DEPARTMENT OF APPIED INFORMATION TECHNOLOGY

THE POTENTIAL OF ORGANISATIONAL LEARNING FOR TECHNICAL COMMUNICATORS

A case study of a large Swedish consultancy company in the process of redeveloping its training support structures

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Abstract

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Purpose: The overall purpose of the study is to understand how Knowledge Management Systems (KMS) can support the learning of technical communicators. This is examined through the case of a large Swedish consultancy company in the process of redeveloping its training support structures for technical communicators.

Theory: This study on organizational knowledge flow is built upon Lave and Wenger's theory of situated learning claiming that all learning processes are inseparable from social practice, so that are embedded in everyday activities where knowledge is created and transferred. The most important aspect of the theory relevant for this research lies in fact that it could be applied to an organizational context, where legitimate peripheral participation and communities of practice are regarded to be cornerstone of knowledge management supporting problem solving and professional skills development, helping organizations to retain employees and, as a result, preserving knowledge within the company. Moreover, KMS are considered to be an important component of communities of practitioners, as are deeply context-based and inseparable from communication processes.

Method: Semi-structured interviews were chosen as a primary collection method for this study to examine both personal problems of each employee in his work with KMS and document a wide range of experience as well. Moreover, thematic method was chosen to conduct qualitative data analysis of the study. The reasons for choosing this method are related to its effectiveness in picking out the most important elements from data in relation to research questions. Moreover, it offers simple and theoretically adaptive approaches, as this method is based on search for themes and relevant patterns.

Results: The study has revealed that technical communicators use a combination of methods and sources in a process of knowledge creation, from E-learning to seminars and workshops. Regarding KMS the dominant challenges of the existed system have been revealed as well as methods for its improvement have been suggested.

Foreword

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List of abbreviations

KMS – Knowledge management system

CoP – Communities of practice

LPP - Legitimate Peripheral Participation

HCD - Human-Centered Design

HCI - Human-Computer Interaction

1. Introduction

Knowledge has come to be recognized as one of the most important resources for business, as production requires involvement of various specialists possessing different types of knowledge. For consultancy companies, in particular, knowledge itself has become one of the main products to sell (Przemysław & Zamojska, 2017; Grant, 1996). The importance of vocational training has been raised correspondingly. In accordance with Acton and Golden (2003), 90 per cent of employees see vocational training as an important aspect of career growth and development within a company. Moreover, a well-designed training increases job satisfaction, employee commitment and performance, thus strengthening organization's competitiveness (Acton & Golden, 2003). As a result, many companies have changed policies, adopted new frameworks and committed effort and finances to the development of training programmes in order to stay competitive in their market (Acton & Golden, 2003). From this perspective, companies have started implementing Knowledge Management Systems (KMS) as an effective tool for managing organizational knowledge.

KMS are recognized as both social infrastructures and IT-based systems designed specifically to support and develop organizational processes of knowledge creation and transfer (Alavi & Leidner, 2001; Assegaff & Hussin, 2012). IT-based and social systems are equally important and alone can not fully organize knowledge flow as the former are good at delivering explicit knowledge to manage information effectively, while the latter are appropriate for distributing tacit knowledge through socialization (Assegaff & Hussin, 2012). While knowledge is considered to be a strategic company's resource, KMS are critical for organizational success in a way that they help to create and transfer tacit and explicit knowledge more effectively at both individual and collective levels in a company to obtain better results (Calvo-Mora, Navarro-García, Rey-Moreno & Periañez-Cristobal, 2016).

The focus of this study is to understand how KMS could support learning processes of new technical communicators in a consultancy enterprise. To date, there have been many studies related to exploring how technical communication knowledge from an educational setting is transferred to a workplace environment, and what are the ways to enhance academic-practitioner dialog (cf. Kohn, 2015; Kramen-Simpson, 2015; Whiteside, 2003). However, little research has examined how technical communicators, specifically novices, create and transfer knowledge directly in a workplace setting. In relation to KMS, much of the existing literature presents the effectiveness of KMS from the perspective of companies, rather than employees themselves (cf. Allen & Eby, 2003; Bjørnson & Dingsøyr, 2005; Hansen, Nohria & Tierney, 1999;). Moreover, little research attention has been paid to how technical communicators use KMS in their process of organizational knowledge flow.

The overall purpose of the study is to understand how KMS can support the learning of technical communicators, with the main focus on new employees. This is examined through the case of a large Swedish consultancy company in the process of redeveloping its training support structures for technical communicators. Therefore, the following research questions have been defined for the purpose of the study:

RQ1: How does knowledge management function for technical communicators in a consultancy company?

RQ2: What exist for implementing KMS, and how do they relate to the current practices of technical communicators in a consultancy setting?

In relation to the research questions, this study has the following structure; Chapter one presents the background section where the description of the research domain, significance and the aim of the study are presented as well as research questions are unpacked. Chapter two consists of three sections and represents a broad analysis of existing and relevant to the research questions literature. The main concepts used throughout the study (organisational learning, KMS, technical communication) are introduced here. Following this, Chapter three presents theoretical background used to frame this research. The next section, Chapter four, describes methods of data collection and analysis as well as ethical considerations and validity. Findings of the study are presented in Chapter five. The results are separated in accordance with the research questions and include quotes from the interviews. Chapter six presents a discussion section where the results are analysed and enhancement is suggested. The study finishes with an overall conclusion and includes implications for academia and industry as well.

2. Literature review

This chapter presents a review of relevant literature related to the field of technical communication and knowledge processes for practitioners of this field. It also examines the literature to identify practices for the use of Knowledge Management Systems (KMS) in technical communication organisations. Literature review is divided into three parts, and starts with the description of the concept of organizational knowledge, then the field of technical communication is presented, and the chapter finishes with highlighting KMS practices of relevance for technical communication organizations that can be identified in the literature. The method of analysis of the existed literature was systematic review. This method helped to solve the problems associated with selecting the appropriate literature among the multitude of published research studies in a way that only relevant to a single research question materials were reviewed (Kirch, 2008).

2.1. Organizational knowledge

This part of the study presents the concept of organizational knowledge. In the beginning a definition of knowledge is introduced as well as the ways of its creation and transfer. Later it describes several types of knowledge used in organizations as well as strategies of its management.

2.1.1. Defining knowledge

Knowledge is a multifaceted concept with multiple logically intertwined meanings (Muchlup, 1980), and most of the existing literature addresses the epistemological notion of knowledge defining it as a *"justified true belief"* (Nonaka, 1994, p.15). Generally, knowledge can be defined as information that is verified through experience, so that represents valuable form of data structured for making well-reasoned decisions (Magnier-Watanabe & Benton, 2017).

Generated in the mind of a person, knowledge is seen as a combination of all the individual's experiences, beliefs and values that form the basis for further formation of a new knowledge (Davenport & Prusak, 1998; Karkoulian, Halawi, & McCartwrite, 2008; Nonaka, 1994; Grant, 1996). All individual's knowledge is tacit in nature, so that is defined by the actions people take and attitudes they have for things they deal with (Schön, 1983). Muchlup (1980) does not separate the growth of knowledge from the process of maturation, as individual's knowledge increases when, for example, superficially learned material examined in detail and a deep understanding of the subject comes. In contrast to Muchlup, Popper (2002) considers that knowledge progresses when individuals construct theories and propose ideas that are governed by criticism or *"refutations"* (p. vii). In other words, by means of criticism, individuals become more familiar with the problem they're trying to solve, as they start understanding the problem more deeply, so that their knowledge grow (Popper, 2002) .

Knowledge is central to several research traditions such as organizational learning, management of technology and managerial cognition (Grant, 1996). Organizational learning is one of the main tools of knowledge management used by companies to increase employees' knowledge and skills and, therefore, build competitive advantage of a company. Moreover, organizational learning is embedded into workplace and developed through communities of practice, that is regarded to be cornerstone of

knowledge management supporting professional skills development and preserving knowledge within a company (Acton & Golden, 2003; Wenger, 2004). These two factors are in the main interest for this work and are discussed further in the study.

2.1.2. Defining organizational knowledge

Knowledge can be viewed as the most strategically important resource for an organization (Grant, 1996), that is often stored not only in documents or the systems, but in organizational routines, practices and norms (Magnier-Watanabe & Benton, 2017). In accordance with Argote and Ingram (2000), organizational knowledge is embedded in individual members; company's tools and technologies; tasks and interrelations and it can also be presented as a combination of all of them.

Organizational knowledge can be presented both on personal and organizational level, where the former results in individual learning and experience, while the latter is seen as a unification of all the employees knowledge in a company with the information built into the enterprise's framework (Davenport & Prusak, 1998) and mechanisms that manage this knowledge (Przemysław & Zamojska, 2017; Grant, 1996; Nonaka, 1994). This means that if organizational knowledge embodies each employee's knowledge with that of the others, the company should provide its employees with guidance and mechanisms on how such knowledge could be accumulated (Grant, 1996). In order for these mechanisms be an attractive and cost-effective solution for a firm to easily store, codify and share information among its employees (Hansen, Nohria & Tierney, 1999) two types of knowledge should be taken in consideration.

2.1.3. Types of knowledge

As was mentioned earlier, knowledge is deeply individual, and represents a product of interaction between the cognition and reality (Magnier-Watanabe & Benton, 2017). However, not all knowledge can be easily formalized, because such cognitive parts as beliefs or experiences can hardly be expressed with words or numbers (Polanyi, 2013). Based on this concept Polanyi (2013) identifies two types of knowledge: tacit and explicit. According to Grant (1996), the critical distinction between these two types lies in the fact that they apply different mechanisms and strategies to transfer knowledge across individuals, space and time. Briefly, explicit knowledge is revealed through communication, while tacit knowledge can not be directly transferred and can be revealed through its application (Grant, 1996). The descriptive analysis of each type of knowledge is presented in subsections 2.1.3.1. and 2.1.3.2.

According to Nonaka (1994), tacit and explicit knowledge are continuously intertwined and interchanged in a process of organizational knowledge flow, and serve as a central theme to stimulate the formation of new ideas and concepts. These interchanges are seen as modes of knowledge conversion named *"externalization", "internalization", "socialization"* and *"combination"* where knowledge is transformed from tacit to explicit or inversely, and even in terms of the same mode (Nonaka, 1994, p.19; Magnier-Watanabe & Benton, 2017). For example, individual's tacit knowledge converts into explicit one through collaboration and shared experience that is a part of "socialization" process, while "combination" originates in information processing (Nonaka, 1994; Song & Chermack, 2008). Moreover, "combination" and "internalization" modes are used in companies with hierarchical

organizational structure, while "socialization" and "combination" are the features of self-organizing teams (Nonaka, 1994). Figure 2.1. demonstrates the modes of knowledge conversion and is presented below.

	Tacit knowledge	Explicit knowledge
	To	
Tacit knowledge	Socialization	Externalization
Explicit knowledge	Internalization	Combination

Figure 2.1. Modes of knowledge conversion by Nonaka (1994)

For the present study revealing the distinction between tacit and explicit knowledge is essential for further work with Knowledge Management Systems (KMS) in order to understand which type of knowledge is the most relevant for the company, so that increases organizational performance and innovation (Magnier-Watanabe & Benton, 2017). Moreover, the transfer of explicit and tacit knowledge often occurs simultaneously, meaning these two types of knowledge should be examined together.

2.1.3.1. Tacit knowledge

As all personal knowledge is tacit in nature (Schön, 1983), it is hard to define and communicate as it *"operates on an internal action that we are quite incapable of controlling or even feeling itself"* (Polanyi, 2013, p.14). Tacit knowledge can not be codified or transferred directly as it can only be discovered through its utilization and obtained directly through practice even without any communication (Grant, 1996; Nonaka, 1994).

Magnier-Watanabe and Benton (2017); Nonaka (1994); Karkoulian, Halawi and McCartwrite (2008) argue that tacit knowledge includes cognitive elements called "mental models" (ideas, strategies, beliefs) that are constructed on the basis of an individual's previous experience, existing in his mind and directing his operations. Besides cognitive elements, there are also technical ones that cover skills, abilities and techniques applied to specific contexts (Nonaka, 1994; Magnier-Watanabe & Benton, 2017). Thus, one individual can obtain tacit knowledge such as mental models or technical skills through direct participation in projects, by means of observation or imitation (Teerajetgul & Chareonngam, 2008).

One of the challenges for organizational knowledge lies in the fact that with practice the actions of employees become mechanical, so by spontaneously addressing to the tacit knowledge they run a risk of *"negative knowledge"* to be transferred (Machlup, 1980, p.144), i.e. wrong information, that is further applied to practice (Schön, 1983). As a result, employees can use wrong knowledge in a work

with a client thus affecting the image of the company. In this sense Schön thinks that reflection-in-action can help to eliminate this problem, as it presents a corrective process through which a practitioner *"can surface and criticize the tacit understandings that have grown up around the repetitive experiences of a specialized practice, and can make new sense of the situations of uncertainty or uniqueness which he may allow himself to experience"* (Schön, 1983, p.61).

Taken together, these results suggest that while tacit knowledge is believed to be the most important source of knowledge, relying on this type only can make an organization face one major problem. As tacit knowledge can not be documented but only transferred through practice, the process of information transfer among employees becomes slower, so that a company might have to increase the costs while finding new effective knowledge transfer solutions (Grant, 1996). This provides the necessity for an organization to concentrate on the aspects of explicit knowledge as well.

