer, either from project-to-project or project-to-organization, as explained in the PCB model is a more complex process and a product of multiple factors which in turn can contribute to organizational learning. Bakker et al. (2011) proposed five factors to be strong influential factors on the degree of project knowledge transfer. These are; (1) *relational embeddedness*, (2) *cognitive embeddedness*, (3) *temporal embeddedness*, (4) *absorptive capacity* and (5) *motivation* (Fig. 2.5).

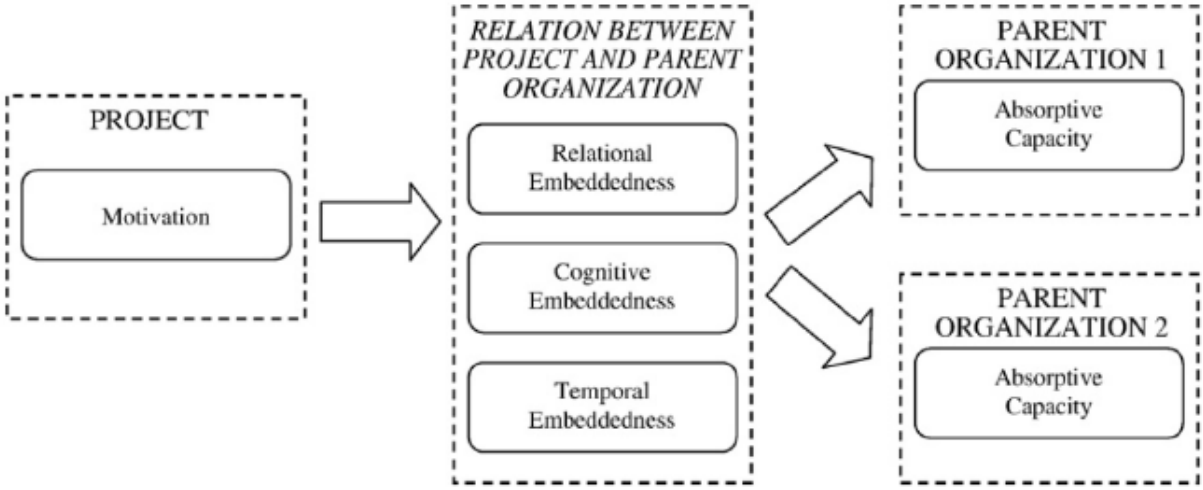

Fig. 2.5. Overview of the five factors impacting knowledge transfer from project venture to -owner(s) (from Bakker et al., 2011)

Relational embeddedness refers to the strength of the relationship between the different organizational actors conducting the project (Bakker et al., 2011). It is believed that strong relational ties between the project venture and partnering organization(s) built on trust, interactions and a level of resource commitment results in a high degree of knowledge transfer, thus creating the foundation for successful learning (Uzzi & Lancaster, 2003). *Cognitive embeddedness* refers to the ability of organizational entities to successfully exchange

knowledge. It provides a mutual understanding between the project venture and parent organization(s) necessary to transfer knowledge successfully (Bakker et al., 2011). However, if the level of cognitive embeddedness becomes too high, the degree of knowledge transfer will decrease as no "new" information can be transferred since the mutual understanding between the two parties is high (Nooteboom et al., 2007). *Temporal embeddedness* refers to the extent of which relations are built during previous, ongoing or even future activities between the project venture and parent organization(s). This creates trust, routines and structure between the different parties (Bakker et al., 2011). Hence, high levels of temporal embeddedness results in higher levels of knowledge transfer. The *absorptive capacity* refers to an organizations ability to recognize the value of newly acquired information, assimilate it, distribute it throughout the organization, and apply it in future relations to obtain a competitive advantage (Cohen & Levinthal, 1990). It seems that the higher degree of absorptive capacity, the higher the inter-organizational knowledge transfer (Van Wijk et al., 2008). The last factor influencing the success of knowledge transfer is *motivation*. The higher the motivation of the project venture to share and transfer obtained knowledge with the parent organization(s), the higher the chances are for successful knowledge transfer (Easterby‐Smith et al., 2008).

The results from the research by Bakker et al. (2011) are presented in Table 2.1 and shows that no single factor alone is enough to achieve successful knowledge transfer, but rather a combination of the different organizational factors is necessary. This implies that successful knowledge transfer is a complex process (Bakker et al., 2011). However, there is a clear trend in their data that the absorptive capacity plays a large contribution to successful knowledge transfer and may be the single most important factor (Bakker et al., 2011). Thus, to achieve successful knowledge transfer, it is important to recognize the value of gained knowledge and be able to use it in future work to achieve a competitive advantage (Cohen & Levinthal, 1990). This combined with the relational variables (relational-, cognitive- and temporal embeddedness) between the project owner and -manager and the motivation to share and transfer project knowledge are crucial to achieve successful project knowledge transfer (Bakker et al., 2011).

	Organizational characteristics					Outcome
	R	*C*	*T*	*A*	*M*	*Z*
Case number	Relational embedded-ness	Cognitive embedded-ness	Temporal embedded-ness	Absorptive capacity	Motivation	Successful knowledge transfer
1	No	No	No	No	No	No
2	No	No	No	No	No	No
3	No	No	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	No	No	Yes	No	Yes	No
6	Yes	Yes	Yes	Yes	Yes	Yes
7	Yes	Yes	Yes	Yes	Yes	Yes
8	Yes	Yes	Yes	Yes	Yes	Yes
9	Yes	Yes	No	Yes	Yes	Yes
10	No	Yes	No	No	Yes	No
11	Yes	No	No	Yes	Yes	No
12	No	No	No	No	Yes	No

Table 2.1. Data table showing the different combinations of factors for successful project knowledge transfer (from Bakker et al., 2011)

2.2.2. Standardization of work processes

In globally distributed teams, standardization has been recognized as an important factor to achieve successful knowledge transfer (Oshri et al., 2008). This includes standardization of e.g. work methodology, templates and routines for storage and access. In these global organizations, employees' often work remotely, increasing the need for standardized work routines which make it easier to share, receive and interpret information throughout the organization. In addition, compatibility and the degree of integration between tools, applications and systems makes remote work easier (Oshri et al., 2008). Standardization also reduces associated costs, but may limit market responsiveness from a business perspective (Ang & Massingham, 2007). According to Ang and Massingham (2007), the decision of standardization vs. adaption is important in any global organization, as it helps the organization to reduce cost or be better suited to respond to local markets. However, even though standardization is important, all projects are unique and composed of different project teams, hence it is important to establish flexible protocols for knowledge storage and transfer (Desouza & Evaristo, 2004). On the other hand, this can create asymmetric information within the organization which may inhibit proper knowledge management (Gholley & Venkatramani, 2018).

To improve project performance, companies commonly implement an approach of standardized project management. This involves standardization of project management (PM) practices and workflows (Milosevic & Patanakul, 2005). Milosevic and Patanakul (2005) uncovered seven factors that could play a role in standardizing project management. Three of them; *(1)*

standardized PM tools, (2) leadership and *(3) processes*, were the most important, while the remaining four; *(4) standardized PM organization, (5) metrics, (6) information management systems* and *(7) organizational culture* were of less importance. In addition, their research found that organizations only tend to standardize project management at some level, while trying to maintain some degree of flexibility.

Consistency in operations is important for any organizations that wishes to survive and grow in the market (Ungan, 2006). However, this is sometimes difficult to achieve due to employees' different ways of performing the same tasks. This may be a result of employees' cultural and educational background, skill levels, experience and previous employers, which all contribute in defining each individual's working style and produces variations in process output (Ungan, 2006). Therefore, it is important to recognize the benefits of having a system with standardized routines, work methodology and procedures. If the best ways of performing procedures and tasks could be identified and documented, this way of working could be standardized in an organization's operational procedures (Ungan, 2006). By creating such standards, project documentations can be stored in a structured way on a company-shared platform, easily accessible and understandable for everyone in the organization. This enhances the ease of which project knowledge can be transferred throughout the organization (Desouza & Evaristo, 2004). Furthermore, if the management focus on making employees following these procedures, variation in operations and documentations will be limited, and the company can increase the quality of their services and products (Ungan, 2006). However, it is important that the management communicates the value of project documentations and allocate enough time on these so that the standards are indeed followed, and valuable information is preserved.

To improve company efficiency, many global organizations have distributed global operations, working across multiple time-zones with limited communication between project members and -groups (Gholley & Venkatramani, 2018). For these companies to succeed, it is important to limit information asymmetry between teams and establish standardized routines for creating, storing and sharing of knowledge. To achieve this, Gholley and Venkatramani (2018) recognized the establishment of a well-defined framework for knowledge management as an important factor. They proposed five challenges that global companies are facing in terms of knowledge management. These are:

1) Lack of defined standards in capturing and storing data
2) Information existing in silos
3) Inefficient use of technology tools
4) Localized best practices
5) Reduced focus on documentation

To meet these challenges, companies need to create standardized templates and documents for project practices to improve the quality of the knowledge available. They should try to prevent compartmentalization of knowledge and development of asymmetric information between teams to avoid missing the *"big picture"* and not waste time on gathering information (Gholley & Venkatramani, 2018). Furthermore, they could implement knowledge management tools to improve searchability of data among employees, and encourage employees to use the existing tools. The management should also try to prevent formation of localized best practices and rather implement these on a global scale, thus increasing their impact (Gholley & Venkatramani, 2018). Finally, the management needs to maintain a high focus on documentation. If this is lacking, project knowledge for previous projects is more difficult to use in future project implementations, and knowledge may be lost when employees leave the company (Gholley & Venkatramani, 2018).

2.2.3. Barriers to successful knowledge sharing

We have established organizational learning and successful knowledge transfer as crucial elements for an organization to prosper and gain a competitive edge compared to the competition. To achieve this, the first step is to identify potential barriers to knowledge sharing and the gap between where an organization is and where they want to be in relation to sharing practices (Riege, 2005). Potential barriers include: (1) *individual barriers*, (2) *organizational barriers*, (3) *technology barriers* and (4) *cultural barriers* (De Long & Fahey, 2000; Riege, 2005).

Individual barriers include e.g. lack of time to share knowledge, age and gender differences, lack of social network and poor communication and personal skills (Riege, 2005). A common opinion is that effective communication, including both verbal and written communication as well as employees' social network are crucial for effective knowledge sharing (Baron & Markman, 2000). *Organizational barriers* include e.g. integration of knowledge management and absence of sharing strategy, lack of leadership and management, lack of communication

regarding potential rewards and benefits of knowledge sharing and poor infrastructure in sharing practices (Riege, 2005). Technology may contribute in the process of making knowledge sharing more effective and easier, encouraging knowledge sharing processes (Riege, 2005). *Technology barriers* include e.g. lack of integration of IT systems and technical support on how and where data should be stored, lack of compatibility between software and processes and reluctance towards using new unfamiliar software (Riege, 2005). The *cultural barriers* include both the individual- and organizational barriers, but could also be treated separately. The organizational culture is unique to each individual organization so there exist no single standardized knowledge management strategy that can be applied for all companies (Riege, 2005). This implies that the strategy for knowledge management should be implemented so that it fits the organizational culture and not the other way around. (McDermott & O'dell, 2001; Riege, 2005). Thus, resources should be set aside for exploring the existing knowledge sharing networks in the company and build on these to encourage and incorporate knowledge sharing into the company (McDermott & O'dell, 2001).

2.3. Change management

In all projects and organizations, problems will occur, and risks will arise. To be successful and survive in a highly competitive and evolving market, such as todays IT industry, it is crucial to handle change in a successful manner. This process is referred to as change management, and is an approach for how organizations can prepare, help and support individuals and groups to adopt organizational changes. This involves transformation of an organization's technology, processes and goals (Prosci, 2019). Moran and Brightman (2001) define change management as *"the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers"*.

An increasing number of literature focus on the importance of change and how to handle change, but there are limited empirical evidence that supports the different approaches to handle change (Todnem, 2005). There is an agreement that the current pace of change has never been higher in the evolving business industry, and the successful management of change is therefore a highly coveted and require skill (Todnem, 2005). However, studies show that around 70 % of all change management initiatives fail, which may indicate a poorly constructed framework for successful implementation and management of organizational change (Balogun & Hailey, 2008).

2.3.1. Change management in the digital society

The IT industry is one of the most rapidly changing industries today, and for companies to keep up with and stay ahead of the competition, it is important for change managers and leaders to search for digital solutions (Davidson, 2018). But how does change relate to digitalization? As mentioned previously, digitalization is one of the most important steps in organizations today and is considered a driving force for change (Smith, 2018). However, successful management of change is tough and frequently fail, e.g. due to lack of resources, attention, outdated models and insufficient techniques for handling change (Davidson, 2018). To handle change in a successful manner, it is important for the change mangers be aware of employees' reluctance towards change and convey the benefits of *"going digital"*. Reluctance towards change and lack of commitment among employees may be a result of poor leadership skills, as not enough information regarding the benefits of change has been communicated. The leaders themselves may also show lack of commitment towards change. Effective leadership and management skills are therefore considered highly important factors to achieve successful change management (Gill, 2002). This corresponds to a survey by the American Management Association (1994), conducted by 259 senior executives in Fortune 500 companies, where leadership was considered the most important factor for successful change (Table 2.2). Next comes corporate values and communication.

	% mentioning this as important
Leadership	92
Corporate values	85
Communication	75
Teambuilding	69
Education and training	64

Table 2.2. Keys factors to achieve successful change (AMA, 1994)

2.3.2. Change management and organizational learning

Learning has been suggested as a main strategy to cope with change, to be able to learn and adapt in a changing environment (Comfort, 2012). Today, many organizations are exposed to increasing competition due to a changing market, customer demands and technology developments. To stay competitive in such an environment it is important to embrace change (Shahrabi, 2012). An important step in achieving this is creation of a good knowledge management framework for better preservation of knowledge. However, to choose an approach

to knowledge management or develop existing frameworks, an organization will have to face organizational changes (Fehér, 2004). How an organization handles change and limits employees' reluctance towards change will play an essential role in the establishment of a knowledge management framework and how they promote organizational learning. However, Shahrabi (2012) argues that the relationship between change and organizational learning is reciprocal. This implies that through change, companies gain experience and learn, which in turn may be used in future settings to improve change behavior for better utilization of the opportunities provided by change.

2.3.3. Implementation of ERP systems

An ERP (Enterprise Resource Planning) system is an integrated set of programs that support the core activities within an organization, such as production, storage, procurement, revenue etc. (Aladwani, 2001). ERP systems contribute to changes within an organization and may cause complaints from potential users. Leaders need to deal with these problems to achieve successful change. The main goal of the ERP system is to reduce costs, increase efficiency and improve processes by e.g. automation (Aladwani, 2001). TOG's software, Energy Components is such a system, and implementation of such an extensive ERP system will result in changes within the organization. Some work may be automated, and employees may be moved to different departments or even fired if they are found excessive. It is no surprise that these changes will be met with reluctance among the employees. Therefore, the management plays an important part in the success of ERP implementations, which will have a greater chance of success if there is good communication from the management regarding the potential benefits of the associated changes (Al - Mashari & Zairi, 2000; Gill, 2002). To ensure long-term success, any change require strategic vision by the management (Aladwani, 1999).

