

Enabling Knowledge Management strategy development in a lean-agile organization

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<p>Knowledge has become a strategic resource for organizations and businesses. The knowledge possessed by the organizations reside in different forms; in tangible assets such as documents and in intangible assets such as skills or know-how. As any resource, also knowledge should be managed to ensure its efficient utilization. Due to the importance and different aspects of knowledge, long-term strategic planning and management actions will be needed in organizations to maintain the knowledge utilization capabilities.</p> <p>The thesis presents a research aimed to enable the development of a knowledge management strategy and enhance utilization of the knowledge resources in an organization operating on a software industry. Research objectives included uncovering the key knowledge processing requirements in the organization and formulating proposals for high level knowledge management improvements. Together these actions and examination results were intended to form a baseline for knowledge management-related strategic planning in the organization.</p> <p>The research included a series of interviews and document analysis as research methods to acquire information regarding the practical knowledge-related challenges and overall knowledge management situation in the organization. Content analysis method was used to analyze the research results. A knowledge management literature review was also carried out to support the thesis development proposal formulation.</p> <p>The findings and conclusions resulting from the research led to define the means and focus areas for improved knowledge processing and knowledge management strategy development in the examined organization.</p>	
Keywords Knowledge management, KM strategy, KM development	

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Abbreviations and concepts

Agile	An ideology relevant in software development
AM	Software Application Management
AD	Software Application Development
ASD	Agile Software Development
Continual Improvement	ITIL-bases Improvement framework
CoP	Community of Practice
CSF	Critical Success Factor
Data	Information in raw form
DevOps	An ideology combining Development and Operations
Framework	A particular set of rules, practices and principles guiding action
IT	Information Technology
ITIL	Information Technology Infrastructure Library
KA	Knowledge Asset
KM	Knowledge Management
KT	Knowledge Transfer
Lean	An ideology focused to promote efficiency
NFR	Non-Functional Requirement
OM	Operating Model
SDM	Service Delivery Manager
SECI	A model for knowledge conversion
SMO	Service Management Office
SKMS	Service Knowledge Management System
Strategy	A guiding plan of actions to achieve an aim
SWOT	A method for evaluating key aspects of business
VNA	Value Network Analysis

1 Introduction

During the recent decades, advancements in information- and communications technology have had a substantial impact on societies and economies: rapid increase in networking, growth in the quantity of information and lowering threshold in the availability of knowledge have emerged new markets and industries, created new professions and formed completely new socio-economic structures. Institutions such as OECD and the World Bank have described these new settings from the economic perspective as a knowledge-driven or a knowledge-based economy. The main characteristic of the knowledge-based economy is the increasing utilization of knowledge-intensive models of production in industries, while the role of physical inputs is decreasing. Altogether, knowledge has become a strategic resource and an enabler for economic growth. (Dahlman, Routti & Ylä-Anttila 2006, 1-7; Unger 2019, 3-11; OECD 2004, 3-14; Powell & Snellman 2004, 199-202.)

Today especially organizations operating on a service- and technology sectors rely to a great degree on the processing and accumulation of knowledge, whereas competition and the dynamically challenging economy requires constant renewal of products and services. According to studies, capabilities to create and manage knowledge contribute strongly to the development of intellectual assets and innovations, which can be turned into competitive advantages. (Powell & Snellman 2004, 199-202; Asih, Rumanti & Wiratmadja 2013, 18-19; Leonard 2011, 15; Delgado-Verde et al. 2011, 8; Du Plessis, 2007, 28). Furthermore, the driver for the knowledge management functionality is the organizational ability to learn, and the skills and possibilities of the employees or members to share and generate knowledge (Ackerman et. al 2002, xi). As Ouriques (2019, 94) has concluded, the lack of understanding how to manage the knowledge through actual practices may impede the utilization of knowledge in the organization. It can be stated that the capability to manage knowledge and knowledge-based assets comprehensively has become a vital function for organizations and companies (Dalkir 2011, 2. Thakur & Thakur 2003, 259-260. Ackerman et al. 2002, 3).