2.1.3.2. Explicit knowledge

Although much of the existing literature on organizational knowledge is dedicated to the discussion of tacit knowledge transfer, relatively little attention has been paid to explicit one. The main reason could lie in fact that explicit knowledge does not require high levels of embeddedness (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004) and can be documented and transmitted through formal language or with the use of information technologies (Karkoulian, Halawi, & McCartwrite, 2008; Magnier-Watanabe & Benton, 2017; Nonaka, 1994). To clarify, explicit knowledge is a kind of objective knowledge that can be transferred via written materials and is referred to the knowledge of facts, figures and theories that can be revealed through communication (Grant, 1996).

The main advantage of the explicit knowledge to be codified and be openly published is that it does not require a high level of socialization, so employees, despite their geographical distribution, can freely access all the necessary information (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004; Argote & Ingram, 2000; Hansen, Nohria & Tierney, 1999). On the other hand, such information can be easily replicated so that it would no longer serve as an advantageous source of knowledge and make a company vulnerable among the competitors (Hansen, Nohria & Tierney, 1999; Grant, 1996). Moreover, explicit knowledge can lead to misinterpretations and misconceptions (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004).

To summarize, these results indicate that explicit knowledge is in many ways appropriate for Knowledge Management Systems (KMS), as all the necessary information could be easily stored in a company's system and reused at any moment by its employees. Regarding this, a company should always ensure that its employees use information that is relevant, accurate and updated. However, organizations often have no time and effort to follow the updates, as they are concentrated on strategically important issues rather than on documentation. As a result, employees, especially new ones, run a risk of possessing wrong information followed by transmission to a customer damaging the reputation of a company.

2.1.4. Organizational knowledge creation

The previous section shows that companies can use one of the two types of knowledge, but some researchers believe that organizational knowledge creation is built upon a continuous dialogue

between tacit and explicit knowledge and serve as a central theme to stimulate the formation of new ideas and concepts (Nonaka, 1994). Producers of knowledge can work on different levels and be transporters, transformers or analyzers of information (Machlup, 1980). All organizations play both roles of producers and users of knowledge as they receive information from the environment, convert it into a new knowledge and utilize the created knowledge in combination with their values and prior experience (Davenport & Prusak, 1998).

An individual is in the center of organizational knowledge creation (Nonaka, 1994), while his knowledge is a key component of the organizational learning process, that can be seen to develop through a process of socialization and use of Knowledge Management Systems (KMS) (Song & Chermack, 2008). Nonaka (1994) sees organizational knowledge creation as a spiral process that starts with the individual knowledge creation and through socialization gradually extends to the highest organizational level, forming a part of the knowledge network of a firm. Regarding this, collaboration benefits the creation of the organizational knowledge as it incorporates active learning through sharing of members' experiences and direct involvement into work-related practice (Nonaka, 1994; Song & Chermack, 2008; Karkoulian, Halawi, & McCartwrite, 2008). To maintain a competitive advantage on the market, a company should enhance learning processes and organizational performance, but awareness on knowledge creation only is not enough for a successful management of knowledge. Organizational knowledge transfer should be taken in consideration as well.

2.1.5. Organizational knowledge transfer

Knowledge transfer, as well as its creation, inside a firm is considered to be an important issue, and the way a company's resources are transferred inside its organization largely determines its capacity to be competitive on the marker (Grant, 1996). Innovation is a key component of competitiveness, and if effective methods of knowledge transfer are implemented inside a company, new ideas for product development are generated (Wijk, Jansen & Lyles, 2008). In other words, the main goal of knowledge transfer results in an ability amongst employees to fully apply knowledge and skills to organizational practice that, in its turn, increases the performance of a firm (Magnier-Watanabe & Benton, 2017).

However, the efficiency of knowledge transmission at both personal and organizational levels depends upon the recipient's ability to aggregate knowledge, adapting information from a new context to an already existing one (Argote & Ingram, 2000; Grant, 1996). According to Grant (1996), the level of aggregation increases when knowledge is transferred with the use of a common language and other forms of symbolic communication, through mutual cognitions and recognition of individual knowledge domains. Similarly, Argote and Ingram (2000) consider that explicit knowledge, i.e. codifiable data that is embedded in technology, as well as clear systems increase the transfer of knowledge inside a firm.

Though organizational knowledge is developed through the interactions of individuals (Grant, 1996), information in companies can be transferred at a higher group level, so that one organizational unit affects the experience and knowledge of another one by means of knowledge sharing (Argote & Ingram, 2000; Wijk, Jansen & Lyles, 2008). Such knowledge transfer could happen explicitly, when both units communicate knowledge and share best approaches, and implicitly, when only one side addresses the information (Argote & Ingram, 2000). In this way, implicit knowledge transfer can

result in an asymmetry of knowledge, as one organizational unit is transferred a large amount of information on a subject to share with the other that is in lack of it (Davenport & Prusak, 1998).

Wijk, Jansen and Lyles (2008) and Davenport and Prusak (1998) write that trust between partners positively facilitates organizational knowledge transfer as colleagues are normally eager to help each other in new knowledge formation. In this sense, face-to-face meeting represents the most efficient way to get reliable information, as methods for accessing distant sources of knowledge could be hidden or unreachable for an employee (Wijk, Jansen & Lyles, 2008). On the other hand, there is a potential risk that high trust relationships could *"create blindness and inhibit the exchange and combination of knowledge"* (Wijk, Jansen & Lyles, 2008, p.835). Organizations that want to provide high-standard services for their customers, need to supply their employees with efficient knowledge transfer mechanisms to manage and develop their knowledge base. In this sense, knowledge transfer can be categorized into codification and personalization, where the former is based upon knowledge databases and repositories, while the latter involves social interactions (Przemysław & Zamojska, 2017).

2.1.6. Knowledge strategies

Codification and personalization strategies are two of the most frequently mentioned in the existing literature approaches used by companies to manage knowledge of their employees (Przemysław & Zamojska, 2017). According to Hansen, Nohria and Tierney (1999) these strategies are quite different, and there is no generally accepted opinion, which approach should the companies rely on, as much depends on the organization's business framework. However, Magnier-Watanabe and Benton (2017) note that tacit knowledge is widely-used by companies following personalization strategies, while explicit knowledge is fundamental for organizations oriented towards codification framework.

2.1.6.1. Codification

The earlier section on types knowledge (see section 2.1.3.) presents four modes of conversion, where tacit and explicit knowledge interchange to assist the flow of organizational knowledge. Nonaka (1994) identifies externalization as a codified mode to transfer information, where tacit knowledge is converted into explicit. Magnier-Watanabe and Benton (2017) and Hansen, Nohria and Tierney (1999) consider that codification strategy and explicit knowledge are inseparable from each other, as extracted individual's knowledge could be converted into codified materials that are further stored on the company's intranet and used by managers without a direct contact with someone who developed this knowledge. However, this strategy both requires the implementation of high-priced IT systems to ease the work with data processing, and runs a risk of confidential information being leaked to unauthorized third parties (Magnier-Watanabe & Benton, 2017). For the present study on organizational knowledge, codification strategy presents an interest, as employees, in a consultancy setting, efficiently reuse codified knowledge, as they are normally dealing with similar cases despite providing services to various customers (Hansen, Nohria & Tierney, 1999).

2.1.6.2. Personalization

Personalization strategy, in contrast to codification, is concentrated on tacit knowledge involving

communications among employees and direct knowledge facilitation that could be organized both face-to-face and with the use of information technologies (Magnier-Watanabe & Benton, 2017; Hansen, Nohria & Tierney, 1999). Companies that are in constant search of new and efficient methods to innovate often choose a personalization knowledge transfer strategy, as it helps to preserve vital information inside the company, and use it against the competitors (Magnier-Watanabe & Benton, 2017). However, employees could demonstrate reluctance towards sharing valuable knowledge with their colleagues, as it helps them to stand out from the crowd of ordinary employees (Magnier-Watanabe & Benton, 2017). Moreover, such employees could sometimes suffer from the actions of the company's competitors who are ready for everything to possess strategically vital tacit knowledge (Magnier-Watanabe & Benton, 2017).

In accordance with Hansen, Nohria and Tierney (1999) and Nonaka (1994), companies following the personalization strategy should still provide their employees with an access to electronic document systems or with the background material on the subject as well as to share contacts of experts who own what information in order to assist further help. As an alternative, informal networks of practice could be created to serve as a space for employees to exchange reliable information on the experts last provided knowledge (Davenport & Prusak, 1998).

2.2. The field of Technical communication

This section describes the field of technical communication. It starts with a definition of technical communication, current challenges and relevance to other fields. Later it contains information about the practitioners in the field and products they produce. Finally, it describes the core competences people should have to be technical communicators.

2.2.1. Defining Technical communication

The area of technical communication started flourishing in the 1970s with the development of portable computers that became affordable by average consumers, and specialists of this area became in a high demand, as they were able to set human-machine dialog and convert technical issues to an accessible text *"making the interactions with the machine more successful"* (Kimball, 2016, p.336; Catanio & Catanio, 2010). During the last half-century the field has been constantly changing and acquiring different titles ranged from information architecture to information design, and finally establishing itself as technical communication (Mirel & Spilka, 2015). Mirel & Spilka (2015) suppose that the field got its title after the Society for Technical Communication, the largest professional association of communication practitioners established in 1970s and working towards the promotion and enhancement of research and practice of technical communication (STC, 2018). Technical communication can be defined as an activity clarifying the beneficial occupancy of artifacts to the audiences with different level of digital proficiency (Estrin & Elliot, 1990). In other words, the main goal of the area is to explain and address technical ideas originated in minds of engineers and scientists for an audience in an accessible way (Wicklen, 2001; Catanio & Catanio, 2010; Whiteside, 2003).

Traditionally, technical communication was thought of as an activity for engineering communicators only (Al-Othmany & Ali, 2012) or someone with an engineering background. Today, technical communication has merged into an interdisciplinary field, borrowing approaches and practices from various relevant areas such as linguistics, graphic design, computer science and organizational communication (Mirel & Spilka, 2015, p. 103; Sánchez, 2016; Whiteside, 2003; Zachry & Spyridakis, 2016). For this reason, the area of technical communication has become a flexible and context-based field (Mirel & Spilka, 2015) with a large number of practitioners with diverse educational backgrounds as well as career changers who started their professional path in some other field (Wicklen, 2001). As a drawback, for the last 15 years STC has been experiencing a dramatic decline in its membership (from 25,000 to 6,000), as technical communicators do not identify themselves as practitioners of any one of these emerging fields (Spilka, 2010; Kimball, 2016).

This change affected not only professional circles, but academia as well, which has made a decision to assign technical communication programs to ones of *"broader disciplinary identities"* (Spilka, 2010, p.5). Thus, earlier existed technical communication programs have received status of mandatory or elective courses only (Kimball, 2016). Despite the fact that such an approach has a positive influence on the growth and expanding academic practitioners (Kimball, 2016). As a result, everyone completing studies in journalism or literature can declare himself to be a technical communicator, but relying on good language skills alone will not help to produce solid documentation without obtaining some specialized knowledge of a field (Turner & Rainey, 2004).

There is a continuous debate on the notion of technical communication, and researchers are divided into those who consider it to be a field (including academia that prepares professionals), a profession itself or simply an activity of practitioners (Kimball, 2016). For example, Turner and Rainey (2004) consider that technical communication has all the criteria to be established as a profession, as it includes all the features of work, organization and quality that have historically been viewed as elements of a profession. Mirel and Spilka (2015), on the contrary, write that technical communication, due to such a diversity of methods and epistemologies being brought to the area, can be better understood as a field. In relation to this they write:

> *"It is not as mature as professions such as engineering, medicine, and architecture, which have articulated visions for the future, set comprehensive goals and standards for professional work and conduct, and established systems for evaluating the work of practitioners to determine whether those standards have been met"* (Mirel & Spilka, 2015, p.99).

As Mirel and Spilka express, due to a significant diversity of approaches, technical communication has moved rapidly into disparate areas, thus restricting opportunities for acquiring a fully professional status through establishing certifications or the power and legitimacy that accompany such status (Kimball, 2016). As a result, it has become almost impossible to establish accreditation in a field lacking conventional education that provides measurements (content, knowledge, skills) for certification (Turner & Rainey, 2004). Moreover, while there is no licensing mechanism confirming the level of professionalism, hardly any trust exists to the quality of work technical communicators do (Turner & Rainey, 2004). For the present study on workplace learning for technical communicators, this lack of educational and professional standards means that currently no mechanism exists to evaluate knowledge of practitioners in this field. To overcome this issue and obtain full professional

status, a strategic plan with a set of standards that both academia and professionals can follow should be created (Mirel & Spilka, 2015).

2.2.2. Relevance to other fields

While the profession of technical communication lacks a widely accepted core, scholars have adjoined it to several fields sharing similar approaches and practices. Kovacs and Szabados (2016) conducted research with a group of technical communicators and concluded that the techniques and methods implemented in their work (walk-through, inspection, review) are close to those of the testers and developers they work with, and that practitioners themselves think in similar ways to these professionals. However, Turner and Rainey (2004), on the contrary, demonstrate that technical communicators relate themselves and their jobs to those dealing with languages and cultures.