3. METHOD

3.1. Qualitative vs. Quantitative method

We mainly differentiate between two types of research methods. These are (1) *qualitative methods* and (2) *quantitative methods*. Quantitative methods refer to data gathered from e.g. surveys or experiments in the form of numbers, which may be used to generate statistical and econometrical models (Dahlum, 2018). In contrast, the qualitative method goes further into detail to interpret data from e.g. one or a few interviews or field observations (Dahlum, 2018). Jacobsen (2015) argues that these two methods should not be considered as opposites, but rather two end-members of a scale. The methods does not necessarily need to be either or, but can be composed of a mix of the two methods (Jacobsen, 2005).

3.2. Data collection

The data used in this thesis is collected through interviews with the management in TOG and a survey answered by the EC services department in Stavanger and the global project managers. The interviews have a purely qualitative research approach, going into depth of questions regarding how the oil and gas division in Tieto promotes organizational learning. In contrast, the survey includes fixed questions where employees rate TOG on a scale from *"very poor"* to *"excellent"* and comment on their answer. This implies a quantitative research with some qualitative aspects and provide both an assessment of the improvement potential in TOG and the possibility of creating statistical distributions from the answers of the employees. The biggest strengths of interviews compared to surveys are the in-depth assessment and flexibility, as it offers the opportunity to follow up unexpected information or interesting answers. On the negative side, interviews are time-consuming to prepare and can only be directed towards one individual at a time (Lotherington, 1990). In contrast, surveys are less time-consuming and may be directed towards multiple individuals. However, this approach offers no flexibility as information is processed after the survey has ended (Lotherington, 1990).

3.2.1. Survey

The survey has been directed towards the business analysts in the EC services department in Stavanger and the global project managers in TOG. This provides an insight into their opinion of how the oil and gas division promote project knowledge transfer and organization learning,

and how they handle change. The business analysts are those that are conducting projects and configuring EC solutions for the customers, while the project managers manage the projects.

The questions in the survey are presented in Table 3.1 and Appendix 1. Each question is divided into two parts. In part A, the questions are rated on a scale ranging from *"Very Poor"*, *"Poor"*, *"Neutral"*, *"Good"* to *"Excellent"*, while in part B, the respondents are asked to comment on their answer to provide suggestions for future improvements in TOG. In this way, the survey includes both quantitative and qualitative research aspects. The quantitative part of the survey makes it possible to present statistics and graphical presentations to see if there is a unifying agreement among the employees regarding the presented topics. If not, this could indicate that the management has made poor efforts to communicate TOG's ways of working to the employees. The qualitative part allows employees to come with suggestions for future areas of improvement and share their opinions. While the multiple-choice questions (Part A) are mandatory, the suggestions for future improvements (Part B) are not, and the quality and time put into each question thus varies from individual to individual.

Survey Questions	
Q1a	To what degree does Tieto promote organizational learning?
Q2a	To what degree are final reporting and technical documentations practiced in Tieto?
Q3a	To what degree does Tieto make final reports and technical documentations known among employees and encourage them to use these?
Q4a	To what degree does Tieto focus on analyzation of project learning?
Q5a	To what degree does Tieto encourage employees to share and receive project knowledge and learning?
Q6a	To what degree does Tieto manage to preserve experience and knowledge when employees quit or retire?
Q7a	To what degree do you yourself try to acquire knowledge from similar projects at the start of a new project?
Q8a	To what degree does Tieto standardize routines for generating, storing and transfer of project knowledge?
Q9a	To what degree do Tieto employees respond to organizational change?
Q10a	To what degree does Tieto manage to adjust their organization and approach to new projects based on learning from previous projects?
Q11a	To what degree are previous results and learning used to improve and define the scope for future clients?
Q12a	To what degree does Tieto manage to focus on both improving existing solutions (exploitation) and innovation (exploration)?

Table 3.1. List of all questions in the survey

3.2.2. Interviews

In addition to the survey, Bente Helland and Liv-Janne Nergaard from the management in TOG have been interviewed to get a more detailed insight into how the management consider their approach to the presented topics. These findings are compared to those of the survey, to examine if there is a correlation between employees' and managements understanding of how TOG promotes organization learning, and how they handle change. If their opinions do not correlate, this may indicate that the management has made poor efforts of, or failed to communicate properly with their employees. In contrast to the survey, the interviews have a purely qualitative approach, going into depth on each question. This approach allows the interviewer to come with counter questions *"on the fly"*, based on the interviewee's answers. The interview questions are presented in Appendix 1.

3.3. Conducting interviews and processing information

The process of gathering information is conducted through the following three phases; (1) *preparation*, (2) *execution* and (3) *processing*. In the *preparation* phase, the interviews and survey were created based on the theory presented in Chapter 2. The interviews were carefully planned and prepared at home and a pilot was run for quality assurance. The respective persons in TOG were informed of the interview and survey beforehand, but only the theme of the assessment and not the exact content or questions. This is to prevent discussion and gathering of too much additional information prior to the interviews/survey, which may result in biased results. During the *execution* phase, the survey was distributed to all respective TOG employees, and the interviews were conducted and recorded to assure that all important details were captured. This maintains a good flow of communication during the interviews and allows the interviewer to focus on the interviewee. However, minor notes were still written during the interviews to capture essential information. In the *processing* phase, notes and recordings were interpreted and rewritten shortly after the interviews to assure good quality of the gathered data. Getting your thoughts into writing is an important process to avoid loss of data over time (Lotherington, 1990). Acting unbiased and processing information in a neutral and critical way to obtain the most accurate results can be challenging during this phase. However, by doing so one provides the most accurate results which could be beneficial for the company.

Anonymization has been weighted in the survey to build trust and avoid information to be tracked back to individuals. This enhance honesty among the respondents and provides a more accurate representation of the reality in TOG. However, sometimes it can be difficult to create

completely anonymous surveys as certain parts, like the comments in this survey, may reveal who made the statements. Certain events or information can for example be tied to specific individuals due to internal knowledge. In contrast to the survey, the interviews were not conducted anonymously, and the identity of the interviewees are known to everyone (see Appendix 1). This provides transparency in the process and build trust towards the management, allowing employees to see if their opinions correspond to that of the management.

3.4. Reliability and Validity

For an experiment or test to be accepted by the scientific community in needs to provide some elements of reliability and validity (Shuttleworth, 2008). Reliability and validity are two important concepts that are referred to, especially in quantitative research methods but is now reconsidered in qualitative research methods. Achieving reliability and validity in our research methods are important steps which helps to eliminate bias and creates credibility towards the research (Golafshani, 2003).

Reliability implies that the results are consistent, thus yielding the same results each time the assessment or experiment is conducted, given that it is run under the same conditions (Patil, 2017). However, qualitative interviews are subjective and may provide different results depending on the interviewee and how the interviewer approaches the subject. This may reduce the verifiability for others at a later stage (Hjelseth, 2000). Validity on the other hand, implies that the results should satisfy the objectives (Patil, 2017). This means that the assessment should produce the intended data. For example, if there is a specific need for randomization to avoid biased results, the assessment will only be valid if this is indeed the case. In this thesis, the interview guide has been discussed with my supervisor (Finn Harald Sandberg) and external parties to provide results that cover my research topic, thus enhancing validity. The relationship between reliability and validity is explained in Fig. 3.1.

Fig. 3.1. Reliability vs. Validity (from Shuttleworth, 2008)

A third concept that is important to introduce is triangulation. Triangulation is a strategy used in qualitative research to improve the reliability and validity of a research (Golafshani, 2003). Triangulation aims to validate data by cross-examining or converging information from two or more sources. The concept behind triangulation is that it can increase the confidence in our results if different methods provides the same results.

3.5. Limitations

Due to limited amount of time, and to obtain valuable information for the oil and gas division, this assessment has been limited to TOG. However, if the sample was enlarged to include Tieto Norway or the entire Tieto corporation within this limited timespan, this could have put constraints on the quality of the data processing.

Different knowledge bases between the business analysts and the project managers that have responded to the survey is another limitation of the survey. Therefore, it might have been beneficial to only focus on the project managers in TOG since they have more knowledge and experience regarding the topics presented in this thesis. However, this would dramatically decrease the sample size. Other important constraints of the assessment include employees' willingness and available time to contribute. Even though the importance of contribution and honesty was stressed when the survey was distributed, experience showed that not everyone took their time to answer or comment on their answers to present their views of how Tieto's oil and gas division can improve to become a *learning organization*. The survey was distributed to a total of 24 business analysts and 12 project managers, in which 23 employees answered the survey, giving a response rate of only 64 %. In addition, there are a lot of employees who have

answered *Neutral* on the multiple-choice questions, which could mean that they are indeed neutral to the statement or that they don't know the answer.

Lastly, since this assessment only focuses on how the oil and gas division within Tieto works towards becoming a *learning organization*, it may give false indications of how the entire Tieto corporation promotes organizational learning. However, the results and suggestions for improvements may be used as an analogue for the entire Tieto corporation or other IT companies to improve their way of transferring knowledge and better promote organizational learning within the organization.

4. RESULTS

In this chapter, the results from the conducted survey and interviews will be presented along with graphical presentations of the results from each question of the survey. The goal is to present an overview of the response from the EC services department in Stavanger and the global project managers in TOG, along with their suggestions for improvements. Their thoughts will be compared to that of the management to examine if there is a correlation between how the employees and the management envision organizational learning within Tieto's the oil and gas division. The questions from the interviews and the survey are presented in the interview guide in Appendix 1.

4.1. Analyzation of the survey

The survey was distributed to the business analysts in the EC service department in Stavanger and all global project managers in TOG. Their response and suggestions for future improvements are presented in the following sub-chapters.

4.1.1. Gender and age

The sample in this assessment is not large, but for validation purposes, I have tried to reach out to different genders and age groups. However, in the IT business it is generally more males compared to females, and the average age for project managers and employees within the EC services department is high (Fig. 4.1). This is likely because EC is a highly complex software and experienced employees are needed to operate and manage it. The age and gender distributions are illustrated in Fig. 4.1 and Fig. 4.2. More than 80 % of the sample consists of males, and less than 15 % of the employees that responded to the survey are younger than 35 years. In the remaining two age classes, 48 % are between 35-49 years and 39 % are 50 years or older. Thus, older males highly dominate the survey sample.

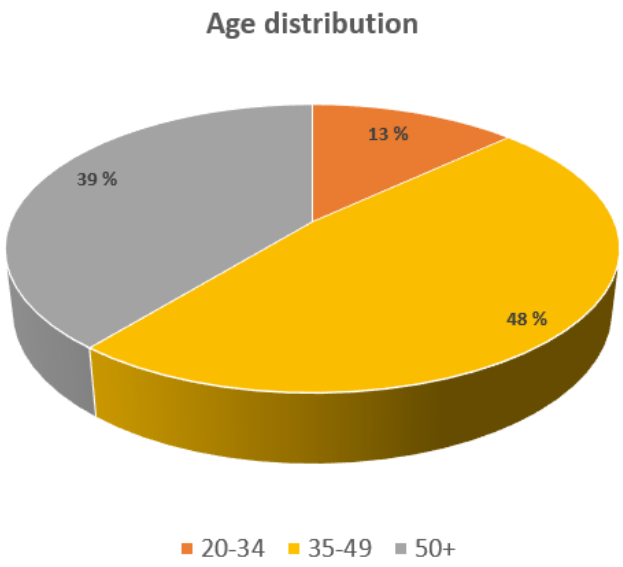

Fig. 4.1. Age distribution in the survey

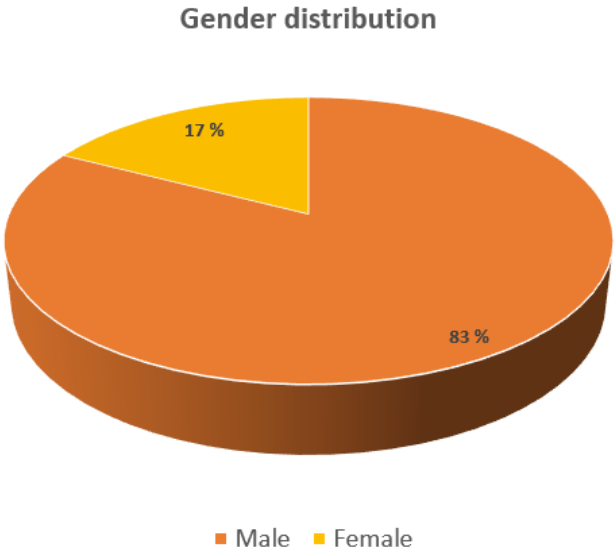

Fig. 4.2. Gender distribution in the survey

4.1.2. Q1

The response from question 1a (Table 3.1) is illustrated in Fig. 4.3. The results show that 44 % have answered that TOG promotes organizational learning in a good manner. 39 % have a neutral relationship to this statement, while 17 % have answered that organizational learning is poorly or very poorly promoted within the oil and gas division.

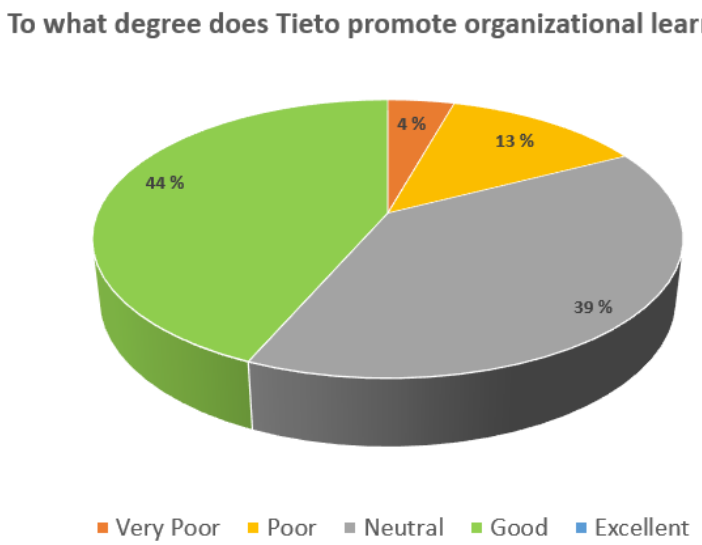

Fig. 4.3. Graphic illustration of the response from Q1a

In question 1b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.1. The main aspects that stand out is that TOG should have clear procedures and guidelines for documenting, storing and sharing of project knowledge, and that these should be properly communicated to all employees. ECpedia is one of the online platforms where project knowledge can be uploaded, although it is often flooded with data, making relevant information difficult to find. Furthermore, face-to-face training course should be organized, where employees can share experiences from similar upgrade or implementation projects before initiation of new projects. Debrief sessions should be held at the finalization of projects to distribute new valuable information throughout the organization. It is challenging for new employees to get "up to speed" in EC because they are dependent on input/knowledge transfer from experienced colleagues and these are often quite busy with their own work. TOG's training portal and onboarding process contributes in building knowledge, but it is not enough to make employees independent. Only exposure to early hands on training will ensure this.