The field of Knowledge Management (KM) has been established to address the challenges emerging from the knowledge-based operations, to provide approaches for systematically processing and managing various intellectual assets and to ensure the efficient utilization of the knowledge resources within organizations. As knowledge forms a basis for both operational functionality of the organization and a capability to respond to change, KM provides strategic tools for understanding and anticipating various challenges. (Dalkir

2011, 2-4). The consensus among the KM practitioners and scholars is also, that companies and organizations could benefit greatly if efforts would be allocated to capitalizing their embedded expertise. (Ackerman et al. 2002, 3).

This thesis presents an examination concerning the Knowledge Management approach and practices in an information technology company, which distinctively fits the descriptions of a knowledge-reliant organization. Based on the examination findings and by reflecting the available KM literature, the thesis aims to introduce KM-related development suggestions for the named company in order enable enhancing the utilization of the organization's intellectual assets. While the settings for the research have been case-specific, the root causes for examined challenges and the Knowledge Management-oriented development proposals should be generalizable.

The thesis research was originally initiated as a practical-level examination, whereas events in the target organization combined with several coincident findings relating to the strategic relevance of the Knowledge Management in the company induced the change in the direction. Thus, the focus of the thesis was changed to the strategic meaning of the Knowledge Management and the emerging development ideas were adapted to support the KM as a strategic function in the target organization.

1.1 Thesis background and research environment

The thesis research focuses on a company, which has been founded as a joint venture between a large financial sector corporation and a global information technology service provider. The joint venture offers IT service consulting and systems integration services, as well as software application management and development services for the financial corporation. In the thesis, the joint venture is hereafter referred to as Company A and the financial corporation as the Customer.

While Company A is following the management framework and other foundational principles originating from the service provider counterpart, its service delivery model is effectively aligned with the Customer organization. As an organization, Company A pursues to utilize a lean-agile operational approach, while the service provider's and Customer's cultures have been until recently more traditional. Company A has been able to establish a significant role in the highly-digitalized and IT service-based Customer ecosystem, but it is constantly competing with third party service providers. Currently the Customer's organization is undergoing a transformation towards an operating model based on Agile and

DevOps principles. Resulting profound changes affect the Customer's IT service management model, steering of business processes, structure of the organization and many aspects of the corporate culture. The transformation is forcing also Company A to renew several of its practices and to adapt to a new collaboration model in order to maintain the business and relationship with customer functional. As the transformation will change the ways Customer manages their business initiatives, the changes have been expected to result tightening competition among the Customer's service providers.

According to the Company A Service Management Office's hypothesis, one of the various adjustments to be carried out within the organization due to the changes in the operating environment, is the redesign of the current knowledge management approach. Based on the SMO's initial assessment, short-term changes are likely needed to ensure the functionality of knowledge flows in the changing organization and more far-reaching activities should be carried out to ensure proper knowledge asset management in the future. Due to the nature of the Company A's position, the ability to carry out renewal also on the KM sector is of great importance. The thesis aims to provide support for the Company A to overcome the transformational challenges affecting Knowledge Management.

1.2 Research objectives

As referred above, the thesis concentrates to examine Knowledge Management approach, realization of the KM principles and knowledge processing-related transformational challenges within the Company A. By analyzing the findings of the examination, the thesis attempts to uncover detailed requirements for Knowledge Management improvements and outlines proposals targeted to enhance value creation of the company knowledge assets. Based on this general directive, following more detailed objectives were defined for the thesis:

- Information gathered during the examination should form understanding of the current KM framework functionality within the company and define a baseline for the improvements.
- As the result of the examination and related analysis, thesis should draw conclusions and formulate proposals for adjusting the Company A Knowledge Management approach.

1.3 Research problem and questions

The research problem in the thesis is, how should Company A develop its Knowledge Management approach? To examine the subject and to provide suggestions, the research questions of the thesis concentrate to examine following:

- How Knowledge Management has been currently organized in the Company A?
- How knowledge is being processed within the company service deliveries?