Rainey, Turner and Dayton (2005) and Sánchez (2016) assume that technical communication is relevant to Human-Centered Design (HCD), as practitioners obtain a whole spectrum of qualities, competencies and skills in user analysis and design, allowing them to understand the needs of the system's potential users and participate in designing products accommodating these needs. Moreover, technical communicators can potentially present and sell themselves as interactive or Web designers if they manage to understand business processes as well as fully implement interaction design principles in their work (Rainey, Turner & Dayton, 2005). Technical communicators try to satisfy the needs of their end users and present documentation in a way to make their interaction with a product more effective, efficient, satisfactory and safe (TCEurope, 2005). This idea is directly correlated with a concept of usability used in Human-Computer Interaction (HCI) where interactive products are designed specifically with the same perspective and above-mentioned goals in mind (Preece, Rogers, & Sharp, 2002). In relation to this Kimball (2016) thinks that technical communicators can show themselves among a group of designers as they possess all the qualities that allow them to hold key positions with the main focus on information architecture, user experience and usability. It is also worth mentioning that those technical communicators who worked in product development today continue their professional practice as user experience designers or become a part of user-centered design teams (Spilka, 2010; Catanio & Catanio, 2010). The field of technical communication has goals and approaches consistent with several areas of HCI, intercultural communications, product development and testing. Due to the multidisciplinary character of the field, technical communicators possess various skills and knowledges, and the list of core competencies varies in relation to the area of work.

2.2.3. Practitioners of technical communication

As the previous sections have illustrated, technical communication is a multidisciplinary field, and practitioners of this field have diverse academic backgrounds, from linguistics to engineering, and the only features uniting all of them are distinct personal qualities, work-related skills and the possession of some sort of degree, yet even that can not be generalized (Wicklen, 2001).

Kimball (2016) puts forward a controversial idea that technical communication is an integrated part of human communication; therefore all people are technical communicators able to express their ideas clearly with no special or preliminary training, while those who can not – do it *"due either to*

insincerity, or carelessness, or ignorance" only (Rickard, 1908, p. 32). As it was mentioned earlier, only language is not enough to produce competent documentation, there should always be a combination of technical, linguistic and writing skills.

Technical communicators are not merely providers of information and receiver of tasks (Turner & Rainey, 2004), but innovation (Estrin & Elliot, 1990), as they can communicate their ideas effectively as well as to design valuable technical documentation with the help of visual representations (tables, graphs and drawings) used to transmit technical ideas (Wicklen, 2001; Kimball, 2016). Hart-Davidson (2001) and Mirel and Spilka (2015) consider that technical communicators cross-functional knowledge, skills and vision demanding at the highest stage of technological decision-making (research, design, business planning), so that they can bring efficiency to the projects thus being beneficial for a company.

Technical communicators contribute to the development of information in areas as nuclear or high-heat manufacturing that have a direct impact on health and safety of the users (Turner & Rainey, 2004), so that practitioners should follow the accuracy of words and use the terms in their precise meaning (Rickard, 1908) in order to eliminate serious consequences and protect the economic interests of a company investing money into a project (TCEurope, 2005). Moreover, Al-Othmany and Ali (2012) suppose that technical communicators deal with legal and ethical issues, so for the former they need to be familiar with the laws of copywriting and trademarking, while for the latter be accurate in the selection of words.

In accordance with figures on May 2017 presented by the Bureau of Labor Statistics (2017) technical communicators are highly employed in the following industries: computer systems design and technical consulting services. Catanio and Catanio (2010) and Wicklen (2001) write that companies publishing vacancies for technical communicators require their potential employees have a background in computer science or at least complete technical communication courses, as such writing jobs are offered by people holding engineering degrees. On the contrary, Kimball (2016) and Rainey, Turner and Dayton (2005) investigate that holding a specific degree is not in priority for the companies rather they want their employees to obtain personal skills and qualities such as being able to communicate their ideas freely and solve problems effectively.

In their aim to create powerful information, technical communicators work with two basic but nevertheless intertwined features of IT that Hart-Davidson (2001) names *"slippery identities"* and *"flexible strategies"* (p.149). The former places high demands of practitioners and requires technical communicators to deal with double standards so that to move from creation of highly personalized texts towards more generalized ones still touching upon each individual. *"Flexible strategies"* mean that once generalized texts are created, they can be repeatedly used by a company to address smaller audiences with similar requirements, so that offers beneficial opportunities for a company to be presented in a wider market (Hart-Davidson, 2001).

Successful technical communicators never claim their audience to be experts in the field (Estrin & Elliot, 1990), contrariwise, practitioners selects only significant and relevant to their audience material for adaptation with regards to the reader's familiarity with the subject and the ability to understand the situation (Wicklen, 2001; Zachry & Spyridakis, 2016; Al-Othmany & Ali, 2012). Technical communicators should always think of the reader, organizing the material logically and clearly,

sometimes selecting simplicity and accessibility of the text instead of the beauty and its extraordinary (Rickard, 1908; Al-Othmany & Ali, 2012). Though technical communicators can not accomplish fully objectiveness in their work, they can still present a balanced view by avoiding exaggeration when transferring information, sorting out primary sources from secondary and unreliable ones as well as think about their target audience (Rickard, 1908; Estrin & Elliot, 1990).

The majority of professional literature on how to be a technical communicator is dedicated to discussions of general principles of writing and procedures of work with different types of texts rather than presenting a set of structured guidelines of work in the field. However, the *"The tech writer's survival guide"* by Wicklen (2011) might be essential for those who want to start their career in this field, as it covers a wide range of issues from resume preparation to highlighting all stages of work with technical documentation. Based on this work the subsection on products technical communicators produce and work with is presented below.

2.2.4. Products of technical documentation

In the previous sections it was described how technical communicators work in a variety of fields and produce a diversity of materials, that frequently contain illustrations, video materials and multimedia products used to provide users with sufficient informational content that ease their understanding of how to interact with technologies (TCEurope, 2005). Wicklen (2011) presents several types of documents technical communicators normally create and work with. The type of products as well as a brief description of them can be found in Table 2.1.

Document	Description
Technical manuals and specifications	This type of documentation varies from simple operating instructions to complicated technical specification requirements, and presents descriptive information about a product. The audience represents both specialists of the field and simple customers unfamiliar with a product.
Training materials	This type of documentation includes course and instructor's materials, study guides, test questions and overhead visuals. Technical communicators quite often work with learning management systems (LMS) and design online courses. The audience represents company's employees and customers.
Online documentation	This type of documentation includes multimedia encyclopedias, online and computer software tutorials, supporting technical products or software with the help of which users can perform product-related tasks. The audience represents both specialists of the field and simple customers unfamiliar with a product.
Web sites	This type of documentation includes work with texts published in World Wide Web or on the company's intranet. The audience represents company's employees and users of the Internet.

Marketing communication	This type of documentation includes work with media products including slides, video, press releases and magazine advertisements. Technical communicators describe the product's strengths and functions in a competitive way. The audience represents potential product's customers.
Technical and consumer journalism	This type of documentation includes work with product reviews for consumer magazines or scientific journal articles, and has the main goal to inform and intrigue the audience for further reading. The audience represents casual readers or scientists.

Table 2.1. Technical communication products by Wicklen (2011)

2.2.5. Core competences

Technical communicators work in different areas, and in each particular case practitioners are required to demonstrate specific knowledge as well as competences highly-valued and applicable to the particular context (Wicklen, 2001). As a result, none of the existing research in the sphere of technical communication present a full list of core competences practitioners in this area should obtain. Based on this and for the purposes of the present study, only frequently defined competences with corresponding technical communication activities will be presented.

2.2.5.1. Information product development and management competences

Technical communicators sometimes simultaneously work with several projects that have different deadlines and requirements, and in order to deal effectively with all of them practitioners should demonstrate organizational abilities, in order to know how to set priorities and schedule their activities in the best way (Rainey & Turner, 2004). In total, three competences have been mentioned in the existing literature and are presented in Table 2.2.

Competence	Description
Process management	Ability to understand and design the processes in order to administrate the life cycle of an information product.
Project management	Ability to plan activities, monitor and evaluate projects as well as know general principles of business administration.
Self management	Ability and willingness to be productive in terms of time and resources to be used; Ability to define priorities and focus attention on primary tasks.

Table 2.2. Information product development and management competences by Turner & Rainey (2004); TCEurope (2005)

2.2.5.2. Writing and visual communication competences

Ability to write is undoubtedly considered as the most important competence technical communicators should possess, and in order to achieve high standards in writing they need to have good oral and written communication skills (Wicklen, 2001), know the way information is perceived and processed by the audience (TCEurope, 2005), as well as clearly identify the purposes that potential readers follow (Rainey, Turner & Dayton, 2005). In accordance with Wicklen (2001), writing competences are based on the ability to analyze, organize and find relevant sources of information, so that requires technical communicators to have a full spectrum of above-mentioned analytical skills. In order to address complex technical information in an accessible way, practitioners should be familiar with specific terminology and stylistics, be able to work with different text types and apply corresponding writing techniques to them (TCEurope, 2005). Moreover, technical communicators should know how to communicate their ideas visually, so that they should understand how to combine visual elements with text, create and use graphs as well as provide designers with clear ideas for supporting illustrations (Rainey, Turner & Dayton, 2005; Wicklen, 2001). All the information concerning writing and visual communication competences is presented in Table 2.3.

Competency	Description
Technical knowledge	Ability and willingness to understand technical content as well a clearly define the user's purposes and contexts to use thi informational content.
Linguistics	Knowledge of stylistics, semantics, syntax and lexis; Ability to us proper vocabulary and language, follow the rules and standards.
Visual communication	Ability to create graphs, use visual elements of a page, clearl communicate ideas for designers to make supporting illustrations knowledge of basics of digital processing; willingness to understan the principles of text-image combinations.
Editing	Ability to edit documents on one's own and do proofreading c printed/online texts.
Documentation planning	Ability to select information to be transmitted as well as efficient way for its transferring; Ability to select appropriate tools and techniques.

Table 2.3. Writing and visual communication competences by Wicklen (2001); Rainey, Turner & Dayton (2005); TCEurope (2005)

2.2.5.3. Conceptual and symbolic-analytical competences

Hart-Davidson (2001) investigates that in order to work effectively and produce *"computerized signs"* (p.150), i.e. any written signs existing in a computerized form, technical communicators need to obtain a range of symbolic-analytic competences. These competences allow technical communicators to think

strategically and analytically when they process large amounts of unstructured texts in an effort to find relevant and reliable source of data (Hart-Davidson, 2001). Moreover, these competences have general features, so that any time they could be improved and applied to various different practices (Hart-Davidson, 2001). As a result, six competences have conceptual and symbolic-analytical features, and a detailed description of each is presented in Table 2.4.

Competency	Description
Experimentation (relevance, synthesis)	Ability to find relevant sources providing task-support delivery information
Abstraction/Analysis	Ability to find patterns, clusters and relationships in large amounts of unstructured information for future adaptation; ability to find information gaps.
System thinking	Ability to work with specific projects and narrow domains by addressing t the strategic thinking that works on a broader level and can impact larg social structures as the enterprise, community, the market.
Logic	Ability to identify logical misconceptions.
Editorial memory	Ability to remember the vocabulary and the meaning of visual symbols.
Information gathering	Knowledge of research methodologies and techniques; Ability to gathe accurate information with the use of different sources (the internet databases)

Table 2.4. Conceptual and symbolic-analytical competences by Hart-Davidson (2001) and Turner & Rainey (2004); TCEurope (2005); Wicklen, J. V. (2001)

2.2.5.4. User-centered design competences

Turner and Rainey (2004) consider that in order to produce cognitively accessible information that allow potential users use products effectively and be satisfied with its overall quality, technical communicators should know the basics of usability. This means that technical communicators should be able to make target group analysis (data collection and processing) as it allows explicitly understand potenetial users of a product, their needs, goals and the context of a product's use (TCEurope, 2005). Table 2.5. demonstrates only one user-centered design competence the most relevant to the field of technical communication.

Competency	Description
Usability	Ability to make target group analyses by means of qualitative an quantitative data collection as well as willingness to provide the audienc with valuable information.

Table 2.5. User-centered design competences by Rainey & Turner (2004); TCEurope (2005)

2.2.5.5. Interpersonal competences

Interpersonal competences are subdivided into employee's ability to build interpersonal relationships with coworkers and subject-matter experts as well as capacity to be a team player. These competences require such attitudes as communication, cooperation and compromise (Rainey, Turner, 2004; Al-Othmany & Ali, 2012). Moreover, to work successfully in teams, technical communicators need to know social, psychological and linguistic aspects of communication (TCEurope, 2005). Interpersonal relationships in a workplace environment are built on trust, and practitioners should be diplomatic, know the product itself, be familiar with relevant terminologies in order to gain trust from developers and be able to receive product-specific information (Wicklen, 2001). Table 2.6. shows interpersonal competences technical communicators should possess.

Competency	Description
Interpersonal communication	Ability and willingness to cooperate with colleagues of different backgrounds, education and status as well as to demonstrate an ability to be diplomatic and respectful to them.
Teamwork/Collaboration	Ability to work in diverse teams and aspiration to contribute to a successful development of the best practices. Demonstrate knowledge in communication theory.

Table 2.6. Interpersonal competences by Wicklen (2001); Turner & Rainey (2004); TCEurope (2005)

2.2.5.6. Technical competences

As it was mentioned above, technical communicators sometimes work on different projects involving the use of various software, so practitioners should know the functionalities of each program as well as how to alternate between them effectively in case of simultaneous work (TCEurope, 2005). Table 2.7. shows technical competences practitioners of the field should posses.