#	Suggestions for future improvement
1	Collect lessons learned from projects in an easily accessible location
2	Debrief sessions when projects are terminated
3	Make it easier to find what you are looking for in ECpedia
4	Create and maintain templates for knowledge sharing
5	Procedures for knowledge management should be better communicated to all employees
6	Create clear guidelines and procedures for how project knowledge and documentations should be generated, stored and shared throughout the organization
7	Organize face-to-face internal training courses on various aspects of EC from configuration to the business behind it
8	Include new employees as co-pilots in projects and give them hands-on training as fast as possible

Table 4.1. Suggestions for future improvements (Q1b)

4.1.3. Q2

The response from question 2a (Table 3.1) is illustrated in Fig. 4.4. We observe that there is a split opinion of how final reporting and technical documentations of projects are practiced in TOG. 44 % states that these documentations are practiced in a good manner, while 26 % have answered that these are poorly practiced. The remaining 30 % have a neutral relationship to this statement. None have answered very poor or excellent.

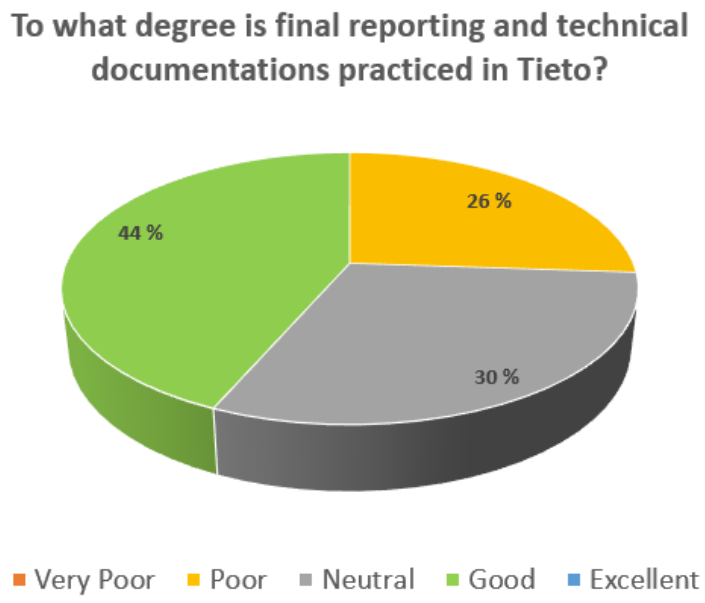

Fig. 4.4. Graphic illustration of the response from Q2a

In question 2b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.2. The main aspects that stand out is that TOG should allocate more time on project documentations near project closure and make all employees aware of where such project documentations are stored. A very common problem is lack of time as project members and managers are often relocated to other projects and are not given enough time to create such documentations. If project documentations are created, a lot of these documents are stored in some obscure folder structure in e.g. TietoShare/SharePoint with limited access, making them difficult to find. These documentations could be used in early phases for similar projects to identify pitfalls, lessons learned, and final numbers compared to estimates. Better tools for knowledge searching, such as a search engine for similar project experience could be implemented to make relevant information easier to find for employees. TOG could also appoint a best practice board to read all obligatory final reports and technical documentations from projects which can be used to update a best practice approach to similar implementation or upgrade projects.

#	Suggestions for future improvement
1	Allocate more time on project documentations near project closure
2	Need to make employees aware of where project documentations are located and give them the required access
3	Create a best practice board of people that can read all obligatory final reports from projects, and improve and update the best practices
4	Create more standardized ways of documentation and publishing knowledge
5	Put increased focus on employees to make them read through documentations from similar projects before initiating new projects
6	Implement better tools for smarter search of similar project experience

Table 4.2. Suggestions for future improvements (Q2b)

4.1.4. Q3

The response from question 3a (Table 3.1) is illustrated in Fig. 4.5. Less than 20 % agrees that TOG makes project documentations know among the employees in a good manner and encourage them to use these. 39 % are neutral to this statement, while the remaining 44 % states that this is done poorly.

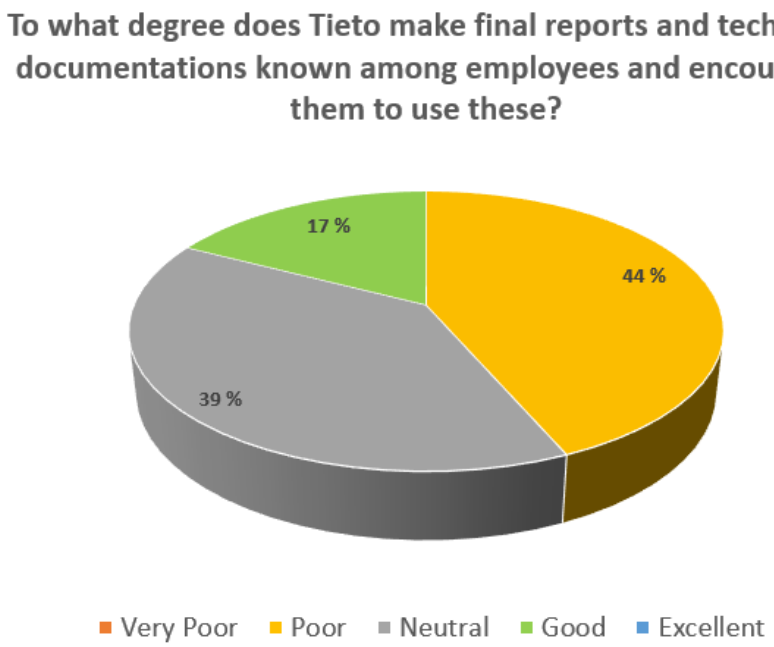

Fig. 4.5. Graphic illustration of the response from Q3a

In question 3b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.3. The main aspects that stand out is that TOG should create a more structured storage platform for project documentations with better searchability, easily accessible to all oil and gas employees. There seems to be an understanding that such documentations *might* be stored somewhere, like ECpedia, TietoShare or SharePoint, but this a not properly communicated by the people that create these documentations, nor by the management. Communicating the use of these different platforms should be included as a part of the onboarding process, where new employees learn to look for necessary information and where to store it when conducting projects. Sometimes, it may be hard to create and share technical documentations onsite at the customers due to confidentiality and security of customers information, e.g. highly valuable production data. However, a project summary report could include an overall discussion of technical gains and issues in the project without getting into specifics. EC Talks and monthly newsletters could be used to further distribute project knowledge through documentations.

#	Suggestions for future improvement
1	More structured storage of project documentations, stored in an easily accessible location, which could benefit from being searchable using metadata
2	Better communication around new project documentations, as many people create resources without properly communicating their existence
3	Make it easier to find documentations in TietoShare/SharePoint and ECpedia etc.
4	Where to find project documentations and knowledge should be a part of the onboarding process of any individual joining the oil and gas division
5	Sharing "lessons learned" between different projects groups globally
6	Create a portal/welcome page in ECpedia with links to relevant documentations
7	Make better use of EC talks and newsletters to promote such documentations

Table 4.3. Suggestions for future improvements (Q3b)

4.1.5. Q4

The response from question 4a (Table 3.1) is illustrated in Fig. 4.6. Again, only a small proportion (18 %) think that TOG focuses on analyzation of project learning in a good manner. 52 % are neutral in the matter, while 30 % state that this is done either poorly or very poorly.

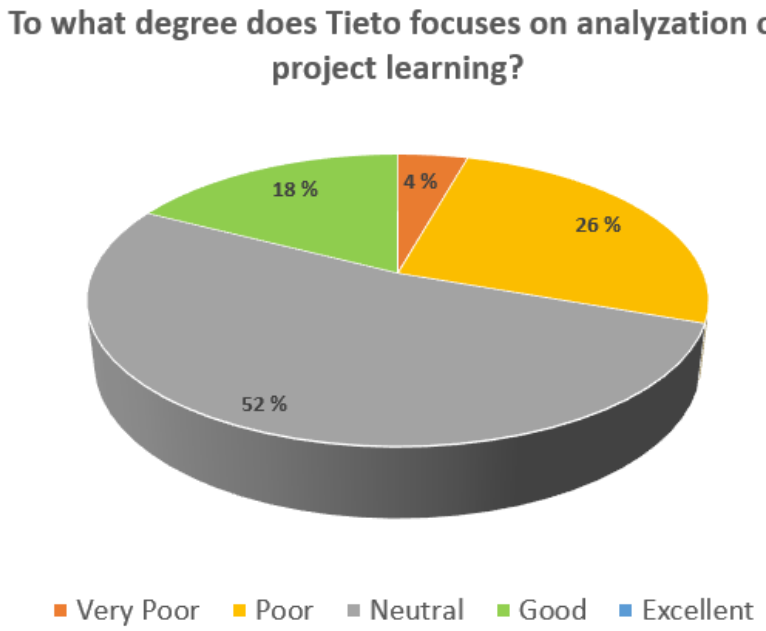

Fig. 4.6. Graphic illustration of the response from Q4a

In question 4b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.4. The main aspects that stand out is that TOG should implement standardized routines for how project knowledge should be analyzed and involve the individual project teams more in this phase. Project teams from similar projects need to share and combine knowledge to improve the quality of the analyzes. An increased focus should be put on regular lessons learned sessions, especially for complex projects, to decrease the time of implementation in future projects. However, these findings are not always available or taken advantage of in new projects. The *"project start-up package"* that project managers receive prior to project implementations should be updated on a continuous basis, based on newly analyzed project knowledge and learning.

#	Suggestions for future improvement
1	Implement a new or update the "project start-up package" for how project knowledge should be analyzed
2	Involve the project team(s) more in the analyzation phase
3	Need to share knowledge from different projects and take these into consideration for better analyzation of project learning
4	Organizational learning needs to be formalized and standardized, as a part of the work processes
5	There should be regular lessons learned sessions through presentations after project completion, especially for new and complex projects

Table 4.4. Suggestions for future improvements (Q4b)

4.1.6. Q5

The response from question 5a (Table 3.1) is illustrated in Fig. 4.7. 26 % states that TOG encourages employees to share and receive project knowledge and learning in a good manner. An equal number of respondents (26 %) disagrees, saying that this is done in a poor manner, while the remaining 48 % have a neutral relationship to the statement.

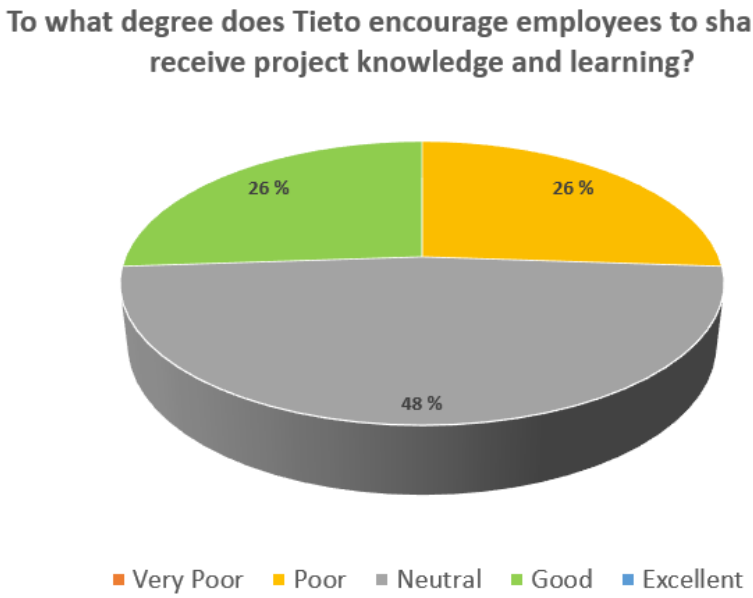

Fig. 4.7. Graphic illustration of the response from Q5a

In question 5b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.5. The main aspects that stand out is that TOG should dedicate one specific platform to storage of project knowledge and learning and make this platform more user-friendly (organized and structured) with improved searchability. In addition, guidelines should be created for how project knowledge should be stored and shared with the entire oil and gas division. They could also create a standardized, global lessons learned document that could be used for troubleshooting issues that might have been dealt with previously. This document should be editable so that new information and better solutions can be added to previous solutions. There should also be an increased focus on knowledge sharing already during the onboarding. A mentor should be provided to all new employees, especially juniors, which can help to emphasize the importance of knowledge sharing and where to look for project knowledge and important documentations which can be beneficial in future settings.

#	Suggestions for future improvement
1	Dedicate one specific platform to storage of project knowledge and learning
2	Make this storage platform more user-friendly, structured and organized
3	Increased focus on knowledge sharing and mentoring programs during the onboarding
4	Creation of a standardized global lessons learned document, which can be referred to when troubleshooting specific issues that might have been solved for other customers
5	Opening the possibility for editing global lessons learned documentations with four-eyes approval
6	Implementing specific guidelines for how and where project knowledge should be stored and shared
7	Improve searchability in current platforms for knowledge sharing

Table 4.5. Suggestions for future improvements (Q5b)

4.1.7. Q6

The response from question 6a (Table 3.1) is illustrated in Fig. 4.8. Only 13 % think that TOG manages to preserve experience and knowledge from employees when they quit or retire in a good way. Almost 50 % are natural to this statement, while 39 % state that knowledge and experience is poorly or very poorly preserved when employees quit or retire.

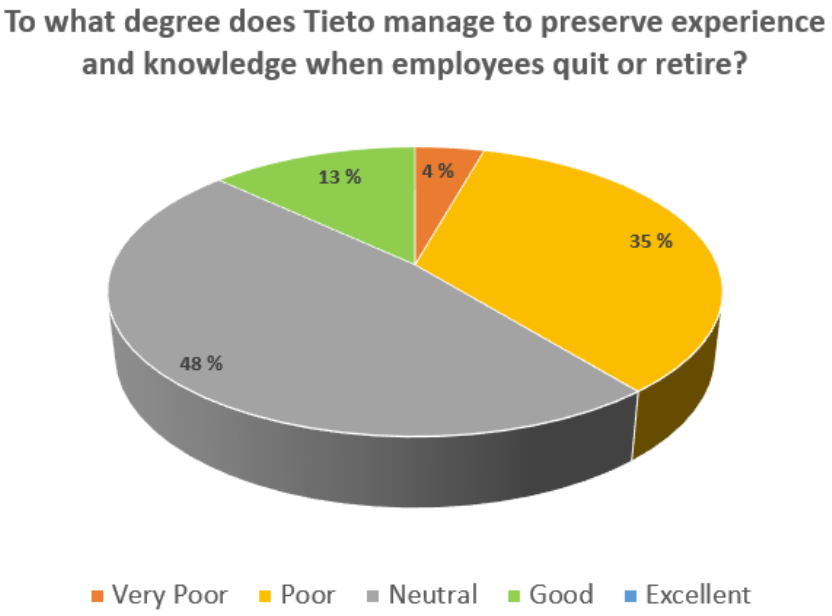

Fig. 4.8. Graphic illustration of the response from Q6a

In question 6b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.6. The main aspects that stand out is that TOG should create guidelines for what is expected of an employee before they quit or retire. Employees that quit usually have a three months' notice period before they leave, which the managers need to use wisely to assure that knowledge is preserved within the organization. The same procedure goes for employees who are retiring, but this period is normally longer (a couple of years), giving managers more room to distribute this knowledge throughout the organization by use of e.g. presentations, mentoring programs, training, EC talks etc. The information they have on their private computer and local storage platforms such as Google Drive/OneDrive need to be backed-up and stored at one designated location (preferably TietoShare or SharePoint). A problem during the recent years is that the platforms have been changed numerous times, which have resulted in loss of data when data is migrated, and confusion regarding where important knowledge or project documentations should be stored and found.