In addition, the research attempts to examine the challenges affecting the Knowledge Management in the company by seeking answers to the following research questions:

- How does the Agile and DevOps practices affect Knowledge Management functions of the company?
- Are there any other underlying challenges affecting knowledge processing?

1.4 Research scope and limitations

The scope of the thesis research included Company A Knowledge Management framework functionality examination and analysis. The intention was to document the KM approach performance, organizational challenges, opportunities and status regarding the knowledge management conventions. Based on the research, thesis was planned to include formulation of high level KM development suggestions covering the found challenges and opportunities.

As the transformational issues faced by the company concern Application Management units the most, the thesis research was limited to examine KM performance in the AM service deliveries in Finland. The Knowledge Management documentation examination was limited to the company official documentation collected to the Operating Model.

1.5 Thesis key concepts elaborated

In order to understand the research and proposals presented in the thesis, certain key concepts and terms related to Knowledge Management and the IT service management should be further clarified.

Data is commonly defined as figures describing events, and *information* is the use and communication of data. Data turns into information, when it is being given an interpretable meaning. *Knowledge*, in turn, is actionable information (Leonard 2011, xv). The concept of

knowledge can be anyhow examined from different perspectives. The traditional definition of knowledge as “justified true beliefs” is still supported by authors such as Nonaka and Takeuchi (1995). Sveiby (1997, 37) has described knowledge as a “capacity to act”. The same author has later elaborated this standpoint by defining knowledge as “intangible asset with a capacity to produce value”, naming know-how as an example (Sveiby, 2001). For businesses, knowledge in principle represents intellectual capital residing largely in the employees (Choo & Bontis, 2002). The underlying connection between the various interpretations is the human factor, as humans are required in the creation and use of knowledge. Knowledge is ultimately considered as a context-specific synthesis of experiences, beliefs, judgement and culture (Nonaka, Toyama & Byosiere (2001, 491-493).

Knowledge assets and intellectual assets are knowledge-based resources. Varying for example from the expertise possessed by individuals to documentation, products, patents and ideas, these assets are either tangible or intangible, valuable units of knowledge and therefore manifestations of the intellectual capital. (Sveiby 2003, 4-6).

Knowledge Management is a field of study and a discipline focused to the development and management of knowledge-oriented functions and knowledge-based assets in organizations. Knowledge Management has been also described as an initiative to transform knowledge and intellectual assets into business value within organizations (Zerega 1998, 61).

ITIL is a widely-accepted IT service management approach. ITIL framework presents comprehensive best-practice –type library of principles, processes, practices and guidance for orchestrating IT services. The objective of the framework is to offer a vision of cost-efficient service delivery management, while the adoption of the ITIL can be done in a flexible manner (ITIL 2007).

Lean is an ideology of efficiency, concentrating especially eliminating wasteful activities. With lean methods, organizations are able to reduce behaviour and features which do not create value (Plenert, Dey & Arindam 2011, 6).

Both *Agile* and *DevOps* are sets of principles and methodologies originating from software development. Emphasizing practicality and collaboration over fixed, steady structures traditionally common in the software deliveries, Agile software development mindset has become popular approach especially due to its efficiency and capability to produce results quickly. Still, Agile allows focusing to quality of the deliverables and responding to changing needs rapidly (Stellman & Greene 2014). *DevOps* is an approach for combining and

managing activities belonging to both “development” and “operations” in the service delivery. In principle, *DevOps* extends the adoption of Agile principles and methods to cover also the service functions taking place in a delivery organization after the development activities (Verona 2016).