Competency	Description
Use of support tools	Willingness to learn and get an updated information on tools supporting th process of product creation; Ability to use relevant to the project tools.
Use of software	Ability to understand the context of use of different software programs Ability to understand standardized structures and its use with the help o word processing and document design software; Willingness to learn new technologies.

Table 2.7. Technical competences by Turner & Rainey (2004); TCEurope (2005); Rainey, Turner & Dayton (2005)

2.3. Knowledge Management Systems

With such a wide variety of core competences required for the practice of technical writing, knowledge creation and transfer are crucial for both new and experienced practitioners. In many companies, the collection and sharing of knowledge is organized through Knowledge Management Systems (KMS) that structure and make knowledge available.

Most of the existing research on KMS is related to exploring how knowledge from an educational setting is transferred to a workplace environment, and what are the ways to enhance academic-practitioner dialog. As follows, such research is conducted principally in an educational institution or in industries, and the effectiveness of KMS is presented from the perspective of companies, rather than employees themselves (Przemysław & Zamojska, 2017). On the contrary, the main interest of the current study lies in how new employees manage knowledge in organisations, and which knowledge management tools or practices are regarded as the most efficient for knowledge transfer and creation.

This part of the literature review starts with the definition of KMS followed by the detailed description of frequently mentioned practices in knowledge management. As part of the results of this study, these identified practices have been used to orient the definition of requirements for a knowledge management framework for technical communicators in a consultancy setting.

2.3.1 Defining Knowledge Management Systems

In the last decade, the work of industries has irretrievably changed due to an explosion of new ingenious and prominent technologies, while knowledge has become *"the most strategically important of the firm's resources"* (Grant, 1996, p.110). In order to maintain competitiveness, companies are searching for new innovative methods to improve and fulfill the needs of their current and future employees (Calvo-Mora, Navarro-García, Rey-Moreno & Periañez-Cristobal, 2016).

Knowledge Management Systems (KMS) are regarded as any form of information systems that represent the usage of the latest technological tools coupled with any other social infrastructures supporting knowledge creation and transfer (Alavi & Leidner, 2001; Assegaff & Hussin, 2012). According to Alavi and Leidner (2001) implementation of KMS promotes the creation of both online and offline communities of practices where employees create corporate knowledge directories and, as a result, share best practices.

Employees, starting their work in a new domain, are required to have general knowledge of the sphere. This knowledge can be developed through vocational training, and more precisely by means of introductory program, where newcomers are transferred initial capital of knowledge useful to work on their first project (Przemysław & Zamojska, 2017). Trainings are designed specifically to fit the needs of stakeholders in their aspiration to create new knowledge. Moreover, they are seen as an integrated part of social infrastructures that in combination with IT-based systems help to achieve key business results (Calvo-Mora, Navarro-García, Rey-Moreno & Periañez-Cristobal, 2016; Rogala, Batko & Wawak, 2017). Organisational advancement and increase in firm's revenues are directly correlated with increase in training expenditures, that, in their turn, influence the overall productivity, job satisfaction and employee retention (Acton & Golden, 2003; Hughey, & Mussnug, 1997; Rogala,

Batko & Wawak, 2017; Catanio & Catanio, 2010). In accordance with Rogala, Batko and Wawak (2017), knowledge contributes to a policy and strategy of an organisation, and those companies that can identify, develop and maintain knowledge among their stakeholders are likely to receive benefits and achieve corporate goals in a short term (Calvo-Mora, Navarro-García, Rey-Moreno & Periañez-Cristobal, 2016). As a result, companies have started to recognize the necessity of a vocational training.

People learn in different ways, that is why various approaches should be taken into account to address the needs of all the employees in a company (Johnson & Senges, 2010). Though unique training is considered to be the most significant and effective way for organizational knowledge transfer and creation, it is hard to implement (Rogala, Batko & Wawak, 2017). What companies can do is to find the balance in practices, as some information can be accessed through easily applied methods, while the other requires time and effort (Rosenberg, 2001). For this purpose, frequently mentioned in the literature practices are presented below.

2.3.2. Practices of Knowledge Management Systems

As was mentioned above, Knowledge Management Systems (KMS) can be understood as information systems used in combination with social infrastructures that employees use in processes of organizational knowledge flow. However, in the current literature review, no research could be identified that presents a collection of practices addressing the issues of information systems and social infrastructures together. The following attempt to synthesize the literature on these areas can thus be seen to contribute to filling this gap with one of the most frequently mentioned practices in the literature described.

2.3.2.1. Mentoring

A key social component of many KMS that is often supported through the use of information systems (especially in cases where the direct communication is limited due geographical distance) is mentoring. Moreover, such systems support mentor and mentee in finding a common domain or subject for discussion, so that an access to information systems containing various resources such as documents or tools (Jacucci, Tellioglu & Wagner, 2007).

Mentoring is seen as a strong legitimate peripheral participation activity which incorporates high-level knowledge transfer to a new employee through communication with a more experienced member (Bjørnson & Dingsøyr, 2005; Rodriguez & Cardenas, 2012). Mentoring programs range from informal to formal ones, and there is no commonly accepted opinion, which form is considered to be the most effective and preferable, as viewpoint depends strongly on a company's strategy and plans towards a new employee (Bjørnson & Dingsøyr, 2005). Although mentoring is essentially of the nature of formal relationships,many organizations are currently practicing informal mentoring programs saying that such form of relationship leads to career satisfaction and, so that is mutually beneficial for a company and an employee as well (Bjørnson & Dingsøyr, 2005). Moreover, informal mentoring demonstrates a positive impact on knowledge sharing and utilization (Karkoulian, Halawi, & Mccarthy, 2008) in a way that only useful knowledge is transferred based upon the bilateral needs. These needs are assessed during the initial contact where a novice and a mentor openly discuss future strategies, identify

knowledge or skills gaps and *"establish norms or acceptable behavioral guidelines"* (Catanio & Catanio, 2010, p. 83).

Both formal and informal mentoring imply the assignment of an experienced colleague to a novice, but still new employees do not appreciate formal mentoring as involuntary mentorship leads to completing main responsibilities with no enthusiasm and establishing transnational relationships between an expert and novice (Allen & Eby, 2003; Bjørnson & Dingsøyr, 2005). On the contrary, informal mentoring is based upon interpersonal relationships with mutual trust, interest and respect as key components for successful partnership (Hocker & Dempsey, 1994; Rodriguez & Cardenas, 2012). Indeed, new employees should be assured that in their relationship with the mentor they can communicate their ideas freely without a sense of judgment or fear of being compromised (Catanio & Catanio, 2010). Newcomers are reported to highly appreciate discussion-based forms of communication and consider it to be one of the most effective ways to facilitate knowledge creation, where an expect mentor is actively involved in a conversation by asking questions and proposing viewpoints on issues (Bjørnson & Dingsøyr, 2005; Przemysław & Zamojska, 2017). Though newcomers tend to favour informal mentoring, they still prefer to minimize the level of their supervisors' engagement in their learning process apart from cases where this involvement is essential (Boud & Middleton, 2003). In cases where mentor-novice interaction is limited, E-learning with the use of codified materials is implemented.

2.3.2.2. E-learning

In contrast to mentoring, that mainly implicates the social infrastructures of KMS, E-learning involves various information systems used by companies to store and transfer information among their employees.

In comparison to mentorship programs that involve time and personnel, E-learning acts as a cost-effective knowledge transfer solution that distributes up-to-date information to an unlimited number of geographically separated employees (Rosenberg, 2001). Self-studies with the use of codified materials such as handbooks, knowledge databases and other repositories are seen as the attributes of E-learning (Przemysław & Zamojska, 2017). Kovacs and Szabados (2016) conclude that employees consider open access knowledge databases and handbooks as one of the most efficient sources of problem solving, while forums and blogs help them to receive new information. Przemysław and Zamojska (2017), on the contrary, investigate that self-studies with the use of codified series increase new knowledge creation, especially in a field different from the main domain of an employee. Because learning materials are normally stored online on intranet portals, these are the first documentary sources new employees address to as a reference point or when organizational problems arise (Boud & Middleton, 2003; Johnson & Senges, 2010).

Though codified materials are considered to be a source of explicit knowledge transfer, Johnson and Senges (2010) illustrate that hands-on tutorials help new employees create new knowledge by means of direct interaction with technologies and involvement into problem solving. In this sense, direct communication, through which employees are normally transferred tacit knowledge, is represented in a form of step-by-step instructions. Unsuccessfully implemented, E-learning could be no more than a storage system for knowledge exchange that does not guarantee organizational knowledge creation or transfer (Davenport & Prusak, 1998). As it was mentioned earlier, in order to maintain competitiveness and influence the success of the learning process, companies should always update

learning databases and provide newcomers with appropriate training materials. If companies can not follow the updates, they need search for other ways to transfer knowledge, for example, by means of seminars or workshops.

2.3.2.3. Seminars, lectures and workshops

As aspects of potential practices for KMS, seminars and lectures are particularly important in providing arenas for socialization, while workshops have a mixture of social infrastructures and IT-based systems, as employees are often involved in direct interaction with digital products under supervision or in cooperation with colleagues.

Machlup (1980) identifies information as an achievement to create knowledge in someone's mind, but the process of informing does not necessarily mean knowledge creation, especially in cases when the recipient simply can not understand the transmitted information. In accordance with this, several authors concluded that lectures are the least productive way for knowledge transfer, and relying on this method only is a bad training strategy as it makes a trainee take a position of a passive participant with a lack of interaction (Read & Kleiner, 1996; Hocker & Dempsey, 1994; Kovacs & Szabados, 2016; Rodriguez & Cardenas, 2012; Hughey & Mussnug, 1997).

Seminars or lectures help newcomers learn more about company's products and become familiar with specific terms (Wicklen, 2001). Such trainings are essential for new employees during pre-project learning stage where core work skills are built and general information in the field is transferred, but hardly matter on later stages where specific knowledge should be transferred (Przemysław & Zamojska, 2017). For oldcommers lectures and seminars, on the contrary, can serve as a valuable instrument to enhance their competence, especially if it is integrated in their work schedules (Catanio & Catanio, 2010; Johnson & Senges, 2010).

If this method is still implemented, then a company should allocate additional time for reflection or breaks, that sometimes could be crucial for an organization that wants to reduce costs on training and achieve goals in short terms (Read, & Kleiner, 1996; Hughey & Mussnug, 1997; Hocker & Dempsey, 1994). In relation to this, peer-assisted learning could be regarded as a solution.

2.3.2.4. Peer-assisted learning

Peer-assisted learning (PAL) is another social component of KMS that fosters knowledge, skill and motivation development through cooperation with employees equal in status (relationship between novices) that render constant support during the whole process of learning (Ehly & Topping, 2009). Furthermore, Speyer, Pilz, Kruis and Brunings (2011) see PAL as a self-assessment tool that helps novices to analyze the performance of their peers and apply this knowledge to their own practice in order to improve the quality of their own work.

As it was mentioned earlier, in mentorship programs newcomers want their relationships with mentor be on a high level of credibility and communication occurs as equals (Catanio & Catanio, 2010). In this sense, PAL can be seen as a desired form of informal mentoring where newcomers openly address work-related concerns, dispel misconceptions and minimize knowledge gaps.

PAL includes a variety of empowering methods from feedback on work to peer observations that allow peers to compare performances and assess each other (Tai, Canny, Haines & Molloy, 2015). However, in order to provide a successful assessment of practice peers need to demonstrate high level of cognitive skills and *"understand the goals of the task, recognize progress toward the goal, judge the potential efficacy of addressing gaps in knowledge or strategy in attaining that goal, and be sensitive to the person to whom feedback is given"* (Ehly, & Topping, 2009, p.455). Moreover, peers can not independently present a full-fledged feedback due to insufficiently developed judgement abilities, that is why support from an experienced member is required (Ehly, & Topping, 2009).

As an advantage, novices working under the observation of peers, experience a more supportive learning environment and demonstrate lower level of stress in comparison to those who work completely alone (Tai, Canny, Haines & Molloy, 2015). Equally, Hocker and Dempsey (1994) conclude that newcomers work more productively and with confidence under the control of their peers as they feel a strong support from them. Despite the fact that novices are reported to appreciate PAL due to its informal type of relationships and see it as one of the most favourable methods of learning, they still much rely on feedback from experienced employees (Tai, Canny, Haines & Molloy, 2015; Johnson & Senges, 2010). In this case involvement in the work on real projects under supervision of an experienced member presents an alternative.

2.3.2.5. Learning by doing

This KMS component is embedded in organizational learning where knowledge is created and transferred through direct involvement into projects and completing everyday tasks with the use of IT-based systems as well as through cooperation with team members.

In comparison to all the above-mentioned practices, project involvement is the main source of knowledge for newcomers, by mean of which they fully integrate into professional environments and deal with issues that could not be experienced outside a project (Przemysław & Zamojska, 2017; Hughey & Mussnug, 1997). Read and Kleiner (1996) and Boud and Middleton (2003) suppose that new employees should not be detached from vocational training inside a company where knowledge is embedded in workplace, as both theoretical knowledge and practical skills created outside a workplace most likely will not be applied to a specific environment.