#	Suggestions for future improvement
1	Create guidelines or a checklist for what is expected from an employee who is retiring or leaving the company (e.g. where and how to store and share information)
2	Managers should contribute more actively in managing knowledge transfer from the person who is leaving to the other employees
3	Employees that are approaching retirement should be stacked together with juniors who may be more susceptible for new information and knowledge
4	Create better routines for data migration between the old and new storage platforms and data migration when employees leave

Table 4.6. Suggestions for future improvements (Q6b)

4.1.8. Q7

The response from question 7a (Table 3.1) is illustrated in Fig. 4.9. The results show that almost 80 % say that they try to acquire knowledge from similar projects before initiating new projects in a good or excellent manner. 22 % are neutral to this statement, while none have answered that they do this in a poor or very poor manner.

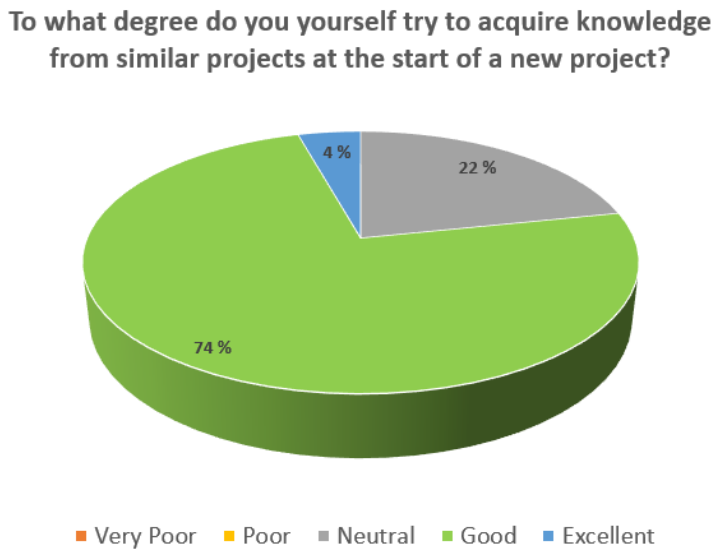

Fig. 4.9. Graphic illustration of the response from Q7a

In question 7b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.7. The main aspects that stand out is that knowledge is most commonly acquired by talking to colleagues who have worked with similar projects previously. Therefore, acquired knowledge is highly dependent on colleague's knowledge base and that each individual employee reaches out to the right people. A suggestion is to create a list of all projects, the responsible project managers, project members and a brief description of the project. This allow employees to reach out to the best sources of information and expand their corporate network on a global scale. The most important projects with complex solutions should be flagged as best practices and made easily accessible at a designated place. In addition, there should be implemented more systematic and standardized routines for how employees should proceed to acquire the right knowledge from the right people. Too many employees feel they ask around randomly without knowing whom to talk to.

#	Suggestions for future improvement
1	Important projects or documentations should be flagged as best practices
2	Creation of more systematic procedures/guidelines for gathering information
3	It should be made common knowledge or created a list of who conducts the various projects, the project managers involved and a brief description of each project
4	Promote proactiveness within the oil and gas division
5	The most experienced project team members should spend time at the start of the project by giving advice and reviewing the work of less experienced employees

Table 4.7. Suggestions for future improvements (Q7b)

4.1.9. Q8

The response from question 8a (Table 3.1) is illustrated in Fig. 4.10. The results show that above one third of the respondents think TOG has implemented standardized routines for generating, storage and transfer of project knowledge in a good way. 35 % are neutral to the statement, while 30 % have answered that this is done in a poor or very poor manner. Therefore, there is a dividing opinion on the process of standardization within the oil and gas division.

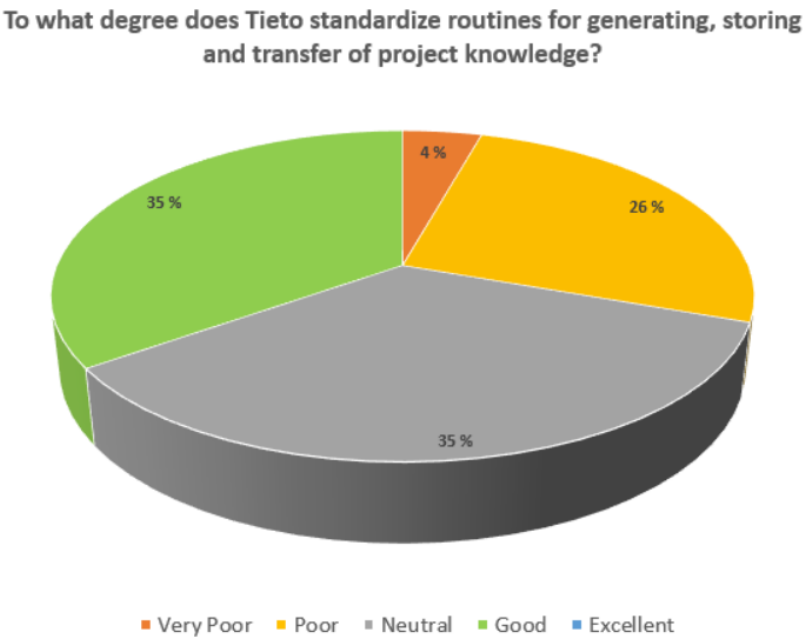

Fig. 4.10. Graphic illustration of the response from Q8a

In question 8b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.8. The main aspects that stand out is that there are some standardized guidelines and procedures on paper (e.g. in the project start-up package), but these are commonly not followed. These standards need to be reviewed and updated on a regular basis as TOG change and expand their IT solutions. After they have been updated, the documents must be uploaded in the project start-up package and the existence of this package should be properly communicated to all employees so that they are made aware of its existence. Additionally, all standards and project documentations should be made available on a company-wide storage platform along with global project temples for the different types of projects TOG conducts (e.g. implementation and upgrade projects). Their employees need to understand that project requirements do not always apply for all type of projects and that they need to approach different projects in different ways.

#	Suggestions for future improvement
1	Improve at following the procedures that are on paper instead of reinventing new procedures for every project
2	Improve download mechanisms to acquire global project templates
3	All project documentation should be placed on a common TietoShare/SharePoint drive
4	Employees need to understand that documents and standards used for implementation projects have many requirements that do not apply to e.g. support/upgrade projects
5	After successful implementation of efficient solutions, these need to be reviewed to decide what is relevant to the different types of contracts we have
6	Standards in the project start-up package should be reviewed and updated on a regular basis

Table 4.8. Suggestions for future improvements (Q8b)

4.1.10. Q9

The response from question 9a (Table 3.1) is illustrated in Fig. 4.11. There is a general agreement that employees respond positively to organizational change within TOG. 65 % have answered that employees respond to organizational changes in a good way, 9 % have answered excellently, and the remaining 26 % are neutral to the statement. None have answered poor or very poor.

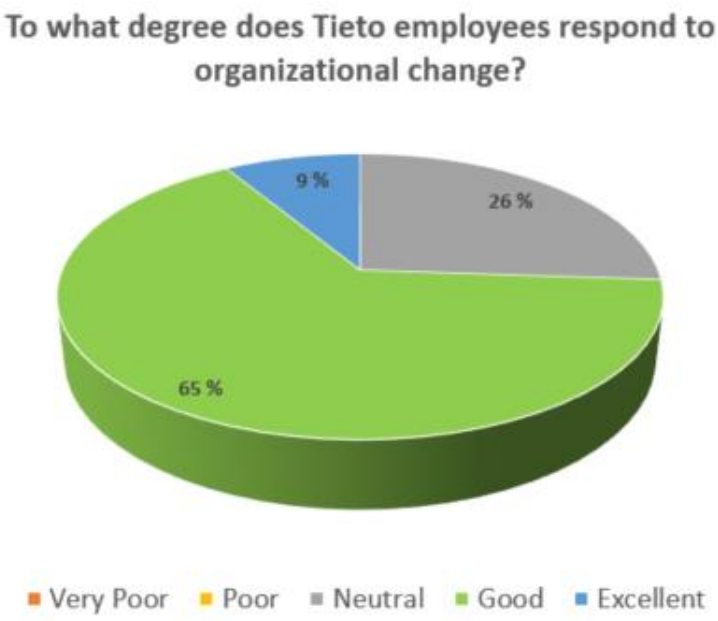

Fig. 4.11. Graphic illustration of the response from Q9a

In question 9b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.9. The main aspects that stand out is that the management need to be better at presenting the benefits of change and decrease employees' reluctance towards change. Furthermore, even though TOG is a part of an innovative IT company, they should be aware of not changing good routines and things that work well within the organization. However, this does not imply that their products should not be innovated continuously. In TOG, new and younger employees are sometimes more open and responsive to change, and even though there are still some *"We have always done it this way"* thinking among older employees, this mindset has started to phase out due to hiring of several younger team members. These younger employees can be shaped by the employer so that they respond more positively to organizational change and see the long-term benefits. In general, IT people are good at change, as the IT industry experience frequent updates, improvements and changes.

#	Suggestions for future improvement
1	The management need to present change and the advantages of change in in a positive manner to keep people from thinking about the negative effects
2	The management should focus on not being too innovative by not changing things that make sense or work
3	The mindsets on new, young employees should be shaped so that they respond positively to organizational change and see the long-term benefits of change

Table 4.9. Suggestions for future improvements (Q9b)

4.1.11. Q10

The response from question 10a (Table 3.1) is illustrated in Fig. 4.12. From the results, almost 50 % of the respondents answered that TOG manages to adjust their organization and approach to projects based on new learning in a good way. 17 % answered that they do this poorly, while the remaining 35 % are neutral to the statement.

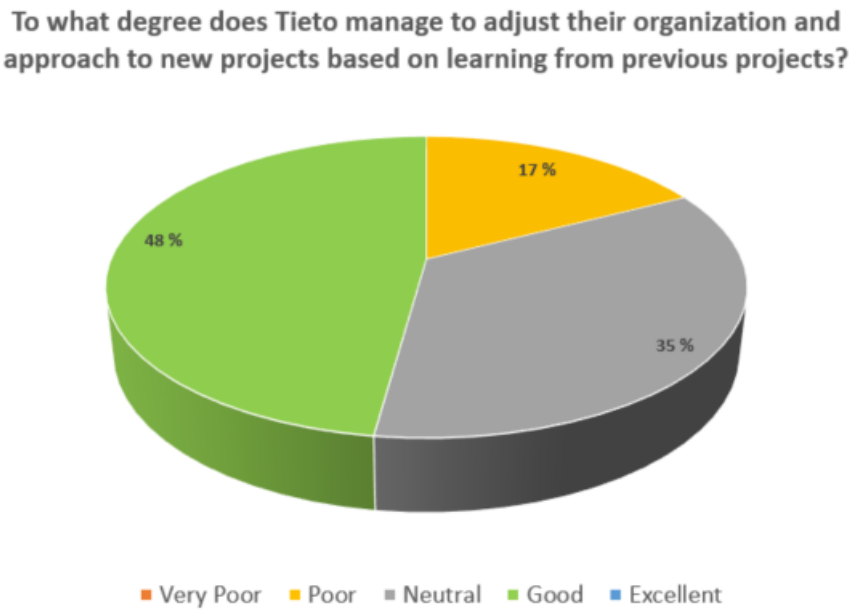

Fig. 4.12. Graphic illustration of the response from Q10a

In question 10b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.10. The main aspects that stand out is that each project is often conducted in isolation, and once it is closed they are commonly not referred to. If documentations are created, they are usually not reviewed by anyone outside the team that created them. Therefore, it would be beneficial to create a (global) lessons learned document which should be properly communicated and made available to all employees in the oil and gas division. Even though TOG has improved, there are still some tendencies to initiating projects without spending enough time to reflect on how to improve future project based on newly acquired information.

#	Suggestions for future improvement
1	Need to use more time to reflect on how to do things differently and improve future projects based on new knowledge and learning
2	Creation of a global lessons learned document that is available to all oil and gas employees

Table 4.10. Suggestions for future improvements (Q10b)

4.1.12. Q11

The response from question 11a (Table 3.1) is illustrated in Fig. 4.13. The results show that above 60 % of the respondents think newly acquired project learning is used to define and improve the scope in future projects. 26 % are neutral to the statement, while only 13 % think TOG does not use project learning wisely to improve the scope in future settings.

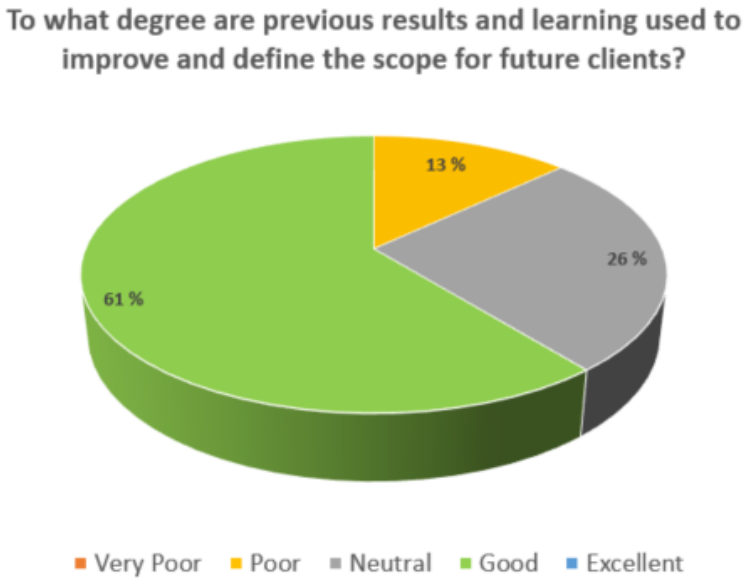

Fig. 4.13. Graphic illustration of the response from Q11a

In question 11b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.11. The main aspects that stand out is that TOG and their project managers should to an increasing degree focus on studying previous lessons learned and final project documentations before initiating new projects. The project managers should receive more training on what documentations are required for the different projects and how these documents should be created in a standardized way. This will make it easier for other employees to know how and where to look for relevant information in all project documentations. In addition, even though this is already practiced to some degree, analyzation client feedback and competitors need to be improved for TOG to enhance their product and delivery.