2 Research strategy and methodologies

A key research objective in the thesis was to establish an understanding of the Company A Knowledge Management status. Largely resulting from the human-centric processes and affected by the behaviour of the organization and its employees, the research methodology had to be suited to elicit both social and technological factors affecting the Knowledge Management. Based on these premises, a qualitative approach was utilized in the research. The aim of the qualitative research is to understand, describe and discover meanings through empirical data collection methods such as interviews, observations and content analysis (Tuomi & Sarajärvi 2018, 62). In addition, when examining organization or a society, qualitative research may provide explanations and understanding for behaviour, elicit perceptions, and for example allow investigation of seemingly hidden processes embedded in work routines (Lapan, Riemer & Quartaroli, chapter 4). As the qualitative research in general allows developing analytic explanations (Barbour 2014, 17), there existed a strong justification for the chosen research approach.

The presented research was carried out as a case study. Case studies allow investigation of phenomena and collecting respective evidence in the actual context, such as organization (Farquhar 2012, 10). Case studies are typically in-depth investigations examining subjects with various means and focusing to analyse activities within a specific environment (Pitkäranta 2014, 35). As a research approach, case study was well-suited for the needed examination and allowed exploring the questions regarding the Knowledge Management performance and challenges in the Company A. The progress of the examination followed an inductive research logic. As Farquhar (2012, 24-26) has described the characteristics of such research orientation, the thesis examination concentrated to explore the subject and collect data with qualitative means, followed by an analyse with result interpretation. The aim was to understand the performance of the organization from certain perspectives and form a hypothesis of needed development activities justified by an inductive data analysis results, but supported also by available KM literature. The research execution followed a process similar than illustrated by Farquhar (2012, 24):



Figure 1: The logic and process steps of an inductive research

2.1 Data collection methods

The primary data collection method of the thesis research was a series of semi-structured theme interviews. As the thesis objectives and research questions required investigation of the KM performance as well as the reasoning behind the Knowledge Management practitioner performance, this data collection method fulfilled the methodological requirements of the research. Theme interviews proceed by focusing the interest of the discussion on a specific subject, and in the semi-structured interviews certain predetermined questions may be used to guide the discussion and to clarify the issues emerging from the conversation. Theme interviews allow flexibility and possibilities to deeper exploration of the topic than interviews with more strict structure would, therefore they provide a well-functioning method for understanding the backgrounds, motives and interpretations affecting the answers (Tuomi & Sarajärvi 2018, 64; Brinkmann 2013, 22).

Warren (2011, 5-7) instructs, that the respondents for the interviews should be selected considering the representativeness of the data. Due to the thesis research scope definition, sampling criteria for the interviews covered roles having management responsibilities in the AM service delivery functions of the Company A. In addition, the number of interviewed persons per role and the respondent's sufficient work experience in the company and were taken into account in order to ensure the credibility of the answers. The interviews were carried out during a vacation period, which limited the sampling possibilities and therefore a discretionary sampling was carried out to involve personnel to the examination. The selected persons were mostly middle-level managers and consultants having service management responsibilities in the organization.

Table 1: Representativeness of the interviewed personnel in examined company

Central operative roles in AM service delivery organization	Representativeness within the company
Service Directors	33% of company total director roles
Service Delivery Managers	44% of company total SDM roles
Supporting roles	Representativeness within the company
Senior Consultants	20% of similar positions in company

The questions and the order of questions varied to some degree between the interviews due to the differences in the respondent roles. According to Tuomi & Sarajärvi (2018, 64) such variance is common in theme interviews, but also a necessary approach for gathering case specific information (Brinkmann 2013, 21). While the interview discussions were allowed to flow relatively freely, dialogue was guided by altogether sixteen questions tar-

geted to clarify how interviewees experience and perform Knowledge Management activities on their responsibility areas. Information was collected exhaustively regarding different variables affecting KM performance in the company and in general to review respondent's comprehension about subject. The research method allowed surveying the interviewee awareness about the KM practices, routines, guidance, challenges, culture, as well attitudes and feelings towards the subject. The interviews were held in Finnish, but transcribed and summarized in a text form in English. The interview technique followed a principle suggested by Puustinen (2011); the interviews were started with general level questions and shifted to more specific ones around the Knowledge Management topic.