Learners build concrete knowledge and skills when learning is inseparably connected to ongoing experiences under the conditions of legitimate peripheral participation (Lave & Wenger, 1991). In other words, engaging in real work, though to a limited degree and with limited responsibilities, newcomers carry out tasks with a help of an experienced member in order to re-apply the gained knowledge in later stages of work (Lave & Wenger, 1991). Rodriguez and Cardenas (2012) and Johnson and Senges (2010) highlight the importance of completing tasks with a growing level of complexity, gradually moving from the easiest to the most difficult ones, so that to create a full spectrum of knowledge and skills they need to become full participants in a community of practice (Lave & Wenger, 1991).

3. Theoretical background

This section presents Lave and Wenger's Situated Learning theory that was chosen as a theoretical framework for this research. The reason for this choice lies in the fact that organizational knowledge is embedded into practice and inseparable from legitimate peripheral participation in Communities of Practice (CoP). Moreover, for a CoP to function, various resources such as documents or tools should be introduced, therefore Knowledge Management Systems (KMS) are regarded to be an important component of CoP, because members need access to this knowledge in order to accumulate the knowledge of a community (Jacucci, Tellioglu & Wagner, 2007). The description of the theory with supportive arguments of relevance for this study are presented below.

3.1. Situated learning

Many studies on organizational knowledge flow are built upon Lave and Wenger's theory of situated learning claiming that all learning processes are inseparable from social practice, and are embedded in everyday activities where knowledge is created and transferred (Lave & Wenger, 1991). Central to this theory is a process of legitimate peripheral participation where learners *"inevitably participate in communities of practitioners and that the mastery of knowledge and skill requires newcomers to move toward full participation in the sociocultural practices of a community"* (Lave & Wenger, 2016, p.29). In relation to organizational learning it means that newcomers are engaged in real work, though to a limited degree and with limited responsibilities, and carry out tasks with a help of an experienced member in order to become full participants of a workplace community (Lave & Wenger, 1991).

This theory of situated learning is dynamic, so it examines how *"people's practices are reproduced and transformed according to changes in contexts, in their interactions and in their purposes"* (Vaast, 2007, p.285). This is especially relevant for this study, as during vocational training inside a company new employees possess one contextual knowledge that is further transformed into the other, as novices start working directly on a customer's side and the context for applying the possessed knowledge changes.

The most important aspect of situated learning theory relevant for this research lies in fact that it could be applied to an organizational context, where legitimate peripheral participation (in a form of mentoring) and communities of practice (work in teams) exist both offline and online. In organizational setting CoP can be regarded to be a cornerstone of knowledge management by supporting problem solving and professional skills development, facilitating transfer of best methods, helping organizations to retain employees and, as a result, preserving knowledge within the company (Acton & Golden, 2003; Wenger, 2004). Knowledge in CoP is of collective competence, and newcomers need to cooperate and communicate with team members in order to obtain knowledge and skills required to move towards full participation in communities of practice. (Lave & Wenger, 1991).

According to Wenger (2004), knowledge sharing in communities of practice is built upon three intertwined core elements (see Figure 3.2.); domain that unites the community and represents the area to be explored and developed, community that is a group of people for whom the domain is relevant, practice that involves both work-related practice (tacit knowledge) and formal methods (explicit knowledge). All three elements play crucial roles in organizational learning as both theoretical knowledge and practical skills created outside a workplace most likely will not be applied to a specific

environment (Read and Kleiner, 1996; Boud and Middleton, 2003). For this research it means that vocational training with knowledge embedded in workplace is considered to be one of the most effective learning methods for new employees, as it takes place in a proper context through social engagements and practice.
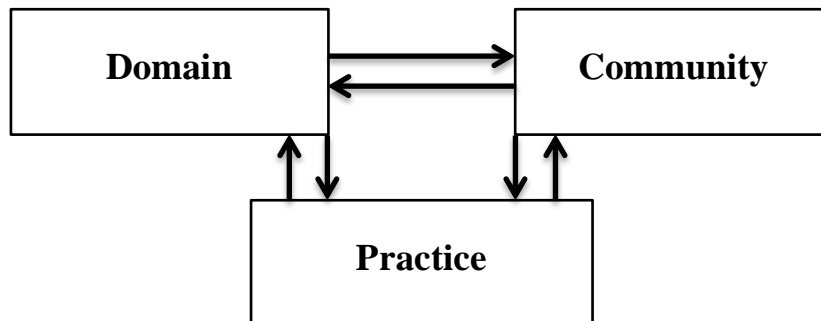
Figure 3.2. Core elements of knowledge sharing in communities of practice by Wenger (2004)

Despite the significance of offline interaction and its influence on organizational knowledge flow, the ability of employees to manage knowledge exclusively offline could be in some sense limited as much of modern work interactions are digitally mediated. This is true for the current case study of a large consultancy company that has office representations around the globe, and where communication among remotely located employees happen often online. As a result, Knowledge Management Systems (KMS) could be viewed as a solution as they represent the usage of technologies coupled with any other social systems supporting organizational knowledge flow (Alavi & Leidner, 2001; Assegaff & Hussin, 2012). Moreover, KMS are deeply context-based and inseparable from communication processes (Walsham, 2005), therefore they promote creation of both online and offline CoP where employees create corporate knowledge directories and, as a result, share best methods of work (Alavi and Leidner, 2001). Thus, KMS such as knowledge repositories (where people process and transfer information) or companys' forums (where employees discuss their offline situations) make interaction possible beyond geographical distance (Vaast, 2007).

To propose the most relevant and effective knowledge management framework, there should be an understanding of a theoretical background as well as a company's learning processes and existing technological resources that could facilitate organizational knowledge flow. With this in mind, this study adopts a situated learning theory to explore organizational knowledge flow in a large consultancy company with the main focus on new employees. Lave and Wenger's theory shows that all learning processes are grounded in social practice or communities of practice, so that they are inseparable from everyday activities where knowledge is created and transferred. Moreover, in order for a company to gain advantages among the competitors, social infrastructures raised from communities of practice should be complemented by IT-based systems (Assegaff & Hussin, 2012). As a result, as examined in this study, KMS are regarded to be an important component of CoP.

4. Methodology

This methods section presents the research design implemented in the current study and includes: data collection and analysis techniques as well as a discussion of ethical considerations and threats to validity.

4.1. Data collection

4.1.1. Interviews

Semi-structured interviews are regarded as the most widely used format for data collection in qualitative studies and as a solid data source for many research questions (DiCicco-Bloom & Crabtree, 2006). For this study semi-structured interviews were chosen in order to examine both personal problems of each employee in his work with knowledge management systems (KMS) and document a wide range of experience as well (DiCicco-Bloom & Crabtree, 2006). Moreover, the data gathered through semi-structured interviews confirmed the results of previous studies (see 2.3.2.) on KMS practices in a way that participants provided not only the answers, but argumented the reasons of their choice.

Questions for interviewing were prepared in advance, and presented list of issues to discuss, while other relevant questions arose during the conversation between the interviewer and an interviewee. All the questions were divided into three categories based on the role of the participants (experienced technical communicators, new technical communicators, unit managers). The questions were based on the subject of interest concerning the functionality of Knowledge Management Systems (KMS), and can be found in the Appendix 1. Both open and closed questions were asked, but priority was given to the former, allowing participants to communicate their ideas freely. The order of the questions was periodically changed to direct the interview on a particular course as well as to support the dialog with the relevant questions and not to make the participants repeat themselves again. One of the main challenges was to avoid asking supportive leading questions and to not make the participants answer in a certain, desired for the interviewer way. All the interviews were recorded and transcribed with the received permission from the participants. Right before an interview, the participant was informed about the purpose of the research, and all unknown concepts appearing in the interview questions were explained in order to avoid any misconceptions.

A list of potential participants was assembled through discussion with the company's unit and project managers. In order to be interviewed the participants should match the selection criteria, such as certain experience and geographical location. As a result, twelve employees were chosen to participate in the interview. The scope represented five new technical communicators (less than 1 year of work in a company), five experienced practitioners (from 1 year of work in a company) and two unit managers administering the work of the chosen technical communicators. All the selected for the interview technical communicators could be divided into those who work at the customer's side and those who work on clients' projects without leaving the office of the consultancy company.
Following ethical considerations (see 4.3.) the participants signed a consent agreement and were assigned with a specified identification number in order to protect their personal information against disclosure and discrediting. The first two letters of the participant codes relate to the position an

employee takes in the company, the third letter and the last two figures defines the day and time when the interview was conducted. The participants codes are presented in Table 4.7.

Code	Role
OCW12	Experienced technical communicator
NTF16	New technical communicator
NTW14	New technical communicator
NTM16	New technical communicator
UCM11	Unit manager
NTF15	New technical communicator
OCW11	Experienced technical communicator
OCW13	Experienced technical communicator
UCT09	Unit manager
OCT10	Experienced technical communicator
OCM15	Experienced technical communicator
NTT18	New technical communicator

Table 4.7. Participants interviewed: OC - Oldcommer, NT - Novice, UC- Unit manager

The interview questions were prepared in such a way as to answer several research questions, and could be divided into two categories. The first group of questions addressed organizational knowledge flow, problems and issues with the currently implemented KMS. This group was used to answer the RQ1. The second category of questions was designed to answer the RQ2 on how mentioned in the literature KMS practices relate to the ones currently used by technical communicators in a consultancy setting?

4.2. Data analysis

4.2.1. Thematic analysis

Thematic analysis is a widely used form of qualitative data analysis that offers simple and theoretically adaptive approaches as it is based on the search for themes and relevant patterns (Braun & Clarke, 2006). This method for data analysis was chosen due to its effectiveness in picking out the most important elements from the data in relation to the research question (Braun & Clarke, 2006). In accordance with Braun and Clarke (2006), thematic analysis has six phases. A description of the steps used in the current research is presented below in Table 4.8.

Phase	Description of the process
Familiarize yourself with the data	At this step the interviews were transcribed and the relevant patterns were identified.
Generate initial codes	After the patterns were identified, they were grouped with the corresponding statements of the interviews. For example, the proposal from the participant on a personal training plan was grouped with the statements related to the individual needs.
Search for themes	At this step the patterns were reorganized into larger themes based on the research question. For example, all the patterns related to the problems were grouped into this category.
Review themes	In this step all the data was reviewed if it was assigned to a proper theme. If the data was assigned to a wrong theme, it was restructured.
Define and name themes	Clear names for the themes as well as definitions were generated this moment.
Produce the report	At this step the results of the analysis were documented and presented in section 5.

Table 4.8. Phases of thematic analysis based on the work of Braun and Clarke (2006)

4.3. Ethical Considerations

Regulations on research ethics vary between countries (Runeson & Höst, 2009), and as the study was conducted in Sweden, it was decided to follow the research ethics guidance of The Swedish Research Council that requires the researcher to avoid fabrication and falsification of scientific data or results (Swedish Research Council, 2017). Moreover, participants signed a consent agreement and were assigned with a specified identification number in order to protect their personal information against disclosure and discrediting. The respondents took participation in the research on a volunteer basis, and were able to withdraw at any time without any negative consequences. All data considered to be of a professionally sensitive nature was not included in the current research.

4.4. Validity

The validity of the current research is based on the richness of the descriptions provided in the results that offer enough information to limit the influence of the researcher's own point of view (Runeson & Höst, 2009). Validity threats as well as approaches for limiting them are presented in the current section.

4.4.1. Construct validity

Construct validity concerns how far studied operational measures represent the intent of the researcher according to the research questions (Runeson & Höst, 2009). In relation to this, the threat of the construct validity of the current research lies in a possibility of any of the interview questions to be misunderstood by the participants. To reduce this threat, all the questions were categorized and designed specifically to the role participants are currently taking in the company. Moreover, before being interviewed the participants were asked about the awareness of the concept of Knowledge Management Systems (KMS), and in case of negative response the definition as well as several examples were presented.

4.4.2. External validity

External validity demonstrates how far the findings could be generalized and to what extent they might be interesting and relevant to people outside the examined case (Runeson & Höst, 2009). In other words, one of the main objectives of the current research is to ensure that the obtained results could be applicable to different contexts and domains. To reduce this threat, practitioners of various units with different fields of work, approaches and tools were involved in interviews.

5. Results

This chapter reports the results of the current study obtained through interviewing the stakeholders of a consultancy firm. The following research questions are addressed here:

1. *RQ1 - How does knowledge management function for technical communicators in a consultancy company?*

The results demonstrate the current challenges and needs of the implemented KMS. Moreover, since one of the main interests of this research lies in the process of knowledge flow in the organization, so the issue as knowledge creation is raised in the current section.

For this research question the results were classified into two parts: knowledge creation (see 5.1) and KMS (see 5.2). Based on the thematic analysis, the following themes were identified in relation to knowledge creation and received the following themes: e-learning, verbal communication, ongoing training and situated learning. KMS was categorized into challenges and improvements, that are, in turn, subdivided into information architecture, usability and information architecture, and user experience correspondingly.

2. *RQ2 - What practices exist for implementing KMS, and how do they relate to the current practices of technical communicators in a consultancy setting?*

To answer this research question, participants were asked to present their opinion regarding one of the most frequently mentioned practices of KMS earlier presented in Literature review (see 2.3.2.) in order to understand how they relate to practices currently implemented in a company. Participants were proposed to either select the most effective from their perspective practice and argue the rationality of their choice or talk a little bit on each of them. As a result, five broad themes emerged from the analysis and include: mentoring, peer-assisted learning, e-learning, ongoing training and situated learning. The results could be found in section 5.3.