#	Suggestions for future improvement
1	Increased focus on studying previous lessons learned and final documentations before initiating new projects
2	Project managers should receive better training to understand what documentations are required for each project and how they should be created and standardized
3	Should be better at analyzing both client feedbacks and competitors to improve their product and the way they deliver

Table 4.11. Suggestions for future improvements (Q11b)

4.1.13. Q12

The response from question 12a (Table 3.1) is illustrated in Fig. 4.14. The results show that 57 % of the respondents have answered that TOG manages to focus on both improving existing solutions and innovation in a good or excellent way. 35 % are neutral to the statement while only a small proportion (8 %) of the sample have responded that they struggle to focus on these areas simultaneously.

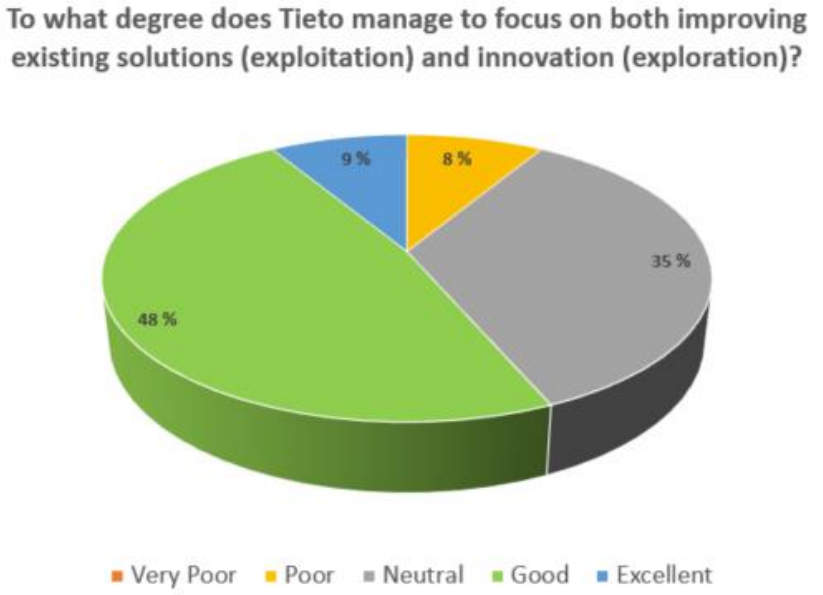

Fig. 4.14. Graphic illustration of the response from Q12a

In question 12b, the participants are asked to come with suggestions for future improvements. These suggestions are listed in Table 4.12. The main aspect that stands out is that TOG needs to work on product deliveries. Commonly, when Energy Components is upgraded, some functionality may be lost as different views and tables have been changed and because the software is interfaced with new versions of Java and Oracle. Therefore, as they innovate their

products, they must keep in mind that they still deliver the existing solutions that their customers originally paid for.

#	Suggestions for future improvement
	Need to work on product deliveries regarding new releases so that clients don't lose the functionality they originally paid for

Table 4.12. Suggestions for future improvements (Q12b)

4.2. Analyzation of the interviews

The interviews were conducted with Bente Helland and Liv-Janne Nergaard, managers of the EC services department in Stavanger. In general, there is a high correlation between the answers in the survey and the interviews, but there are some deviations regarding standardization of procedures and documentations, analyzation of learning and how TOG preserve knowledge when employees leave. The questions asked in these interviews are presented in Appendix 1 and the main findings are provided in the following three sub-chapters.

4.2.1. Organizational learning and knowledge transfer

During the recent years, TOG has changed storage platforms several times, which have resulted in confusion regarding storage location for project documentations, and subsequent loss of project knowledge. The long-term goal is to use one designated storage location for all global documented project knowledge. A problem that have been observed when switching between storage platforms is loss of valuable data. This is largely due to lack of routines and procedures prior, during and after data migration. There is also lacking information from the management regarding which new platform should be used as a standard. A common problem when working in global organizations is that even though knowledge is shared between individuals at one location (e.g. Norway or Stavanger) it may not reach out to the whole organization. However, since some project documentations contain valuable data from the customer it may be difficult to make these documents accessible to everyone in Tieto’s oil and gas division due to confidentiality matters.

Analyzation of project knowledge in TOG is a continuous process, where EC quality analyzes the information from completed projects to improve how they conduct future projects. The intended purpose of EC quality is to review and analyze project documentations, maintain quality assurance and update the project start-up package that are handed out to the project

managers prior to project initiation based on new information. However, previous experience shows that this does not always happen. One form of analyzation technique used to analyze how well TOG employees conducts and delivers projects for the customer is customer perceived value (CPV). This is an evaluation from the customers and is used to improve individual and project team performance in future projects by making employees readjust based on the customer feedback.

In TOG, the management encourage employees to gather and transfer project knowledge, but not in a formalized way. Employees are made aware that there are indeed some that have conducted similar projects before, but it is up to each individual employee or group to search for the relevant information themselves. There might be some information on one of the storage platforms, but due to lack of procedures and routines for creating, storing and sharing of project knowledge and documentations, there are uncertainties regarding the location or even existence of such information. Therefore, due to the relatively small size of the oil and gas division, the most common way of transferring knowledge is by asking colleagues that have conducted similar projects previously. This largely depends on individual communication capabilities and relations between employees.

TOG constantly tries to allocate their employees to different projects and customers so that no single employee is irreplaceable. This limits loss of knowledge when employees quit or retire. In addition, experienced employees are often teamed with younger employees to transfer knowledge and preserve it within an organization. This include mentoring programs, presentations and training courses. However, this is not a standardized process and it highly depends on the individual managers and the time available. A newly implemented measure to better preserve knowledge when employees leaves, is the abolishment of Google Drive. The problem with Google Drive has been that all files, even locally downloaded and renamed files of a leaving employee have disappeared as his or her google account has been deleted. This has resulted in loss of highly valuable data and is something TOG strives to improve.

In TOG, they have tools to deal with new knowledge and learning. An example of this is the risk improvement log. This tool registers risks and improvement potential based on new learning, but it has not yet been implemented for the entire organization, although it could be a great tool for transferring project knowledge throughout the organization.

4.2.2. Standardization

When conducting projects, TOG follows a standardized project start-up package where all required project documents, guidelines, standards and workflows are located. This package is provided to the project manager prior to project initiation, whose responsibility is to fill out and make sure that these documents are used. A designated place where all project documentations are supposed to be stored is specified in the project start-up package. A flaw is that even though there are well-established standardized procedures for project documentation and implementation, these are commonly not used. Project documentations are often stored on a personal workplace or Google Drive/OneDrive instead of the storage place specified in the project start-up package. Because of this, important knowledge may be lost and excluded from the analyzation of project knowledge and therefore it cannot be institutionalized into the organization's systems, processes and workflows etc. This process of institutionalizing knowledge into the organization is regarded a weakness by the management in TOG.

The management is working on creating a Project Management Office (PMO) to support TOG projects regarding standardization, effectivization and to improve project delivery. The goal of the PMO is global implementation, which should help the company maintain their standards for project management within the organization.

4.2.3. Change management and reluctance towards change

TOG employees are generally very adaptable, especially those working within the EC services department, as they work with dynamic projects on a daily basis, which require them to be open to change. Therefore, the management see no correlation between adaptability and age, and consider the general reluctance towards change as low. However, they have stated that some are more open to change than others and that there is a trend that those with a scientific background may be less open to extensive documentation and use of different processes.

TOG is an adjustable organization and are constantly launching new solutions based on new project learning and market changes. Today, EC is a leading hydrocarbon management software, but it is a complex software with high cost of ownership compared to other software in the market. Because of this, a new software solution has been launched, EC Smart, which will be easier to implement and upgrade, easier to use for the customers and it also have a lower cost of ownership, making it more fit for the future. Other examples of response to the competitors in the market is creation of the upgrade tool to reduce the upgrade cost of EC for

the customers, and Energy Components as a service (ECaaS), which is their cloud solution. Based on this, we conclude that TOG manages to respond to the marked and competition in a good way by improving existing solutions, but also by creating new solutions.

4.3. Data comparison

From the gathered data, there is a correlation between the employees' and managements thoughts regarding organizational learning in TOG. Both parts agree to a various extent that there is confusion regarding how project knowledge and learning should be documented, and where it should be stored and shared. According to the management, this information should be stated in the project start-up package that the project managers receive prior to project initiation. The problem however is that the content of the project start-up package, e.g. standardized documents, guidelines and workflows are often not followed. This corresponds with the results from the survey. Both parts state that TOG is lacking in communicating the existence of project documentations and the importance of these when initiating similar projects. There is also an agreement that there is room for improvement in encouraging employees to share and receive project knowledge in more formalized ways than they are today. This is because most knowledge is transferred based on each individual employees' own initiative and motivation to reach out to fellow employees.

A main difference that stands out is that the management states that knowledge is preserved within the organization when employees quit or retire, although there are no specific routines for this. From the survey however, it is evident that this knowledge is poorly preserved. In addition, the management states that they have good routines for analyzation of project knowledge, where project knowledge is reviewed and analyzed by EC quality on a regular basis and information is updated in the project start-up package. The response from the survey however, although there are divided opinions, indicates that this information is poorly analyzed, and that the project start-up package is rarely updated. There are also deviating opinions regarding standardization, as the management claim that they have good standardized procedures (although not always followed), while there are divided opinions between the employees regarding the process of standardization. When it comes to organizational readjustments and changes in project scope based on project learning, there is a general agreement that TOG manages to do this successfully and that they focus on both improving existing solutions and innovation. Overall, there is a correlation between the answers from the

survey and the interviews, and there is a general agreement that TOG to some degree promotes organizational learning, but that there is much room for improvement.

4.4. Quality of the study

Following the presentation of the results of this study, it is important to keep in mind two very important concepts, which are reliability and validity. How can we determine if the assessment is reliable and valid? Firstly, the results from the survey and interviews (with a few exceptions) correlates. Secondly, the survey does not only include the business analysts conducting the projects, but also TOG's global project managers, thereby broadening the target group and reducing biased results. Thirdly, the results presented in Table 4.13 shows that there is a general agreement among the respondents in the survey and that the response to each question most commonly dominates two or three of the five categories. The numbers with a red font indicate the answers that received the highest response for each question. *Good* is the most frequent response, followed by *Neutral* and *Poor*. Fourthly, the assessment has been conducted individually and there has been no communication of the content of the survey before it was distributed. Lastly, the survey has been conducted anonymously, thus enhancing the honesty of the employees' answers to each question, which results in greater accuracy. All these elements increase the validity and reliability of the assessment.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Very Poor	1	0	0	1	0	1	0	1	0	0	0	0
Poor	3	6	10	6	6	8	0	6	0	4	3	2
Neutral	9	7	9	12	11	11	5	8	6	8	6	8
Good	10	10	4	4	6	3	17	8	15	11	14	11
Excellent	0	0	0	0	0	0	1	0	2	0	0	2

Table 4.13. Summary of the response rates of each question of the survey

One interesting aspect that was uncovered which is clearly visible in Table 4.13. is that the answers are much more *"positive"* for question 7 and 9. Both these questions relate to the individual employees, how they respond to organizational changes and how they try to acquire project knowledge before initiating new projects. This suggests that employees are less critical to questions regarding themselves than the company and the management, which may reduce the reliability of the survey.

Lastly, there is one very important aspect that should be taken into consideration regarding reliability when interpreting the results. The respondents of the survey are mainly business analysts with limited knowledge and insight into the area of project management. Therefore, although briefly explained, some of the terms introduced in the survey may cause confusions for the respondents, which could *"force"* them to answer *Neutral* to some answers due to limited knowledge. In hindsight, it may have been beneficial to provide a *"I don't know"* answer possibility to filter out inaccurate answers and improve the reliability of the results.

5. DISCUSSION

5.1. Organizational learning and knowledge transfer

The results suggest that TOG still has some way to go to become a *learning organization*, and that they lack routines and procedures for how project knowledge should be documented, stored and shared. According to the 4I framework model of organizational learning (Fig. 2.2) by Crossan et al. (1999), learning occurs in three distinct levels, the *individual-*, *group-* and *organizational level*. These three levels define the structure through which organizational learning takes place, and are bound together by the four processes*; (1) intuiting, (2) interpretation, (3) integrating* and *(4) institutionalizing* (Crossan et al., 1999). In TOG, although there are no specific routines for this, learning mainly occurs on the individual- and group level as colleagues share experiences and ask project teams that have conducted similar projects previously for information. This happens through the first three processes, *intuiting, interpretation and integrating*, although the boundaries between these levels are difficult to define as e.g. *integrating* may happen on both the organizational level and group level. However, the fourth process, *institutionalizing* only occurs at the organizational level (Crossan et al., 1999), which seems to be lacking in TOG. At this level, learning from the individual- and group level is embedded into the organization as tasks are defined and routines and procedures are created to ensure that certain actions occur (Crossan et al., 1999). This final step is as important as any of the others to achieve organizational learning, and is something that needs to be improved to better promote organizational learning within the organization.

An important requirement in organizational learning is managing and recognizing the tension between what has already been learned (feedback) and assimilating new learning (feed forward) (Crossan et al., 1999). To fully assimilate new learning into the organization, learning on the individual- and group level need to be institutionalized into the organization. In contrasts, to utilize new learning at the organizational level, learning needs to be looped back to the individual- and group level (Crossan et al., 1999). Therefore, it becomes evident that TOG struggles on both the feedback and feed forward mechanisms of learning on the organizational level. However, at the product level it is apparent that they successfully manage to use learning and customer feedback to focus on both improving their existing solutions and exploring new ways to improve their business (e.g. the development of EC Smart). This is reflected in question 12a of the survey (Fig. 4.14). For an organization, it is important to manage the relationship

between explorative- and exploitative learning to achieve strategic renewal, prosper and ensure long-term survival (Crossan et al., 1999; He & Wong, 2004; Sirén et al., 2012).

In their paper from 2004, Brady and Davis present their project capability-building (PCB) model and a concept they refer to as *project-led learning* (Fig. 2.3). Project-led learning occurs when organizations move into a new market base or technology and develop new project capabilities as they move through the three phases of project-led learning; (1) *Vanguard project(s)*, (2) *project-to-project*, and (3) *project-to-organization* (Brady & Davies, 2004). The model attempts to identify the transition from exploration to exploitation, and Brady and Davis (2004) explains that as firms move through these phases, *explorative learning* is transferred to the company and is gradually replaced by *exploitative learning*. A good example of project-led learning in TOG is the development of EC Smart, where a new project group is established to explore strategic opportunities by adapting to a changing market that requires cheaper and less complex software solutions. This is phase 1 of project-led learning. As this project progresses, the challenge will be to transfer new learning from this project to future projects (phase 2), such as implementations of EC Smart, and finally assimilating or institutionalizing knowledge and information from these projects into the organization (phase 3).