Interview questions	
1	2
How familiar are you with the organizational Knowledge Management including processes, activities and tools?	Do you have any unit or team level objectives, arrangements, routines or guidance for Knowledge Management activities?
Interviewed roles	Answers / units of analysis in condensed form
	DCS1
	In general the KM is familiar topic to me, but in COMPANY A we don't have much related activities, routines or instructions in place. As you know, we tend to operate in an agile way, so there's very little formal
	We don't have organized model for knowledge-related issues, I'm using my own best practices with my team so there's anyway some routine. There isn't any planning ahead for anything else than billable
DCS2	
In principle yes, I'm familiar with KM, but in COMPANY A we don't have coordinated activities like this on the general level. There isn't actual tools or processes for KM, but we used to have these before the merger at	
There's no guidance, so I'm a bit unaware what is needed. At the moment there is routinely carried out meetings of all sorts. Some of these are good for knowledge sharing, and some are only for case solving	
SDM1	
I have to admit that I'm not familiar with the KM. We have had discussions on the communications issues in our team and the problems with unclear responsibilities, but I guess it's not exactly the subject you are	
Not really. We were discussing in your workshop earlier about the needs to clarify the communications with polish and indian teams, but there isn't any real processes for this area. We do what we're needed to do,	

Figure 2: A partial view of the transcribed interviews as analysis units being processed

Figure 2 presents partially the Excel document structure, which was used to collect and organize the interview data. The transcribed and summarized interview answers were collected in an Excel in a condensed form. The summaries or condensed answers per interviewee for each question were treated as analysis units in the analysis phase. The guiding interview questions have been presented in the appendices.

A document analysis was used as a secondary research method in the thesis mainly for the triangulation purposes. As Bowen (2009, 28-30) has defined, document analysis is a systematic procedure for inspecting and evaluating materials consisting of generally texts and images, while certain observations and findings concerning the content will form the basis for the analysis. Document analysis has been described particularly suitable for case studies, and it is often used with other research methods to verify the findings and conclusions (Bowen, 2009, 29).

The Company A operational principles and practices are based on an Operating Model (OM) framework. The OM has been built in a web page form and besides being available for all company A employees, it is a mandatory part of the operative guidance. The OM provides descriptions of service delivery principles, processes and practices on a high level, but also includes guideline documentation, templates and instructions for the delivery functions such as Application Management, Application Development and Application Operations in addition to describing and referring to several company internal activities. The Operating Model should contain also documentation and references to a Knowledge Management framework or general KM practices in use. These contents and materials were included in the document analyse of the research and were reviewed to identify evidence of the KM activities. The review utilized similar questions than the interviews in order to allow cross-comparison between the two research method findings.

2.2 Data analysis methods

An inductive content analysis method was used with the both research methods to analyze the collected data. Inductive content analysis is used to identify themes, patterns and to form generalizations from the data through an interpretation and with an aim to find elements for the concluding theoretical construct (Farquhar, 2012, 92). In a simplified form, content analysis can be divided into three main phases: research data analyze and reduction, content clustering, and defining abstractions with relation to underlying theory (Tuomi & Sarajärvi 2018, 86). Following the example presented by Tuomi & Sarajärvi (2018, 86) the content analysis for thesis research data was carried out with process described in figure 3:

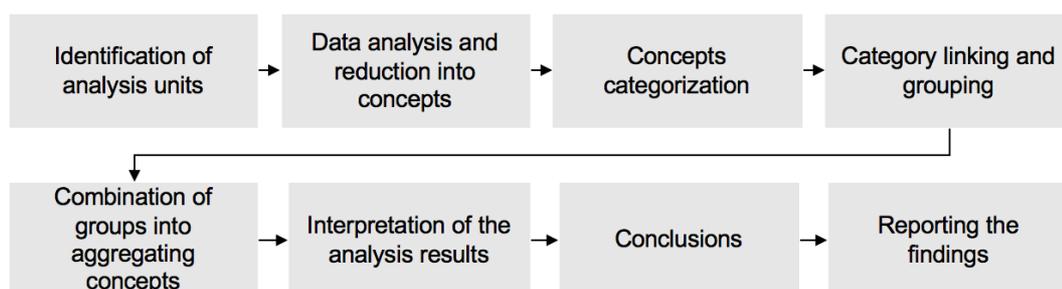


Figure 3: Inductive content analysis process in the thesis

The interview content analysis process began with the identification of analysis units, which consisted of sentences from transcribed interviews supported by the notes from the interview situations. This processing step has been illustrated in figure 2. Both interview responses and the notes were already divided according to the guiding questions, although the responses covered typically themes and issues relating to several questions.

The materials were analyzed to identify meaningful concepts from the research question perspective, thus reducing the data into simplified form. The concepts and categorization were emerging from the content generalization, indications of these have been illustrated in the figure 2 by different color markings in the texts. This processing step was guided by the interpretation of the content and utilized also the interview notes. The method allowed the interviewee's key message linking with the phenomena such as KM enablers and the theoretical concepts of KM, but also added the aspect of respondent's non-verbal communication to the interpretation.

The analysis continued with grouping, categorizing and aggregating the concepts to eventually form abstractions from the data. The abstractions were defined by interpreting the meaning of the grouped concepts with regards of the research questions. Both research methods and related analyses were used to identify signs of common behaviour, evidence or lack of the evidence concerning Knowledge Management activities and features, findings related to organizational behaviour and the performance of the company employees on the sector of Knowledge Management.

Interview questions forming a basis for the analysis	All analysis units condensed into question-specific statements	Codes and concepts derived from the analysis units	Codes arranged and combined into categories
Synthesis of the analysis units		Concepts / Codes	Categories and themes
Question 1	The idea or of KM is familiar to most people. Personnel are not aware of KM practices in COMPANY A.	Sense of familiarity towards KM Deficient KM approach	1. Awareness of KM and KM requirements
Question 2	There does not exist coordinated, structured unit/team-specific KM activities or routines, nor there are any instructions, clear roles or designated tools in place. In certain teams there are attempts to share knowledge continuously. On the KM area, requirements and objectives are unspecified. Expectations in general without any support Insufficient time to plan or create structure Insufficient processes and guidance	Lack of means and guidance for knowledge processing KM value recognized Lack of KM vision and direction Sense of defective culture or management Problems with resourcing and management approach Lack of means and guidance for knowledge processing	2. Insufficient KM enablers 1. Awareness of KM needs 2. Insufficient KM enablers 2. Insufficient KM enablers 3. Unsupportive culture 2. Insufficient KM enablers
Question 3a	Doing only the minimum on the KM sector Reliance on only meetings and direct communication Lots of ad-hoc work without planning, no possibilities to develop working methods Management does not support KM due to prioritization of short-term gains KM is not established as a measured process or feature	Sense of doing only the minimum Lack of means and guidance Ineffective conversion of knowledge Sense of defective culture or management Lack of processes	5. Organizational management model issues 3. Unsupportive culture 8. Issues concerning organizational learning 3. Unsupportive culture 5. Organizational management model issues

Figure 4: Structure of the interview content analysis in Excel

The content analysis structure in practice for the interview data has been illustrated in the figure 4. The processing of the data was carried out in Excel. In the figure 4, the answers for the interview questions have been summarized in statements, and based on the statements the key concepts or codes have been identified for each line. The codes and concepts represent condensed meanings of the statements, which in turn have been combined into categories with a common nominator. The linking of the concepts and categories, and the interpretation of these highest forms of interview data abstractions have been elaborated in the thesis findings section.

The document analysis process followed the same logic as the interview data processing. The Company A Operating Model was reviewed according to document analysis practices; by systematically analysing each of the 20 OM processes or sections including the descriptions, content, attachments and linked document repositories in order to recognize any references to Knowledge Management functions.