5.1. Knowledge creation

The ways knowledge is created by the company's technical communicators are presented in the this section. Through interviewing, it was discovered that none of the participants purely rely on one source of information, and none of the discussed approaches is considered to be the most efficient. In relation to this one of the employees said:

> *"If you're really curious about learning then you get more information. So if we have 2 persons with an equal ability to learn, the one that goes out to seek more information will learn a lot. And if you tell me that the other is googling a lot, so finds an information himself, he learns also"* - UCM11

However, for further discussions it was decided to highlight one of the most frequently mentioned methods. Four themes emerged from the thematic analysis (see section 4.2.1.), and the results are illustrated in the thematic map below in Figure 5.3.
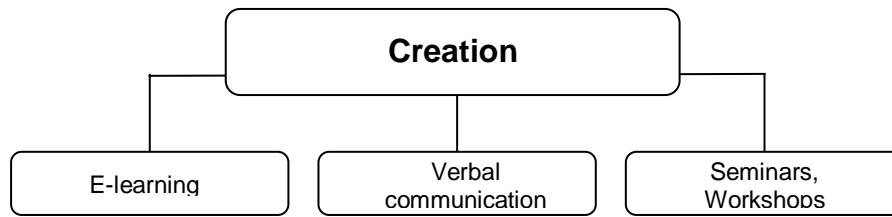
Figure 5.3. Thematic map of knowledge creation

5.1.1. E-learning

Rosenberg (2001) and Przemysław & Zamojska (2017) identify E-learning as self-study with the use of electronic systems that store various codified materials (handbooks, knowledge databases) and the Internet, where the information is updated and transferred in real-time.

The majority of participants mentioned that in the first place they access different electronic documents stored in a company's system, but the way of searching new information varies between newcomers and experienced employees.

Some participants commented that new technical communicators do not have any structured way of proceeding company's information, so they read everything that could be found in a system or even in a printed version. One participant commented:

> *"We just read everything we had, that had been printed out. Mostly it was a product description, the way of working, some writing rules"* - OCT10

On the contrary, most of the experienced employees reported that they know exactly where the materials are stored, and which sources or documents should be used in order to get the required new knowledge:

> *"As part of technical knowledge and as part of technical writing we can order a special book. I can read the material that is not specified by someone that «you should read this», its just my personal reading. But there is a lot of material you can choose yourself"* - OCM15

Two other newcomers responded that they use the company's project documents, whether current or archived ones, to create new knowledge in the domain:

> *"Sometimes it is looking for examples of documents that have been done. You can have a look at a format, templates."* - NTF15

Searching information in the Web is considered by the participants to be not the main, but a supplementary source of knowledge creation that is used after the examining the basic materials stored in a company's system. Talking about this issue an interviewee said:

"I read online, because technology is changing quickly. I check some books, but you do not follow the latest basics of technology. Much of the information now you have to gather online" - OCW13

5.1.2. Verbal communication

Melnik and Maurer (2004) see knowledge as a socially constructed and collectively held source of information. As a result, direct communication and cooperation with the colleagues lead to an efficient knowledge creation because such verbal channels allow to get fast mutual feedback and stimulate further thinking (Melnik & Maurer, 2004).

When participants were asked about the sources used to create new knowledge, new employees, unfamiliar with the domain knowledge of other coworkers, commented that they receive new information from their team members, while experts contact a responsible person directly. In response to the question: *"Who in a company helped you to get new knowledge?"*, one of the participants said :

"Mainly the team. I got a lot of help and support from experienced writers. The team is normally set up already, so as a newcomer you can basically talk to your colleagues in your team, because they can transfer the knowledge to you" - OCW11

In addition to this, one of the respondents said that newcomers can also get support from their unit managers in a way that the latter help to organize meetings or workshops with experienced in a specific area employees to learn how to work with customer's tools, discuss problematic issues, and eliminate misconceptions.

5.1.3. Seminars, Workshops

Wicklen (2001) considers seminars and workshops to be a source of organizational knowledge flow through which information about technologies and company's products is transferred to employees.

Talking about this issue, none of new technical communicators named seminars to be an efficient source of knowledge creation apart from technical writing sessions where *" they told us how to write, use English grammar for technical writing. It was like an hour and everyone could join if they wanted"* - NTT18

Experienced employees, on the contrary, said though some issues require enhancement, they consider seminars and training in groups to be the most structured and effective methods to learn something new in relation to their work.

5.2. Knowledge Management Systems

As was already defined in the Literature review (see 2.3.1), the concept of Knowledge Management Systems (KMS) is used to describe any type of interactive systems or technological tools used in combination with any social infrastructures that support organizational knowledge flow. Two discrete categories, challenges and improvements, emerged from the analysis and presented in this section.

5.2.1. Challenges

The problems of using currently implemented KMS are presented in this section. The challenges are split into four separate themes on the basis of the thematic analysis, and the results are illustrated in the thematic map below in Figure 5.4.
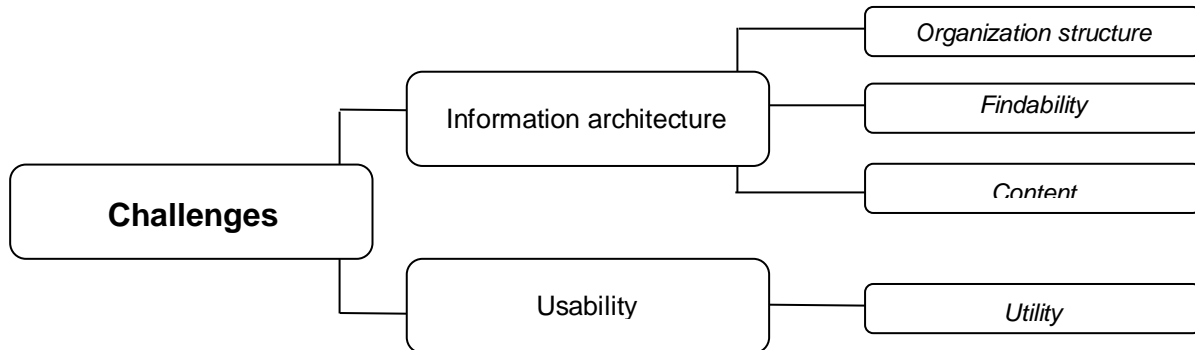

Figure 5.4. Thematic map of challenges

5.2.1.1. Information architecture

In accordance with Tidwell (2005) information architecture is implemented in work with highly interactive interfaces, and has the main goal of handling various organizational models and large amount of information in the best and the most accessible way for an end user. Information architecture includes various elements such as navigation, searching and labeling systems, organization structures and schemes as well as content (Rosenfeld & Morville, 1998).

Content

One of the main goals of the information presented on a website or stored in a system is to be meaningful and have suitable content for an end user (Tidwell, 2005).

Experienced technical communicators were the ones who said that they face the majority of problems with the content of the existing seminars. Two participants explained that though seminars by their very nature are useful sources of knowledge, currently the content does not vary greatly from session to session. For example, one interviewee said:

> «People need different kinds of seminars. Giving them the same topic every year, it is probably not so helpful. You're not looking to learn the same things again. You probably want to learn a little bit more on something else» - OCW12

In comparison to seminars, trainings are more oriented towards new employees, where the work of various work-related software is shown in practice. Two participants mentioned that the content of such training is not meaningful for new employees, as they are given an introduction training on software long before the actual work with it starts, so that is delivered in improper time. One employee said:

«I was puzzled, because there is lots of software. Well, from my perspective, to be honest, of course I got an introductory training for all these programs, but it was like, okay, maybe one hour, two hours on each software. You just get, okey, this is how it works, and there were a lot of information, that, actually does not make any sense in the beginning, until you start working with it» - NTF16

Organization structure

Rosenfeld and Morville (1998) identify organization structure as relationships between different pieces of a content where a successful structure is organized in a way so that a user can easily navigate on a website or an intranet through the primary sources.

Through interviewing it was discovered that one participant considers the information to be organized in an ambiguous way with deep structures, hindering him from finding the useful information. Regarding this he says:

"I think it is quite hard to handle and hard to comprehend how subpages originate from the main pages and what's the relation between subsets within the site. It is just an unclear structure. Everything is just there, and we seem to be adding new information there without knowing where it really goes" - NTW14

Another technical communicator said that the current KMS has no structure as it simply represents a document management and storage system.

Findability

Findability is inseparable from organizational structure (Tidwell, 2005), and in order for information on a website to be navigable and easily discovered (Morville, 2005), content should be properly structured.

Talking about this issue, technical communicators said that they face problems both offline and online. For example, one of the respondents said that in the beginning of his work in the company he could not identify the field of expertise of his colleagues, so he did not know who he should address to in case problems arise. Two other participants, talking about the information stored on the company's intranet, mentioned that they find it hard to find relevant or useful for their work material:

"Sometimes there's too much of information on a one screen. I know what information is stored and what information I can get in touch with, but I do not know exactly where it is located" - NTM16

5.2.1.2. Usability

Preece, Rogers and Sharp (2002) define usability as an area of HCI responsible for the quality of users' interaction with a product or a system, and focuses on how interactive products fulfill their goals in being easy to learn, effective and safe to use.

Utility

One of the main usability goals of an interactive product lies in its utility, in order to provide users with proper functionalities allowing them to complete their tasks in a way they want and need (Preece, Rogers & Sharp, 2002). When a system does not fulfill its purpose, end users can show reluctance to work with a program, as it prevents them from carrying out their tasks effectively. For example, one of the respondents said the following:

> *"It is not user-friendly. I do not even want to work on sharepoint, because it is very junky, and slow, and search is terrible"* - OCW12

The other employee said that the current system does not support technical communicators in a proper way:

> *"Look at the system we have today: it is not...it is basically more a place where we store the documents, of course there is some other support in the systems like...but it is not mandatory that it will be utilized in a perfect way. Current systems do not support as so much, this is true"* - UCM11

5.2.2. Improvements

Suggestions on how to improve company's Knowledge Management Systems (KMS) are presented in this section. Based on the thematic analysis, employees needs and wishes are split into two separate themes with the results presented in the thematic map in Figure 5.5.
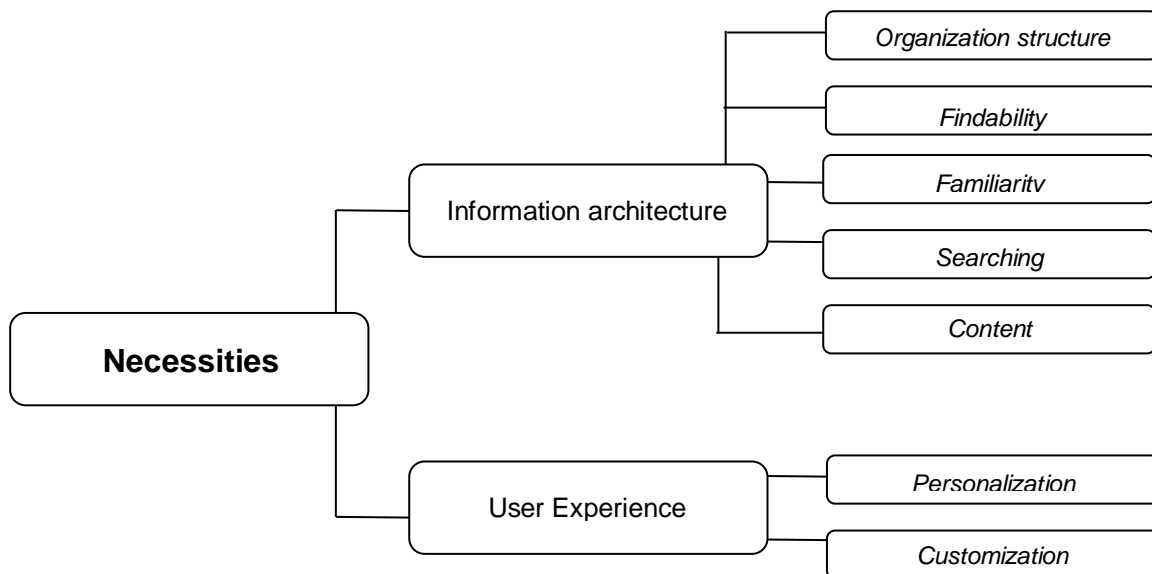
Figure 5.5. Thematic map of the necessities

5.2.2.1. Information architecture

It was decided not to duplicate the text on the information architecture including "organization structure" and "findability", so the description of the current concept with the corresponding elements

can be found in the section 5.2.1.1. New concepts, that have not been mentioned earlier, will be characterized.

Organization structure

One of technical communicators mentioned that due to a large amount of information stored in a system it is hard to find the most important for his work information, that is why he would like the relevant content to be prioritized:

> *"We have some useful thing inside this folder. Which I do not think it is very easy to locate. Maybe what we could have is better organization like priority based, so the most important ones come first, others like optional if you want to look further"* - NTF15

The other participant said that the materials for his projects are fragmented, so that he would like to have all the appropriate information to be stored in one directory.