In phase one, a project group is established to explore for strategic opportunities and to move into new market bases or technology, or adapt to changes in the current environment. All experience and knowledge gained is held within the project group (Brady & Davies, 2004). To achieve double-loop learning, it is important to be prepared to break out of existing procedures that are not working to invent better procedures and to work more efficiently (Ayas & Zeniuk, 2001). This form of "unshackling" represents an important part of organizational learning and innovation. From the interviews, it is apparent that TOG employees are good at recognizing these potential pitfalls and adjusting by implementing creative solutions. However, this form of creativity does not apply to standardized processes and documentations, which should be followed more carefully as these tend to be ignored. If a need for adjustments are found in these settings, the management must be informed, and they must deal with them accordingly.

In the second phase, attempts are made to transfer new knowledge and experience from these vanguard project to other project teams that may benefit from the information (Brady & Davies, 2004). An example of this type of learning is creation of project documentations, such as final reports and technical documentations, and making these available on a company-shared

platform (e.g. SharePoint/TietoShare), intrapage, etc. This information needs to be properly communicated and made available to other project teams (Brady & Davies, 2004). There are some routines for this in TOG, but these are commonly not followed, and it is mainly up to the individual project groups to contact other individuals or project groups that have conducted similar projects previously to acquire necessary knowledge. Although they have been successful in transferring learning in such informal manners, this is a process that needs to be improved by more formalized and standardized procedures.

In the final phase, attempts are made to gather all learning and knowledge from the project and distribute it throughout all organs of the organization responsible for delivering projects (Brady & Davies, 2004). This learning is used to improve and create new routines, workflows and procedures in the company to ensure that new knowledge is embedded within the organization. This phase of learning is lacking, as stated in both the interviews and survey, and is something that needs to be improved to promote organizational learning within the company. In Chapter 5.4, some suggestions for future improvements will be presented.

As projects are conducted, knowledge and learning are acquired by the project group, but this does not imply that the knowledge is shared to the benefit of other parts in the organization (Szulanski, 2000). If this knowledge is not shared, organizational learning will be inhibited. From the results of the survey and interviews, it is apparent that TOG is good at transferring knowledge ad-hoc within the projects teams, throughout the local offices and maybe even on a national scale. However, standards and procedures for how knowledge should be transferred throughout the whole oil and gas division on a global scale is lacking. According to Bakker et al. (2011), there are five factors that strongly influence the degree of successful project knowledge transfer. These are; (1) *relational embeddedness*, (2) *cognitive embeddedness*, (3) *temporal embeddedness*, (4) *absorptive capacity* and (5) *motivation*. Observations from the survey and interviews show that the relational-, cognitive- and temporal embeddedness are all high in TOG. They have strong relationships between their project groups and customers based on mutual trust, and the project teams commonly have a well-established line of communication with TOG and the customer. In addition, as the employees conducting the projects are business analysts (except for the PM) with a mutual knowledge base, there is a greater chance for successful knowledge transfer. This implies that the problem may lie with the motivation to share knowledge and the absorptive capacity.

According to Cohen and Levinthal (1990), the absorptive capacity of an organization refers to its ability to recognize the value of new learning and knowledge, assimilate it into the organization, distribute it throughout the organization and make use of it as a competitive advantage. In TOG, there seems that most project groups and members recognize the value of new information, but the process of assimilating this knowledge into the organization often fails. This may be rooted in lack of standardized procedures for documentation, storage and sharing of project knowledge on a global scale. According to Bakker et al. (2011), the absorptive capacity of an organization may be the single most important factor for an organization to achieve successful knowledge transfer. This may be one reason why project knowledge transfer is lacking globally. The fifth factor that may influence the success of project knowledge transfer is motivation (Easterby‐Smith et al., 2008). Lack of motivation to share and receive knowledge may be a reason why procedures are not followed in TOG, something that will inhibit organizational learning within the organization. Hence, the absorptive capacity and motivation among employees to share and receive knowledge are two factors that should be improved for the future. To increase the motivation, project knowledge TOG can implement individual/group recognition and rewards, allocate more time on project documentation and knowledge sharing, and creation of a good organizational system for knowledge sharing. When it comes to the absorptive capacity, it has been argued that the absorptive capacity largely depends on a firm's innovative capabilities, knowledge management systems and information and communication technology (Cohen & Levinthal, 1990; Session, 2004). To improve their absorptive capacity, TOG should establish a framework for knowledge management and focus on institutionalizing knowledge and learning, create standardized procedures for knowledge sharing and expand the social- and knowledge networks within Tieto's oil and gas division.

There are many barriers that one must overcome to achieve successful knowledge transfer. By combining research from De Long & Fahey (2000) and Riege (2005), four potential barriers to successful transfer of knowledge are established. These are; (1) *individual barriers*, (2) *organizational barriers*, (3) *technology barriers* and (4) *cultural barriers*. However, as stated earlier, culture barriers include both individual- and organizational barriers, but is treated separately in this thesis. The individual barriers are interpreted to have a low risk in TOG. This is because there is a great social unity and an effective and well-established line of communication between employees and the management. However, during times with limited capacity and lots of projects, the amount of time allocated on knowledge sharing may be limited. Therefore, documentation of project knowledge highly depends on the time available.

The organizational barriers are interpreted to have a medium-high risk in TOG. Too little focus has been put on knowledge management, such as a knowledge sharing strategy and retaining knowledge from employees who are leaving. Previous studies have stated that a common problem in organizations is that the goals and strategies for knowledge sharing are often lacking or vaguely mentioned in the business strategy (Riege, 2005), which also seems to be the case in TOG. An infrastructure for storage of project knowledge and learning is in place, but it is not structured in an organized manner, nor clearly communicated by the management to all employees, which results in storage of project knowledge at different locations. One platform should be designated for project knowledge storage and sharing, and the benefits of this platform should be communicated by the management to all TOG employees globally.

The technological barriers are interpreted to have low-medium risk in TOG. Being an IT company, employees are good at adapting and handling different IT systems and have a realistic view of what these systems can contribute with. In addition, the Tieto corporation has a support team in India whose main purpose is to help employees all around the world with technical difficulties and in the integration of IT systems. On the negative side, there have been some challenges with the technological barriers, as information and knowledge have been lost when switching between different data storage platforms (e.g. Google Drive to OneDrive) and when employees quit or retire.

Finally, the cultural barriers are interpreted to have a medium risk in TOG. Since Tieto's oil and gas division is a global organization, there is always a possibility that cultural and national differences may inhibit the success of knowledge transfer (De Long & Fahey, 2000; McDermott & O'dell, 2001). Therefore, focus should be put on standardized solutions and better integration between individuals and offices on a domestic and international scale. Examples of this include global teambuilding activities and face-to-face interaction to improve communication when working remotely. Such face-to-face meetings between employees working in globally distributed teams prior to project initiation may often prove beneficial to improve communication within the project group. Additionally, it is important to recognize that each organizational culture is unique and that there exist no single universal strategy for how knowledge management should be implemented for all companies (Riege, 2005). However, as suggested by McDermott & O'dell (2001), it is important to be aware that a knowledge management strategy should be implemented so that it fits the organizational culture rather than

trying to make the culture to fit the strategy. This is a common pitfall to knowledge management strategies, and is an area where TOG should allocate their resources and investigate how knowledge management can be improved and customized according to their organizational culture.

5.2. Standardization

Standardization has been recognized as a crucial factor to achieve successful knowledge transfer, especially in globally distributed organizations and teams (Oshri et al., 2008). There are disagreements as to whether TOG has implemented standardized procedures for project knowledge storage and transfer. The management states that there are good measures taken to standardize processes, but these are often not followed by the project managers, and the business analysts that are implementing the projects know little or nothing of their existence. Therefore, the management needs to put more effort into communicating this information to all employees within the oil and gas division, along with the value and benefits of following these procedures and guidelines. Such standardization of workflows and documentation make it easier to gather, interpret and share information when working in global organizations where work is often conducted remotely (Oshri et al., 2008).

Previous studies have suggested that cultural differences could put constraints on cross-border transfer of organizational knowledge and may limit standardization of processes and workflows within the organization (Bhagat et al., 2002). This research corresponds with findings from the survey, where one of the respondents claims that procedures and methodologies varies according to geographical location and that this put constraints on how well knowledge is shared on a global scale. To reduce such cultural differences, TOG could arrange an annual global teambuilding, with the aim to increase the unity within the oil and gas division. This can expose employees to cultural differences and increase their responsiveness to other workflows, routines and processes. By combining the best of *"both worlds"* from all global teams and offices, TOG can create a standardized best practice way of conducting their projects globally. This in turn may result in more successful knowledge transfer between globally distributed teams and offices (Oshri et al., 2008).

In TOG, there are mainly three types of projects; (1) implementation projects, (2) upgrade projects and (3) support projects. These must be distinguished, so that separate standardized procedures for project documentations and guidelines could be implemented for each project-

type. However, all projects are unique, and it is important to include some degree of flexibility in these procedures and guidelines for project knowledge generation (Desouza & Evaristo, 2004). TOG also needs to make employees recognize the benefits of having a system with standardized routines and work methodology. By doing so, they motivate their employees to follow the standardized project methodology, which could increase the degree to which project knowledge is generated according to a standard, and stored in a structured way on a company-shared platform, easily accessible for all oil and gas employees. This enhances the ease through which project knowledge can be transferred and shared with the organization (Desouza & Evaristo, 2004).

5.3. Change management and reluctance towards change

Based on the survey (mainly question 9, 10 and 11) and the interviews, there is a general trend that Tieto's oil and gas division responds very well to change. This might be due to years of experience working in an IT company where projects are conducted dynamically, and changes in both business and operations happens rapidly. Previous research states that the IT industry is one of the most rapidly changing industries today and it is crucial that companies handle change in a good manner to stay competitive (Davidson, 2018). It has been suggested that the management's ability to handle change goes hand in hand with employees' reluctance towards change (Moran & Brightman, 2000). This implies that the management needs to properly communicate the purpose of change, new performance requirements, new roles and responsibilities to reduce the reluctance towards change among the employees. Leadership is therefore considered a highly important factor for successful change management (Gill, 2002). This is reflected in the results from the survey, which shows that the management in TOG is good at communicating the benefits of change and changing their business and approach to projects based on new project learning, customer feedback and market changes.

Within a company, change is not always considered positive and may be met with resistance within the organization due to e.g. lack of knowledge, fear of losing their jobs etc. Single-loop and double-loop learning are tools used for change management and behavior change, and can help improve employees understanding of the cause of problems and how to solve them (Argyris, 1977; Van Vliet, 2012). According to the results, TOG should focus not only on solving problems that occur, but also on processing learning from arising problems and thereby changing the underlying assumptions before initiating a new plan. This is what Argyris (1976) describes as double-loop learning and is an important type of learning, especially in a rapidly

changing environment such as the IT industry. By doing so, Tieto's oil and gas division may acquire a deeper understanding of their norms/values and can improve their decision-making in daily operations. Double-loop learning has been suggested to be a main contributor to organizational learning (Argyris, 2002). However, although double-loop learning is important, single-loop learning is the most common type of learning where we make better use of established ways of thinking (Argyris, 1976), and this must not be forgotten.

The comments from the survey, indicate that the perception of how well TOG handles change has changed over the last couple of years due to hiring of younger professionals. This has led to the abolishment of thoughts like *"We have always done it this way"* and possibly contributed to changing the mindset of the older employees. This correlates with examples from the literature which suggests that younger professionals in general are more prepared to handle change than their older colleagues (Lattuch & Young, 2011). This is because young professionals are generally more flexible early in their career compared to older colleagues who joined the corporation when career paths were generally more structured and well-defined (D'Amato & Herzfeldt, 2008). These younger employees grew up in a time where organizations were constantly forced to rethink their business models with substantial advancements in technology, which results in a more dynamic environment with rapid changes.

Although TOG has come a long way in managing change based on new knowledge, there is still an attitude of getting things done quickly without enough time to analyze and reflect on how things should be done differently. Therefore, they should put an increased focus on analyzing information from e.g. final reports, technical documentations, client feedbacks and competitors. Such valuable information needs to be recognized and institutionalized into the organization. By doing so, new knowledge and learning is transferred into the organization and can be used to change current workflows and procedures within the organization to achieve a competitive advantage in future settings (Cohen & Levinthal, 1990). Examples of this in TOG are Energy Components as a service (ECaaS, their cloud solution) and the development of EC Smart. Due to the complexity of EC and the vast number of hours needed on implementation and upgrade, EC has lost market shares to smaller and less complex software solutions. Therefore, by analyzing client feedbacks and competitors, TOG is responding to the changes in the market, and with the help of interested customers, they are developing a cheaper and less complex EC solution with the most important functionality to meet new market demands.

5.4. Improvement potential in Tieto Oil and Gas

After having processed the information gathered from the survey and interviews, several measures that could be implemented to promote organizational learning within Tieto's oil and gas division have been uncovered. After reviewing relevant literature, the most important success factors that should be focus on are presented in Table 5.1.

#	Suggestions for future improvement in Tieto Oil and Gas
1	Implementation of a globally, well-defined knowledge management framework to improve efficient knowledge sharing and inhibit compartmentalization of knowledge
2	Further development of the PMO to improve standardized routines and guidelines for how project knowledge should be generated, stored and shared within the organization. New standards should be updated in the project start-up package
3	Improve procedures for analyzing project documentations and institutionalizing new knowledge within the organization through workflows, strategies and routines etc.
4	Increased focus on organized and structured storage of all project documentations and knowledge on one dedicated platform (e.g. TietoShare or SharePoint)
5	Creation of a standardized global lessons learned document which can be referred to when troubleshooting specific issues and technical challenges that have been solved previously
6	Proper communication to all oil and gas employees regarding where project documentations and knowledge are stored. This information needs to be easily accessible to everyone
7	Implement tools for smarter search for project knowledge in existing platforms (e.g. search engine in TietoShare/SharePoint or ECpedia)
8	Create guidelines / checklist for what is expected from an employee who is leaving the company and contribute more actively in managing knowledge transfer from leaving employees to other employees and the organization
9	Implement better procedures for data migration between the old and new platforms when changing corporate platforms for data storage
10	Create a list of who conducts the various projects, their role, the project managers involved and a brief description of each project
11	Increased focus on knowledge sharing during the onboarding phase and implement specific procedures for mentoring- and training programs for new employees
12	Improve at following the procedures that are on paper instead of reinventing new procedures for every project, e.g. by following the procedures in the project start-up package for how project knowledge should be documented, analyzed, stored and shared

Table 5.1. Suggestions for how Tieto Oil and Gas can improve organizational learning

Today, companies often work towards a global market with employees situated in different geographical locations and time-zones, and there is often limited interaction between globally distributed teams. To account for this, the industry has started to recognized the value of a well-established knowledge management framework to promote knowledge sharing and organizational learning on a global scale (Gholley & Venkatramani, 2018). Efficient knowledge management requires processes for generating, storing and sharing of project knowledge, thereby inhibiting compartmentalization of knowledge and information asymmetry, and improving efficient knowledge sharing throughout all organs of a company (Gholley & Venkatramani, 2018). Because Tieto's oil and gas division is a relatively small global organization, it will benefit greatly from implementation of a good knowledge management framework. By doing so, project documentations can be generated in a structured and standardized way and stored and shared on a company-wide storage platform, easily accessible to all employees within the oil and gas division. Such standardization of processes and structured storage on a storage platform increases searchability among employees, further increasing the process of knowledge sharing. An example of how the company-wide storage platform could be organized is illustrated in Fig. 5.1.

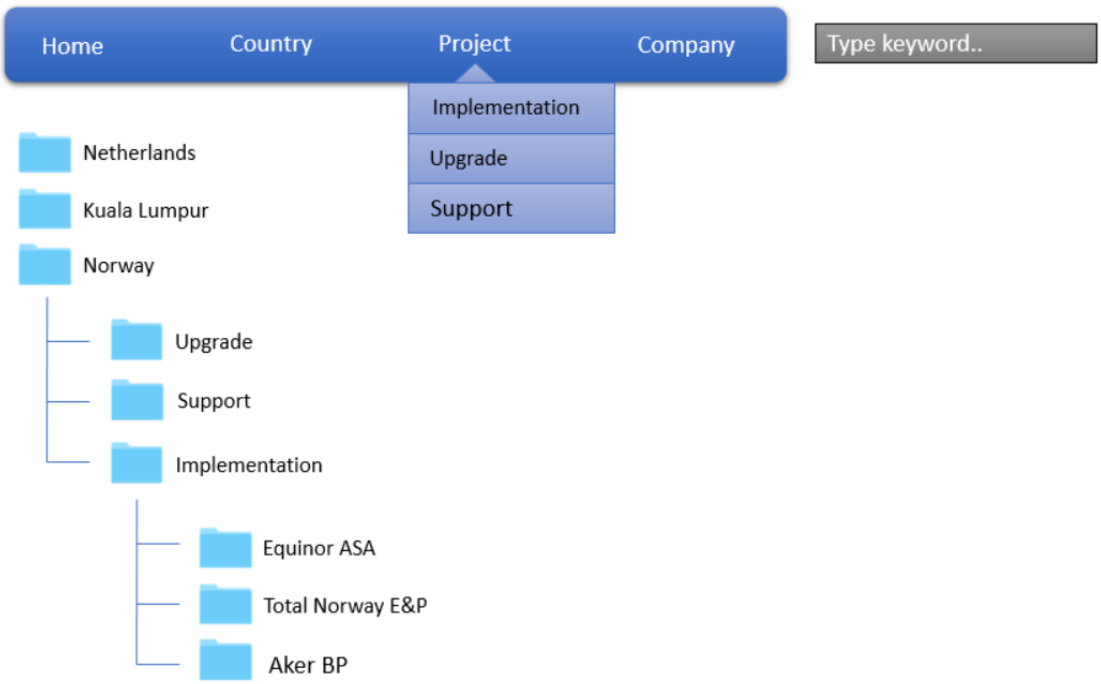

Fig. 5.1. Suggestion of an example for how the folder structure can be constructed

According to Gholley and Venkatramani (2018), there are numerous challenges global organizations are facing in terms of knowledge management. These are:

1) Lack of defined standards in capturing and storing data
2) Information existing in silos
3) Inefficient use of technology tools
4) Localized best practices
5) Reduced focus on documentation

These challenges correspond with findings and suggestions for future improvements in TOG mentioned previously in this assessment (Table 5.1). Table 5.2 provides an overview of where Tieto's oil and gas division is lacking and what they should focus on to overcome the challenges proposed by Gholley and Venkatramani (2018). Overcoming these challenges are important if they wish to create a good framework for knowledge management and promote organizational learning within the organization.

#	Tieto Oil and Gas's response to the challenges of knowledge management
1	They should implement templates and better standardized procedures for generating, storing and sharing of project knowledge. They also need to put an increased focus on following these standards. This will greatly impact the quality of the knowledge available
2	Compartmentalization of knowledge seems to be a problem due to Tieto Oil and Gas's global extent and lack of routines for knowledge sharing. This results in asymmetric information across departments and wasted time on finding relevant information/people
3	They are currently working on implementing a risk improvement log to register improvement potential based on new learning and help transfer project knowledge throughout the organization. Additionally, they use various online storage platforms, where all documentations are stored and shared between project members. However, there is no specific platform designated for this purpose, nor does there exist a knowledge searching tool for easier access of relevant data, which could greatly promote knowledge sharing
4	They have some localized best practiced, but these are not shared with the larger organization, thus limiting their impact. They should create a global best practice document for conducting projects based on previous knowledge and learning from complex projects. Certain project documentations may also be flagged as best practices
5	The degree of focus on project documentation is highly variable and depends on each individual project team and their time available. This is an area where the management needs to allocate time to enhance knowledge sharing. Additionally, lack of project documentations and knowledge may result in loss of accumulated knowledge when employees leave the company.

Table 5.2. Tieto Oil and Gas's response to Gholley and Venkatramani's (2018) challenges of KM

A study by Ungan (2006) states that consistency is an important factor for an organization to survive and grow. By standardizing processes and documentation, organizations minimize variations and increase the quality of the services or products that can be delivered to their customers (Ungan, 2006). Simultaneously, operational timeframes will be reduced, and project documentations will be easier to use for all employees. In TOG, these standardized documentations and guidelines should be located in the project start-up package that the project managers receive prior to project initiation. The content of the package should also be forwarded to all project members. However, since there are various types of projects (e.g. implementation vs. upgrade project), the packages need to be constructed so that it fits the respective projects. Therefore, I suggest that one project start-up package should be created for each of the major type of projects (implementation, upgrade and support), although some of the documents and procedures may be similar for the different types of projects.

To further support the process of standardization and efficient knowledge sharing, TOG should continue the development of their Project Management Office (PMO). Although the definitions of a PMO has evolved over the years, today, a PMO is thought of as an organizational business unit to help in standardization of project processes, sharing of resources, methodologies and tools (Darling & Whitty, 2016). The practice of PMOs are commonly referred to as *"best practice"* in regards to enhancing the success and outcome of a project, although this may not always be the case (Darling & Whitty, 2016). Therefore, the PMOs are commonly dynamic entities that change over time and require regulatory updating and has been thought of as organizational innovation of project management (Hobbs et al., 2008). To achieve this, project knowledge needs to be analyzed on a regular basis. There are some disagreements whether this is practiced in a good way or not in TOG, but the management states that there are indeed well-established procedures for continuous analyzation of new project knowledge in place. I suggest that once the PMO have been implemented for the entire oil and gas division, there should be created a group, dedicated to reviewing and analyzing project documentations and learning on a continuous or short-interval basis. The output from this analysis should be used to update the PMO, through which all project documentations, routines, and procedures are created according to a company standard. Furthermore, the project start-up package should be updated according to the PMO standards to better fit the product, market and requirements in future projects. By doing so, all global project managers and project team members are provided with the most up to date information, procedures, workflows and documentations that should be used when conducting projects.

After a project has been closed and all project documents are finished, these documents should be stored on one designated company-wide storage platform, easily accessible to all employees within the oil and gas division. To further promote organizational learning, it is important that the management properly communicate the location and importance of the storage platform and knowledge sharing in general to all employees. Once this is successfully executed, the next challenge is to utilize, distribute and finally institutionalize this knowledge. This is a weakness in TOG, as stated by the management themselves, and is an area of improvement with high potential. It has been proposed that organizational practices and technological infrastructure are two critical factors in institutionalization of knowledge management (Owino et al., 2012). According to the interviews conducted by Owino et al. (2012), most organizations had not yet implemented a policy of knowledge management, while those that did recognize the value of knowledge management had plans to implement it. However, institutionalization of knowledge management is accompanied with several challenges, such as lack of time and will for knowledge sharing, lack of rewards and recognition for knowledge sharing, development of a culture for knowledge sharing, management support and commitment, and information technology (Owino et al., 2012). These are areas where TOG needs to allocate time on improving if they wish to increase individual knowledge sharing and better absorb and institutionalize knowledge within the organization.

On their company-wide storage platform, there should be created a global *"lessons learned"* document, containing important project learning such as how new complex issues were solved and how technical challenges were overcome. By doing so, time could be saved on finding the solution of a problem which is often quite time-consuming as people tend to remember the problem, but not the solution. Collecting and documenting lessons learned from projects have been recognized as an important factor to successfully manage projects and learn from previous failures and successes (Duffield & Whitty, 2015). However, this is a process that rarely happens, and when it does, it most commonly does not deliver the intended results (Schindler & Eppler, 2003). Therefore, this process needs to be closely managed, and like all other documented project knowledge, this "lessons learned" document needs to be constructed in a structured and standardized way to improve searchability among employees. To further increase the searchability in their storage platform or project portal, I suggest that TOG create a filtering system or a search tool that allows their employees to search more efficiently for relevant information. However, without knowing exactly what you are looking for, a search bar that enables you to type in a part of the file-name is difficult to use. Therefore, by adding a tag(s) to

all stored project documentations, one could easily filter out information by the most relevant tag(s) independent of the file-name. However, stored project knowledge commonly has limited accessibility and can often not be found even when searching for the right file-name or added the specific project tag. This problem of accessibility regarding stored project knowledge that does not involve confidential information is something TOG should focus on improving.

Another area where TOG can improve is in their handling of data when employees quit or retire. Managers need to contribute more actively in the process of transferring knowledge from these individuals to other employees and throughout the organization. This include allocating employees on different projects and customers so that no employee is irreplaceable, and creating guidelines for what is expected of an employee who is leaving the company. This is indeed practiced at some level, but due to lack of formalized procedures and routines, this is commonly handled by the individual managers in the different offices or countries. This is an area that needs to be improved, and formalized routines should be institutionalized within the organization to limit loss of knowledge and customer relations in these situations. According to Peña (2013), organizations often lack sufficient transfer programs and procedures to limit losses when employees leave. This in turn may result in loss of institutional knowledge, translating to lower institutional efficiency and higher costs. Peña (2013) states that one important action is to identify critical knowledge held by the employee who is leaving and implement necessary steps to preserve this knowledge and institutionalize it. One way of doing this is by arranging mentoring programs by transferring this knowledge to younger employees (Peña, 2013). Other ways of limiting the loss of institutional knowledge is through documentation processes, job sharing, specialized training programs, video content and presentations by the older more experienced employees (Peña, 2013). Some of these activities, e.g. face-to-face training courses, online onboarding videos and mentoring programs are practiced in TOG, but as previously mentioned, this highly depends on the individual managers and the time and projects available, as there are no implemented guidelines for this purpose. Even the online onboarding process may be limited, as it might be tempting to give new employees early hands-on experience and make them profitable in projects as fast as possible. However, by doing so, one may limit transference of necessary knowledge needed to contribute efficiently in future projects.

The process of data migration between storage platforms in TOG is lacking, and better routines are needed to handle migration of data. This include when employees leave and when the

company change from one platform to another. The employees have stated that multiple substitutions of such platforms during the recent years have resulted in loss of data due to poor routines for data migration and confusion regarding where project data should be stored. Although information regarding where project information should be stored is found in the project start-up package, this information needs to be properly communicated to all oil and gas employees and not just the project managers when organizational changes happen. Baron & Markman (2000) stated that in addition to a well-established social network, effective communication, through both verbal and written communication is an important factor for successful knowledge sharing. Therefore, in addition to written information in the project start-up package, important information should be conveyed orally as well. This should be a combined effort from the management on a regional scale and the project managers on a more local scale.

As previously stated, in TOG, the most common form of knowledge sharing is through unformalized interaction between employees. This process of knowledge sharing should be developed so that routines and procedures for knowledge sharing become institutionalized within the organization and the degree of knowledge sharing increases. Previous research have proposed multiple factors that foster knowledge sharing (Cabrera & Cabrera, 2005). Many of these factors are recognized in Tieto's oil and gas division, but there are also some areas where they are lacking. This include assessment of communication skills, training in how to communicate knowledge and creation of incentives for knowledge sharing (e.g. rewards). Other measures to promote knowledge sharing include creation of open landscapes, implementation of knowledge sharing software and increased focus on knowledge sharing during the onboarding phase (Youngren, 2015). In TOG, there is an open landscape culture, but limited software solutions for knowledge sharing, other than the risk improvement log and platforms for knowledge sharing. Furthermore, the onboarding could include more information regarding the actual process of knowledge sharing within the company, and mentoring and job shadowing routines should be less ad-hoc than they are today. In addition to these formalized ways of sharing knowledge, there should also be put an increased focus on the unformalized ways of knowledge sharing since these are important in the organization. An example of this is by creating a list of who conducts the various projects, the project managers involved and a brief description of each project. As EC quality is supposed to review and analyze all project documentations, they should also be made responsible for maintaining and updating this list on a regular basis. For each project they add to the list, they should include a tag (e.g. Revenue

implementation, Aker BP) which can be used as a filter in a project knowledge search tool or their online storage platform. It is important that this list is shared with, and made available for all employees within the oil and gas division. By doing so, TOG creates transparency, make it easier to find relevant information online and promotes unformalized interaction between employees in their search for other employees that have experience dealing with similar projects and problems. The results from the survey and interviews show that such unformalized communication between employees is considered a very important factor for transference of knowledge within the Tieto's oil and gas division.

Although information regarding generation, storage and transfer of project knowledge may be implicit for employees with multiple years of experience, this may not be the case for graduates and other new employees. Therefore, efforts should be taken to focus on the process of knowledge sharing already during the onboarding. According to the survey conducted by UrbanBound, 37 billion dollars are spent annually on employees who do not understand their jobs, and 35 % of all companies spend 0 dollars on onboarding (Baumann, 2018). Hence, there lies a tremendous potential for better productivity and knowledge management in the onboarding process, and it's an ideal time for the employer to convey necessary information to new employees regarding how they should do their job well (Rhatigan, 2016). TOG has an excellent onboarding program, where new employees can gain insight into various work and business processes within the company, how to arrange meetings through skype, how the intraplatform works, how to fill out your hours and much more. However, the topic of knowledge transfer and organizational learning is an area that is not extensively covered during the onboarding and is an area where TOG can improve.