Findability

Talking about findability, new technical communicators said that they focus mainly on offline issues rather than on online, so new employees primarily want to know who in a company is responsible for the domain where a question is raised in:

> *"If we knew a person responsible for this or that maybe he or she could just give a briefing. So we have people assigned for certain tasks and when a new employee comes, they can always go and ask this person about that. Maybe it will be easier"* - NTF16

Familiarity

One organization can use several systems, so Rosenfeld and Morville (1998) consider that these programs should maintain the same organization structure or labeling (textual and iconic) in order for users to see familiarities and adapt faster to a work with new systems.

Through interviewing it was discovered that technical communicators are normally involved into a work on a project in collaboration with different specialists, but in some cases can belong to several teams that still work with the same customer, but operate differently. These discrepancies are seen in the overall architecture of the systems that in their turn cause the downtime of employees forced to adapt to new structures while alerting between the projects. Regarding this, two participants said that they would like to work on different projects in the same system, or at least the content to be structured in the same way:

> *"This might be beneficial for a company. If the company puts an effort into it, it will be easier for writers to switch between different teams. If it had the same document view or the same system, it could be beneficial. So it should be structured in the same way"* - OCW11

Searching

According to Rosenfeld and Morville (1998) proper organization structure, labeling, and navigation systems lead to successful searching throughout the program. As a result of good organization, new employees, who are not wholly familiar with the an area, are able to find the right answers on their questions even if their search criteria are not completely accurate. Regarding this issue, one employee mentioned the following:

> *"If you do not know the exact terminology, you should be able to enter synonyms, and the system should return a list of suggestions and documents that matches your search criteria. A bit like free search mechanism but wider in scope"* - OCW13

The same participant also suggested the system to have the history of search activities in the employee's account in order to keep track on what has been done and searched for.

Search engines should both process the information qualitatively as well as instantaneously, as the information anxiety intensifies when a user spends more time on searching than he expects (Morville, 2005). Talking about this issue one employee said:

> *"As a beginner you do not know what's there and what's not there. So it is very important that you find things that you're looking for. And if you have a KMS, it is very important that the system would let you find information quickly, so you do not get frustrated"* - OCW12

Content

A common view amongst interviews was that seminars as well as codified materials stored in the company's system should be improved.

One of the participants said that he would like to have standard training materials that every new technical communicator can read when he joins the company. These materials should include *"something regarding specific tools we are using, ways of working with different clients, perhaps. I also would like to have information about the company's products and other "internal" things/tools/methods we have developed here. And also things about how to be a good technical writer"*- UCT09. Moreover, some of the participants wanted the materials to include external and internal links leading to the related sources.

Two other technical communicators mentioned that instead of offline participation in the same seminars, they could be recorded and stored on the intranet, thus being easily accessed by anyone in a company despite the geographic position:

> *"Everytime we have a newcomer we repeat the same information again again. Maybe it will be possible to record it. In this case they can watch these videos by themselves, and we do not have to give them any physical training. It will also save costs. Do not think it provides with much information when it is repeated again. Newcomers are normally bombarded with lots of information during the first week, that is hard for people to digest"*- OCW11

When it comes to the seminars, the majority of the participants said that though current trainings on writing are quite informative, the employees are in lack of discussions on technical issues. According to the participants, these specified needs could be addressed through customization strategy described below in section 5.2.2.2. In response to the question: *"Is it possible to give some specified seminars?"*, one participant answered:

> *"You see the trend of people, how they write, what kinds of issues come up more often, and based on it you put a seminar, that's it. If there are 3-4 people with the same issues then you an have a small workshop just to help these people. You do not give the same thing to everyone. You give the things people want based on where the efficiency are"* - OCW12

5.2.2.2 User experience

In accordance with Preece, Rogers and Sharp (2002), user experience has its main goal to meet the requirements of a customer interacting with a product. In other words, the exact needs of end users should be identified and cover such aspects as usefulness, desirability, credibility, and accessibility. All these elements, as well as the overall user experience, could be enhanced through personalization and customization strategies, where the former gives control to the system, while the latter stays in control of a user (Nielsen Norman Group, 2016).

Personalization

The main objection of personalization strategy lies in the delivery of the content coupled with functionalities in a way to fulfill the specific needs and interests of a user without his direct involvement (Nielsen Norman Group, 2016).

One of the respondents mentioned that it would be beneficial for new technical communicators in the beginning of their work to have a personalized training plan to follow that could be stored and updated in a system. Two other participants said that they want the company's employees to be assigned through the system to specific professional courses in case the necessity for knowledge or skills improvement arise:

> *"What I'd like to do more is to have more personalized approach. For example to sign up a person to a specific course. If we go to a new KMS, it has more like a learning platform which means that we will be able to follow up who has completed each course and so on. Today we expect everybody to take their own responsibility to do these kind of things. With new KMS we will easily follow up who has not fulfill their training"* - UCM11

One technical communicator stated that the above-mentioned approach nevertheless should be used in combination with offline discussions initiated by unit managers, especially *"for new people you need to talk about the things you expect from them. And give them some time to going towards these expectations to see how it is going. Are they growing of that. And then in a few months they will learn a little bit more. And then have again have a discussion to understand what was helpful or no"* - OCW12

Customization

In comparison with personalization, the main goal of customization is to allow users to take control over the system and make their own decisions about what they exactly want to see and do (Nielsen Norman Group, 2016). Regarding this, several respondents said that they would like the current system to be enhanced in such a way that employees can send requests on the training or courses they want to take in order to fill the gaps in their knowledge:

> *"Maybe we can put this requirement in the system. We have a lack of system now, and if we had it, we can contribute to our requirements and then the company can analyze. And see that the consultants have the requirements that could be bounded. And then customize a course for these people who need this training. Maybe part of my requirements overlaps with some other requirements, so the company can benefit to other consultants"*
> - OCW11

5.3. Practices of KMS

In the final part of the interviews participants shared their opinion on Knowledge Management Systems (KMS) practices identified in earlier researches and presented in the Literature review (see 2.3.2.). The participants answers can be categorised as addressing to mentoring, peer-assisted learning, E-learning, Seminars/Lectures/Workshops. The results are presented in the next sections.

Mentoring

Similar to the findings of Boud and Middleton (2003), new technical communicators were talking about the importance of mentorship programs and support from other experienced members in cases when this involvement is necessary. Equally to Boud and Middleton (2003), the majority of interviewees argued that technical communicators need mentor's involvement only in the beginning of their work, while one of the participants said that he would like to have this support even after several year of work:

> *"I think I personally prefer mentoring, like face-to-face. Maybe not that often. But I feel if I need it, this would probably work the best for me, when we can sit down, I can ask my questions, solve any issues. The best thing about mentoring is that you go together with an actual problem"* - NTM16

Boud and Middleton (2003) also write that in mentoring new employees appreciate discussion-based form of communication as it stimulates knowledge creation and helps users get an immediate response to their questions. In relation to this one interviewee said:

> *"For me mentoring is really good as we can have a discussion. Maybe the same thing with peer-reviewed learning how to do a task, discuss knowledge. I like more deep learning in a discussional things, so human contact is the best for me. I would choose mentoring"* - NTW14

E-learning

Kovacs and Szabados (2016) and Przemysław and Zamojska (2017) write that in organization knowledge E-learning considers to be one the most effective source to solve problems as well as transfer and create new knowledge. Surprisingly, but the overall response to this question was low, even though participants mentioned that they address to codified materials a lot, they do not find it to be an effective practice promoting knowledge creation or transfer. One participant said :

> *"I did not find handbooks effective, nor overwhelming, there are a lot of scary diagrams"*
> - NTF15

In their research Davenport and Prusak (1998) conclude that E-learning can not guarantee efficient organizational knowledge creation or transfer and be no more than a storage system in cases of wrong implementation. This theme came up in discussions of problems with existing E-learning system, where one of the participants said that "*It is basically more a place where we store the documents*" - UCM11.

Seminars, lectures, and workshops

In accordance with Read and Kleiner (1996), Hocker & Dempsey (1994), Kovacs and Szabados (2016), Rodriguez and Cardenas (2012), and Hughey and Mussnug (1997), lectures are the least productive method of knowledge transfer and creation because recipients are not actively involved in participation, can not simply understand information or forget everything by the time when transmitted knowledge should be put into practice. Regarding this one participant said:

> "*Lectures. I have some problems with lectures, though they're informative, if you do not apply them instantly, most of it just goes away. When you go to a lecture is like...You hear about the problem , but by the time you need to remember, you've already forgotten what you've learned*"
> - NTW14

Wicklen (2001) and Przemysław & Zamojska (2017) write that ongoing training, especially during pre-project learning stage help new employees create general knowledge in the field and get familiar with specific terminologies that colleagues use in their work. Similar to this issue, one of the participant said that an introduction seminar on technical writing is very effective for new employees as they discuss effective strategies, writing styles. The exact comment below demonstrates this:

> "*I think the ones that seminars on technical writing, they were really useful as a newcome. They had the basics like grammar rules, technical writing tips, so they were very useful. For the newcomers technical writing seminars were very good*" - OCM15

Another interviewee, when was asked about the effectiveness of seminars for new technical communicators, also said that they are useful in a sense that help new employees understand the areas of improvement in writing. As follows he commented:

> "*For everyone who is employed an introduction on technical writing is organized, so with an experienced employee they go through the writing test together to identify the lack of*

competences, regardless if you have very good writing test. Then they identify areas to work on. So that they do get it at the very beginning".

Another important relevant finding was that as well as several scientists, one of the interviewees mentioned that seminars or lectures should have additional time for reflections. With regards to this issue he responded:

"It would be better if we're giving this things, we have a discussion with them. If you have a seminar, you should have 15 minutes following up to get if it was helpful or not. I do not think that this could be a problem, you can reduce some time for a seminar and use it for a feedback" - OCW12

Peer-assisted learning

Though in accordance with literature, Peer-assisted learning (PAL) acts as a cost-effective method of efficient knowledge transfer and creation, the overall response for this method was low. The reason for this might lie in a fact that employees consider interaction with all the colleagues, both experienced and novices, as PAL where *"it is a part of everyday work. It is there all the time"* - OCM15

Only one participant was talking about PAL in a sense that scientist define it, as this participant started his work in a company together with another novice. Overall, the participant got a positive experience, but none of the methods (observations, feedback on performance) highlighted in the literature, were mentioned by the participant. Talking about this issue the interviewee said:

"I had another colleague with me accompanying me so we both could discuss with each other, and it was very helpful I would say, rather than having it alone. So whatever project manager discussed with us, we could later discuss it on ourselves when we were leaving the room. That was I would say a very effective for me to have a partner with me"- NTF16

5. Discussion

This study was designed to investigate how Knowledge Management System (KMS) can support learning processes of new technical communicators of a Swedish consultancy company. The interviews showed the ways technical communicators create new knowledge in a company with the use of KMS as well as the problem they face while interacting with them. This chapter presents the comparison of the mainly used by the participants KMS with the literature review. The main purpose of the discussion is to show how KMS could be designed in order to facilitate knowledge flow of new technical communicators in a consultancy company. Moreover, since one of the main interests of this study lies in the process of organizational knowledge flow, so the issue as knowledge creation is raised in the current section. It is presented in a form of verbal communication as one of the main sources mentioned by the participants. The discussions of the results are presented below.

Verbal communication

As a socially constructed and collectively held source of information, verbal communication in a form of direct communication and cooperation with colleagues leads to an efficient knowledge creation (Melnik & Maurer, 2004). As follows, in the interviews the majority of technical communicators mentioned that knowledge transferred through direct communication and cooperation with their team members is one of the most effective method to create new knowledge. However, it was discovered that only after vocational training new employees got assigned to teams or projects, and before that they just share rooms with other technical communicators who they address when questions arise. From the perspective of Wenger's knowledge sharing model, collocation is not enough for knowledge to be transferred, as there should always be a shared activity involving members into participation in practice (Wenger, 2004). Here community of practice (CoP), as a cornerstone of knowledge management, might act as a support towards professional skills development, that facilitates transfer of best methods, and helps organizations to retain employees and, as a result, preserve knowledge within the company (Acton & Golden, 2003; Wenger, 2004).

Lave and Wenger (1991) consider that newcomers need to cooperate and communicate with team members in order knowledge and skills required to move towards full participation in CoP to be transferred. The strength of CoP can be defined in terms of amount of shared activity, and when knowledge transfer occurs closely between members, CoP is strongly framed (Boud and Middleton, 2003). This might be problematic for consultancy companies where lots of employees are placed in other organizations, i.e. new employees start working directly on a customer's side, so that they are cut off from interaction with other technical communicators. Due to a diversity of team members, where new employees start working with, there is a chance that no other technical communicators will be involved into a project or no daily activities where novices can interact with other technical communicators take place. Though in interviews technical communicators have not mentioned virtual networking to be an effective knowledge management practice, implementation of online structures might become a solution for those employees who do not share the same location with other practitioners of the field. As a result, such online structures create places and opportunities for new employees to interact with other experienced technical communicators.

For CoP to function, various material resources such as documents or tools accompanied with social infrastructures should be introduced, therefore Knowledge Management Systems (KMS) are regarded

to be an important component of CoP, because members need access to this knowledge in order to accumulate the knowledge of a community (Jacucci, Tellioglu & Wagner, 2007).