Lastly, one problem that seems to be reoccurring in TOG is that the project groups should be better at following standardized routines, documentations and procedures that are in place rather than customizing these for every project. All necessary information and documentation should be in the project start-up package and should be followed so that all project documentations are created according to a standard, and shared with the oil and gas division on one designated storage platform. A good example of this is TOG's Upgrade Factory, which is now currently being used by the Netherlands office. Here, all assets that are upgraded are treated the same way, with standardized workflows and documentations, which provide easier collaboration between assets and better searchability. This offers better teamwork across all assets, but it may be difficult for other employees within Tieto's oil and gas division that are not familiar with the

Upgrade Factory to contribute at an early phase as they utilize unfamiliar procedures and standards for documentation and workflows. Therefore, all procedures, workflows and documentations should be to the best of their ability standardized on a global scale for better and easier collaboration between all of TOG's offices globally. This corresponds with research by Oshri et al. (2008), who recognized standardization as an important factor in achieving successful knowledge transfer, especially in globally distributed organizations. In addition, when working in globally distributed project teams, the management should arrange face-to-face meetings in an early phase of the project to establish some form of relations between the counterparts (Oshri et al., 2008). The project group should also arrange regular meetings, preferably through video conferences. By doing so, TOG promotes good communication and teamwork, which forms the foundation through which standardized routines and procedures are followed, thereby enabling successful knowledge transfer between globally distributed teams and offices.

6. CONCLUSION

In globally distributed organizations working across multiple time-zones with limited interaction between teams, it is imperative with a well-defined and effective framework for knowledge management, which in turn can promote organizational learning. To achieve this, it is important that companies establish standardized procedures for generating, storing and sharing of knowledge throughout the firm on a global scale to harness the potential of such knowledge. By doing so, companies increase their ability to limit compartmentalization of knowledge, increase innovation, increase the degree of successful knowledge transfer and increase their ability to respond to challenges more quickly, thereby gaining a competitive edge in the market. This research aims to provide a better insight into how organizational learning is practiced within Tieto's oil and gas division.

The results from the survey and interviews indicate that there is a general correlation between the understanding of the employees conducting the projects and that of the management regarding the process of organizational leaning within TOG. Overall, there seems like organizational learning is practiced to some degree, as shown from Fig. 4.3, where 83 % have stated that organizational learning is promoted in a good or neutral way. However, their answers suggest that there are multiple areas that need improvements, which are presented in Table 5.1. The main findings from this research are as follows:

- Standardized project documentations, guidelines and workflows should be in the project start-up package, which should be updated on a regular basis. These are only followed to a varying degree and appears to be deviating according to geographical location
- TOG should continue their development of the PMO globally to improve their project standards, making employees aware of these and making sure that they are indeed followed. This could increase project management efficiency and delivery
- A good framework for knowledge management should be established to inhibit compartmentalization of knowledge, information asymmetry and improve efficient knowledge sharing through all organs of the organization
- Although there are deviating opinions between the management and employees regarding the process of project knowledge analyzation, TOG should improve

analyzation of project knowledge and work towards institutionalizing new knowledge within the organization through e.g. workflows, systems, processes etc.

- The process of knowledge sharing lacks proper procedures and depends too much on individual motivation to share and receive knowledge, and social relations within the company. Focus should be put on knowledge sharing already during the onboarding
- Multiple platforms for storage of project knowledge have been used during the recent years, which have resulted in confusions regarding the actual storage location. One structured and organized platform should be dedicated for this purpose. Knowledge sharing tools could also be implemented to further improve searchability
- Tieto's oil and gas division needs to communicate where to find and store project knowledge to all employees in the oil and gas division, especially to new employees during the onboarding
- The degree to which knowledge and experience is preserved when employees quit or retire depends too much on each individual manager, and is highly variable due to lack of proper procedures and guidelines for this
- Poor routines for data migration when changing storage platforms and when employees are leaving have resulted in loss of valuable data
- Tieto's oil and gas division and their employees respond very well to organizational changes and manage to adjust based on new project knowledge and market needs (e.g. the development of EC Smart)
- TOG manages to focus on both explorative- and exploitative learning

An interesting approach for future research would be to conduct two separate surveys, one with all project managers and one with all business analysts, both on a global scale. By doing so, one might observe if there is asymmetric information between the project managers managing the projects, and the business analysts conducting the projects regarding e.g. the content of the project start-up package. This may include deviations in procedures, routines and workflows for how projects should be conducted and how knowledge should be documented, stored and shared. If there is indeed asymmetric information between the two groups, this may indicate poor communication from the management, and/or between the project managers and project groups. This in turn may inhibit effective transfer of knowledge and organizational learning.

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APPENDIX 1 – Survey and Interview Guide

This thesis aims to answer how Tieto's oil and gas division promotes organizational learning and knowledge transfers between projects, how they assimilate it into the organization, and how they respond to organizational changes. I believe there lies a tremendous potential in proper procedures for generating, storing and sharing of project learning, and my goal is to uncover shortcomings where TOG can improve to promote organizational learning within the organization. Change management has been included in the assessment to understand how change is handled, which is an important factor if the organization is to adjust to achieve successful knowledge transfer and organizational learning. If employees are unable to learn from previous experience, and change how they approach new projects, the company will not be able to achieve organizational learning. In this assessment I wish to discuss the following topics:

- Routines for generating, storing and sharing of project knowledge and learnings
- How project documentations such as technical documentations/reports are practiced
- Encouraging and motivational factors for sharing and receiving knowledge
- Employees' willingness and response to change and the management's ability to handle change
- Change management, including project approach, scope and risk

For this assessment, I wish to observe how the management perceive their approach and routines to the presented topics and compare them to that of the other employees to see if their opinions correlate with that of the management. Therefore, I have created a survey for the EC services department in Stavanger and the global project managers in within Tieto's oil and gas division, which will be compared to a more extensive interview with the management. The survey has been conducted anonymously to preserve integrity and provide the most accurate results. However, the identity of the interviewees, Bente Helland and Liv-Janne Nergaard, are known to create transparency in the assessment and build trust towards the management. All subjects of the survey will be provided a link to an online google sheet where all questions will be provided, and the survey will be handed in anonymously. I have asked everyone to provide an honest and subjective opinion. This allows me to provide the most accurate results and recommendations for measures TOG could make to stimulate organizational learning.

Interview with the management

1) What are your routines for transfer of knowledge and learning from:
    a. Project to project
    b. Project to organization
2) Final reporting and technical documentations may be important factors for transference of knowledge.
    a. How are these documents stored and preserved in the organization?
    b. How is this information used to improve the workflow in future projects?
3) A common problem is that project documentations are often not utilized.
    a. How do you make these documents known in the organization?
    b. Do you have a mutual platform in Tieto for storage of knowledge and learning from completed projects?
    c. If so, is this platform known and easily accessible for all employees?
4) Leadership is considered a highly important factor to achieve successful change management and organizational learning
    a. In what way(s) do you encourage your employees to use project documentations or in other ways share and transfer knowledge and experience?
    b. Do you use any motivational factors to achieve this?
    c. Do you consider it a greater challenge to get your more experienced seniors to be open to and share and receive new knowledge and learning?
    d. Do you approach these employees in a different way than the juniors?
5) Without proper analysis of gathered knowledge and learning it may be difficult to uncover useful information and improve future decision-making.
    - How do you process and analyze new project learning and knowledge?
    - Do you have any periodical routines for this? (e.g. monthly, yearly)
6) If no precautions are taken, knowledge and experience may often be lost when employees quit or retire.
    a. In Tieto, how is knowledge and experience preserved in the organization when employees leave?
    b. Any specific procedures?
7) Standardization is an important factor in achieving successful knowledge transfer and may contribute to easier storage and access of data and reduce ambiguity.

a. Do Tieto have standardized routines for generating, storing and transfer of project knowledge?

8) Employees reluctance towards change may greatly inhibit organizational learning.
   a. How do you feel employees respond to organizational change?
   b. Do you see a pattern in who opposes and who welcomes organizational change? (e.g. age, habits, position etc.)
9) The IT industry is an evolving and highly competitive market. To survive, it is crucial for the management to identify improvement potential and handle change in a successful manner.
   a. How do Tieto adjust the organization and approach to projects based on knowledge and learning from projects? (e.g. final reporting or documentations)
   b. Do you feel previous results and learnings are used to improve and define the scope for future clients?
10) In the IT industry, it may be tempting to focus solely on innovation to try to gain a competitive edge in the market and not fall behind.
   a. How do you weight the relationship between innovation (exploration) vs. improving existing solutions (exploitation)?
11) Do you have any additional comments or thoughts of how Tieto can further promote organizational learning within the organization?

Survey for the EC services department and the project managers

1) Please state your gender
    - Male
    - Female
2) Please state your age
    - 20-35
    - 35-50
    - 50 +
3) Organizational learning is the process of creating, retaining, and transferring knowledge within an organization to improve current processes. To what degree does Tieto promote organizational learning?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
4) Final reporting and technical documentations of projects are considered long-term investments and may contribute to organizational learning. To what degree is this practiced in Tieto?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
5) Even though technical documentations are created, they are often not utilized. To what degree does Tieto make these documentations known among the employees and encourage them to use these?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
6) Without proper analysis of gathered knowledge and learning it may be difficult to uncover useful information and improve future decision-making. To what degree does Tieto focus on analyzation of project learning?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
7) To what degree does Tieto encourage employees to share and receive project knowledge and learning? (e.g. a common platform for storage of project learning?)
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Name examples**
    - **Do you have any suggestions for improvements?**

8) When employees quit or retire, their knowledge may be lost or assimilated into the organization. To what degree does Tieto manage to preserve experience and knowledge in these cases?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
9) To what degree do you yourself try to acquire knowledge (e.g. from colleagues or shared drive) from similar projects before the start of a new project?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
10) Standardization is an important factor in achieving successful knowledge transfer and may contribute in easier storage and access of data, reduce ambiguity and increase quality. To what degree does Tieto standardize routines for generating, storing and transfer of project knowledge? (e.g. final reporting and technical documentation)
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
11) Employees reluctance towards change may greatly inhibit organizational learning. To what degree do Tieto employees respond to organizational change? (e.g. opposes or welcomes change)
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
12) Leadership is considered a highly important factor to achieve successful change management. To what degree does Tieto manage to adjust the organization and approach to new projects based on knowledge and learning from previous projects?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
13) To what degree are previous results and learnings used to improve and define the scope for future clients?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**
14) In the IT industry, it may be tempting to focus solely on innovation (explorative learning) to try to gain a competitive edge in the market. To what degree does Tieto manage to also focus on improving existing solutions (exploitative learning)?
    - **Very poor ( ) – Poor ( ) – Neutral ( ) – Good ( ) – Excellent ( )**
    - **Do you have any suggestions for improvements?**

APPENDIX 2 – Results from the survey

The results from the survey are listed in the two figures below, which have been used to create the diagrams in Chapter 4. Q1a through Q12a refers to Question 1 through Question 12 (Part A) from Table 3.1, while A1 through A23 refers to the 23 anonymous individuals that responded to the survey.

	Gender	Age	Q1a	Q2a	Q3a	Q4a	Q5a	Q6a	Q7a	Q8a	Q9a	Q10a	Q11a	Q12a
A1	Male	50+	Neutral	Neutral	Poor	Neutral	Neutral	Neutral	Neutral	Good	Excellent	Good	Good	Excellent
A2	Male	20-34	Good	Neutral	Poor	Good	Good	Neutral	Good	Good	Neutral	Good	Good	Good
A3	Female	35-49	Good	Good	Good	Neutral	Neutral	Neutral	Good	Good	Good	Good	Good	Good
A4	Male	35-49	Neutral	Good	Good	Very Poor	Poor	Very Poor	Excellent	Poor	Excellent	Poor	Poor	Poor
A5	Male	50+	Good	Good	Neutral	Good	Neutral	Good	Good	Neutral	Good	Neutral	Good	Good
A6	Male	50+	Good	Poor	Neutral	Good	Good	Poor	Good	Good	Good	Good	Good	Poor
A7	Male	35-49	Neutral	Good	Neutral	Poor	Neutral	Poor	Neutral	Neutral	Good	Neutral	Poor	Neutral
A8	Male	50+	Neutral	Poor	Neutral	Neutral	Poor	Neutral	Neutral	Neutral	Good	Neutral	Neutral	Neutral
A9	Male	50+	Poor	Good	Poor	Poor	Neutral	Neutral	Good	Poor	Good	Good	Good	Excellent
A10	Female	20-34	Poor	Poor	Good	Neutral	Neutral	Neutral	Good	Neutral	Good	Neutral	Good	Good
A11	Female	50+	Poor	Good	Poor	Neutral	Poor	Poor	Good	Good	Neutral	Poor	Neutral	Neutral
A12	Male	20-34	Good	Good	Neutral	Neutral	Poor	Neutral	Good	Good	Neutral	Good	Neutral	Neutral
A13	Female	35-49	Neutral	Neutral	Neutral	Poor	Neutral	Poor	Good	Neutral	Good	Good	Good	Good
A14	Male	50+	Very Poor	Neutral	Poor	Poor	Poor	Poor	Good	Poor	Good	Poor	Poor	Neutral
A15	Male	35-49	Neutral	Poor	Poor	Poor	Poor	Neutral	Good	Very Poor	Neutral	Poor	Neutral	Neutral
A16	Male	50+	Good	Neutral	Poor	Neutral	Good	Good	Good	Good	Good	Neutral	Good	Good
A17	Male	35-49	Good	Neutral	Good	Neutral	Good	Poor	Good	Good	Good	Good	Good	Good
A18	Male	35-49	Good	Good	Neutral	Good	Good	Neutral	Good	Poor	Good	Good	Good	Good
A19	Male	35-49	Good	Neutral	Poor	Neutral	Neutral	Neutral	Neutral	Neutral	Good	Neutral	Neutral	Neutral
A20	Male	35-49	Neutral	Poor	Poor	Poor	Neutral	Neutral	Good	Poor	Neutral	Neutral	Neutral	Neutral
A21	Male	35-49	Good	Good	Neutral	Neutral	Neutral	Good	Good	Neutral	Neutral	Good	Good	Good
A22	Male	35-49	Neutral	Good	Neutral	Neutral	Good	Poor	Neutral	Neutral	Good	Good	Good	Good
A23	Male	50+	Neutral	Poor	Poor	Neutral	Neutral	Poor	Good	Poor	Good	Neutral	Good	Good

Summary

	Q1a	Q2a	Q3a	Q4a	Q5a	Q6a	Q7a	Q8a	Q9a	Q10a	Q11a	Q12a	Total
Very Poor	1	0	0	1	0	1	0	1	0	0	0	0	4
Poor	3	6	10	6	6	8	0	6	0	4	3	2	54
Neutral	9	7	9	12	11	11	5	8	6	8	6	8	100
Good	10	10	4	4	6	3	17	8	15	11	14	11	113
Excellent	0	0	0	0	0	0	1	0	2	0	0	2	5

	Age
20-34	3
35-49	11
50+	9
Total	23

	Gender
Male	19
Female	4
Total	23