E-learning

A key information system component of KMS that consultancy companies use to promote explicit knowledge transfer through the use of written materials and information technologies (Karkoulian, Halawi, & McCartwrite, 2008; Magnier-Watanabe & Benton, 2017; Nonaka, 1994) is E-learning. Moreover, it has been discovered that E-learning is widely-used in a consultancy setting as a part of a company's codification strategy (Magnier-Watanabe & Benton , 2017), because knowledge is actively used and efficiently reused by employees while providing services to various customers (Hansen, Nohria & Tierney, 1999).

Argote and Ingram (2000) consider that explicit knowledge, i.e. codifiable information that is embedded in technology, as well as clear systems increase the transfer of knowledge inside a firm. This is particularly important for new technical communicators who deal with large amounts of information especially in the very beginning of their career, therefore transparent organization structure and findability of relevant information are two key components of information architecture that new technical communicators should have.

Through interviewing it was discovered that novices have no structured way of working through the company's information, so they read everything that is stored in a system. As a result, new employees run a risk for information irrelevant for their field to be transferred, thus they might potentially miss other more salient information. From this perspective, relevant information should be prioritized in a system if not through personalization strategy, where specific needs and interests of a user are addressed without his direct involvement (Nielsen Norman Group, 2016). Then the system should be structured in a way so that general information is followed by specific information. Overall, the main objective is that new employees should not have problems in finding information they need, both when it comes to content and time. Regarding the latter, new employees should not spend more time on searching than they expect as it increases information anxiety (Morville, 2005) and distract from concentration on their process of learning.

The participants also mentioned that though they address to codified materials a lot, they do not find it to be an effective practice promoting knowledge creation or transfer. In the same way, Davenport and Prusak (1998) conclude that E-learning can not guarantee efficient organizational knowledge flow, so that consultancy organizations, in order to maintain competitiveness and influence the success of the learning process, should always update their learning databases and provide newcomers with appropriate training materials. Moreover, this approach helps employees, especially novices, avoid creating wrong knowledge followed by transmission to a customer damaging the reputation of a company.

Seminars, lectures, and workshops

As components of KMS, seminars, lectures and workshops represent sources of organizational knowledge flow, where tacit knowledge in a form of cognitive elements or technical skills is transferred through face-to-face interactions and participation in projects, by means of observation,

imitation and direct interaction with digital products (Teerajetgul & Chareonngam, 2008). Moreover, seminars, lectures and workshops are recognized to be social components of personalization strategy that consultancy companies normally use to efficiently manage knowledge among their employees (Magnier-Watanabe & Benton, 2017; Hansen, Nohria & Tierney, 1999).

Magnier-Watanabe and Benton (2017) write that the main goal of organizational knowledge flow lies in an ability amongst employees to fully apply transferred knowledge and skills to practice. In relation to this, thoroughly designed approaches can help new technical communicators deal with information overload and control their knowledge gained both through formal learning methods such as seminars or lectures and work-related practice such as workshops.

New technical communicators do not consider seminars, lectures and workshops to be one of their main sources of fostering knowledge creation or transfer, and there might be several reasons. Firstly, the process of informing does not necessarily mean knowledge transfer or creation, especially in cases when a new employee takes a position of a passive participant with a lack of interaction (Machlup, 1980; Read & Kleiner, 1996; Hocker & Dempsey, 1994; Kovacs & Szabados, 2016; Rodriguez & Cardenas, 2012; Hughey & Mussnug, 1997). Regarding this, offline sessions should have additional time for reflection and discussion, as this reflection-on-action approach leads to creation of propositional knowledge and forces new employees to analyze and make conclusions from presented information rather than simply remember it (Read & Kleiner, 1996; Munby, 1989). Secondly, offline sessions are essential for new employees mainly during pre-project learning stage where core work skills are created and general information in the field is transferred, but hardly matter on later stages where employees become full participants of a community of practice (CoP) and would like to gain specified knowledge in a field (Przemysław & Zamojska, 2017). In order to progress, the content of seminars should be improved and become more diverse so that address the specified needs of an audience.

Catanio and Catanio (2010) and Johnson and Senges (2010) argue that for experienced employees lectures and seminars can serve as a valuable instrument to enhance their competence and knowledge in the field. As a result, oldcommers in their interviews mentioned that general seminars (conducted on a systematic basis) should be recorded and stored online, as they bring repetitive information for them, and new knowledge is hardly transferred or created. However, novices still need to participate in offline sessions in order to have discussions, get-to-know the field of expertise of their colleagues (to address them directly in case of emergency) and more important, to become legitimate peripheral participants. To clarify, when experienced technical communicators invite new members to offline seminar, i.e. CoP give novices an access to legitimate peripheral participation (LPP), then new employees move gradually towards becoming full and central members of the CoP (Lave & Wenger, 1991), whereas watching videos online limits knowledge creation and constraints novices from offline participation.

When it comes to workshops, that are a part of ongoing vocational training where new employees are demonstrated how to manipulate software, the results show that new technical communicators do not find them effective until the actual work with them starts. This happens as much of knowledge received this time is not capable of retaining (Machlup, 1980), that is why newcomers should intermittently apply knowledge to practice in order to reinforce skills they learned, otherwise their knowledge will take a transitory character and is sooner forgotten (Hocker & Dempsey, 1994). From

this perspective, workshops whether should be delivered on the eve of a newcomer's enrollment into a project, or still long before the actual work but through legitimate peripheral participation where a novice is permanently involved into a work on a small project with the use of current software. As a result of repetitions, later newcomers will be managed to perform actions unconsciously retrieving the equivalent situations from their earlier practice (Popper, 2002).

5.1. Limitations of the study

The objective of this study is to understand how KMS can support the learning of new technical communicators in a Swedish consultancy firm. One of the most challenging tasks for this research was to find the appropriate number of participants, as there was a limited number of new technical communicators being hired at the moment to work on the current research. As a result, it was decided to interview more experienced practitioners as well, hence the chosen participants present one of the main limitations of this study.

Another limitation lies in fact that due to the time allocated for work on this research, it was decided to interview technical communicators at one of the cities that the consultancy firm operates in. Based on this, the results can not be generalized and further research should be done in other locations.

5.2. Future work

This research examines the work of technical communicators in one of the cities that the consultancy firm operates in. It would be of interest to study to see the way technical communicators work in other offices, both in Sweden and abroad, to see if the results could be used for other companies as well. Furthermore, this study was conducted during the process of redeveloping a company's training support structures for technical communicators, so future research on a new launched system might be done. This should be done in order to see if sources of knowledge creation and opinions of employees on KMS practices have changed as well as existing challenges have been eliminated.

6. Conclusion

This research was conducted to understand how Knowledge Management Systems (KMS) can support the learning of new technical communicators in a large Swedish consultancy company in the process of redeveloping its training support structures for practitioners of this field. To answer this, two research questions were designed as well as semi-structured interviews were conducted.

1. *RQ1 - How does knowledge management function for technical communicators in a consultancy company?*

For this research question the results were classified into two parts: knowledge creation and KMS. When it comes to organizational knowledge flow (the issue of knowledge creation is raised in particular) some of the main findings include the following: 1) Technical communicators use a combination of methods and sources in a process of knowledge creation, including E-learning, verbal communication, seminars and situated learning 2) Electronic documents stored in a company's system are the first sources employees address to, while verbal communication with team members and participation in seminars (with exception to technical writing sessions) are considered to be one of the most and the least efficient ways of new knowledge creation, respectively. Regarding KMS the dominant challenges of the existed system are: 1) Unclearly structured information hindering employees from finding useful information fast 2) Insufficient support and failure to provide technical communicators with proper functionalities, rather than document storage 3) Discrepancies in the overall architecture of the work systems causing the downtime of employees forced to adapt to new structures while alerting between the projects 4) Insufficient work of search engines presenting inaccurate results.

2. *RQ2 - What practices exist for implementing KMS, and how do they relate to the current practices of technical communicators in a consultancy setting?*

To answer this research question, participants were proposed to present their opinion regarding existing and frequently mentioned practices of KMS in order to understand how they relate to practices currently implemented in a company. The results show that new technical communicators acknowledge a discussion-based form of communication in mentor - mentee relationship as well as full support in the beginning of their career. When it comes to E-learning, it can not fully promote knowledge creation or transfer until the system rather that document storage is created. Peer-assisted learning does not exist in a company in its traditional form, where community of novices is created, as new technical communicators are not hired in groups. Nevertheless, peer-assisted learning is regarded by employees to be embedded in everyday work, where knowledge transfer happens through communication with colleagues regardless their professional status. General seminars are considered to be an effective practice for novices, while specified information should be addressed during later stages of work. Moreover, an additional time for reflections and discussions should be introduced. In contrast to the reviewed literature, situated learning is not viewed to be an effective method as, probably the same for PAL, it is embedded in everyday work.

In general, this study has revealed that successfully implemented KMS increases job satisfaction, employee commitment and performance, thus strengthening organization's competitiveness (Acton & Golden, 2003), while challenges in some cases can greatly influence the work of new employees to the

extent of complete unwillingness to use implemented systems, and, as a result, the development of work anxiety and dissatisfaction.

6.1. Implications for academic research

This research contributes to the existing academic knowledge within Knowledge Management and Organizational learning as well as reinforces current known practices associated with Knowledge Management Systems (KMS). Moreover, little research that presents a collection of practices addressing both the issues of information systems and social infrastructures exist. The following attempt to synthesize the literature on these areas can be seen as a contribution to filling this gap with one of the the most frequently mentioned practices described in the literature.

The main interest of this study lies in exploring the ways KMS can support learning processes of new technical communicators in a consultancy company. Until now, there have been many studies examining how technical communication knowledge from an academic world is transferred to a workplace setting, and what are the ways to improve academic-practitioner dialog. However, not many studies have examined the ways new technical communicators create and transfer knowledge directly in a workplace environment. Moreover, little research attention has been paid to how technical communicators use KMS in their process of organizational knowledge flow. Regarding KMS, many studies demonstrate the effectiveness of KMS from the perspective of companies, rather than employees themselves. To summarize, this research has aimed to investigate the above-mentioned issues and present results that address the gaps in the existing literature.

6.2. Implications for professional practice

This study presents the detailed information on how knowledge is created by a company's technical communicators, what is the actual usage of implemented training support structures with the main focus on the current challenges and areas of improvement. The results of the study show how social infrastructures complemented by IT-based systems should be implemented by a company in order to stand out among the competitors. Improved KMS can help the company to supply its employees with efficient knowledge transfer mechanisms to manage and develop their knowledge base. In its turn this will benefit for a company that wants to provide its customers with high-standard services. From this perspective, the findings can contribute to the new system that is being implemented by showing how improved KMS can increase employees' knowledge and skills in general and support the learning process of new technical communicators specifically.

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Appendix 1

Interview questions

Ask interviewees if they're familiar with the concept of knowledge management, if not explain it to them, and make sure you both have the same understanding or definition of it. Give examples if necessary.

Project manager/ Unit manager

1. What types of KMS do you have in a company at the moment?
2. What types of KMS are technical communicators currently using?
3. How new technical communicators in the organization acquire knowledge useful for their work?
4. When a newcomer comes he/she has some specific knowledge gaps. Does the company help to fill these gaps? In what way?
5. How technical communicators, in your perspective, should use KMS to be successful in their work with a client?
6. Which features of KMS are the most effective from your perspective?
   > If names nothing, go directly to 7
   > If names, ask why?
7. Do you have any problems with the current KMS?
   > If YES
   > What could be changed in your perspective?
   > If NO
   > What are the elements that could be improved?

New Technical communicators (less than 1 year of work)

1. Do you know what types of KMS does a company have?
   > If YES
   > Could you please name them?
   > If NO
   > go directly to the question 2
2. What types of KMS are you currently using?
3. How do you learn something new in relation to your work?
4. When you came into the company you had some gaps in knowledge. Did the company help you to fix it in some certain way?
5. Do you study in your free time in order to upgrade knowledge in an area of your work?
6. What do you do to keep your knowledge up-to date (not to forget what you've learned)?
7. How do you apply this knowledge in a work with a client?
8. Which features of KMS are the most effective from your perspective?
   > If names nothing, go directly to 9
   > If names, ask why?

9. Do you have any problems with the current KMS?
   > If YES
   > What could be changed in your perspective?
   > If NO
   > What are the elements that could be improved?

In the end of the interview name all frequently mentioned in the literature practices for the very last question and make sure you both have the same understanding of them.

10. Which practice is the most effective from your perspective? Can you please motivate your answer?
    > Ask to motivate it for oldcomers
    > Ask to motivate it for newcomers

Experienced Technical communicators (from 1 year of work)

1. Do you know what types of KMS does a company have?
   > If YES
   > Could you please name them?
   > If NO
   > go directly to the question 2
2. What types of KMS are you currently using?
3. Which KMS, that you currently using, are the most effective from your perspective?
4. How do you acquire information that is related to your work?
5. When you came into the company you had some gaps in knowledge. Did the company help you to fix it in some certain way?
6. Do you study in your free time in order to upgrade your knowledge in an area of your work?
7. What do you do to keep your knowledge up-to date (not to forget what you've learned)?
8. Which features of KMS, that you are currently using, are the most effective from your perspective?
   > If names nothing, go directly to 9
   > If names, ask why?
8. Do you have any problems with the current KMS?
   > If YES
   > What could be changed in your perspective?
   > If NO
   > What are the elements that could be improved?

In the end of the interview name all frequently mentioned in the literature practices for the very last question and make sure you both have the same understanding of them.

9. Which practice would be the most effective to you? Can you please argument your decision?