Operating Model processes and functions	Document analysis questions	
	1	2
OM processes and functions	Evidence of Knowledge Management processes, activities and tools	Evidence of unit or team level objectives, arrangements, routines or guidance for Knowledge Management
Work instructions	None. Working instructions repository	No evidence of KM-specific objectives or routine
Templates	Templates include following KM-related	Templates section does not contain any evidence
Guidelines	The guidelines contain a KT instruction	No evidence of KM-specific objectives or routine
Checklists	The repository offers ADtoAM checklist	No evidence of KM-specific objectives or routine
Acronyms	No references to KM functions	No direct evidence. The "acronyms" section is in
Glossary	No references to KM functions	No direct evidence. The "glossary" section is in pl
Incident management	No references to KM functions	Recurring reviews with customer in place
Problem management	No references to KM functions	Recurring reviews with customer in place
Change management	CAB and PIR procedures have been cre	Process includes procedures intended to proces
Request fulfilment	Knowledge sharing takes place due to	No evidence of KM-specific objectives or routine
Application development	No references to KM functions	No evidence of KM-specific objectives or routine
Business development	No references to KM functions	No evidence of KM-specific objectives or routine
Continual improvement	There have been modelled and instruct	There are instructions available, other evidence
Governance	Company level meetings are the only a	The "governance" sections does not contain any
Security	KT takes place with infoletters, tests an	No evidence of KM-specific objectives for this ar
Supplier management	No references to KM functions	No evidence of KM-specific objectives or routine
Transition	Transition model includes KT procedur	No evidence of KM-specific routines for this area
Tool support	No references to KM functions	No evidence of KM-specific objectives or routine
Trainings	Trainings are being held occasionally, t	No evidence of KM-specific routines for this area
Quality assurance	Emails and meetings have been design	The process is in place due to improve and main

OM process characteristics described and summarized as analysis units

Figure 5: A partial view of the document analysis summary being analysed

In practice the document analysis covered identification of KM-related evidence in the OM relying on a keyword and reference analysis, and by interpreting the OM process or function objectives. In most the OM process cases, the process description and available content such as attachments and links revealed the intended purposes and preferred ways carry out the modelled activities. The KM references and evidence were identified based on nine questions corresponding the interview questions, but also analysing especially the instructions and process descriptions from the theoretical KM point of view to identify KM features. The findings were described and categorized by the research questions in order to form the analysis units, as presented in the figure 6.

The figure 6. presents the document review analysis structure used to process the OM findings in Excel. Similar to the interview analysis, the findings were collected in a condensed form per question and reduced into concepts or codes. In the figure 6. example the aggregation and interpretation of the concepts and codes have enabled the definition of main categories characterizing the Operating Model from Knowledge Management perspective.

Questions forming a basis for the analysis	OM process content condensed into question-specific statements	Codes and concepts derived from the analysis units	Codes arranged and combined into categories
Questions	Synthesis of the analysis units	Concepts / Codes	Categories and themes
Question 1	No evidence of actual KM framework, only few intentional KT activities within	No coordinated KM practices	1. Insufficient KM approach
Question 2	No evidence regarding KM objectives, some knowledge processing routines or occasional Activities exist only because of required interaction with customer	Insufficient KM steering Lack of processes and management	1. Insufficient KM approach 1. Insufficient KM approach
Question 3a	Only few knowledge sharing activities In general the isn't steering or management activities facilitating KM	Lack of processes and management No management ensuring KM activities	2. Management model issues 2. Management model issues
Question 3b	No designated tool, available tools do not seem to support Km very well	Insufficient tools	3. Insufficient KM tools
Question 4	Very little evidence supporting KC or KT	No coordination in KM area	2. Management model issues
Question 5a	Knowledge assets have not been identified, principles for KA identification or categorizations have not been created	Insufficient KM steering	1. Insufficient KM approach

Figure 6: The structure of the document analysis

The results and conclusions of the document analysis have been elaborated in the thesis findings section.

2.3 Summary of the research process

The figure 7. summarizes and illustrates the process of research planning and execution, including the thesis conceptual framework aspects and methodological choices:

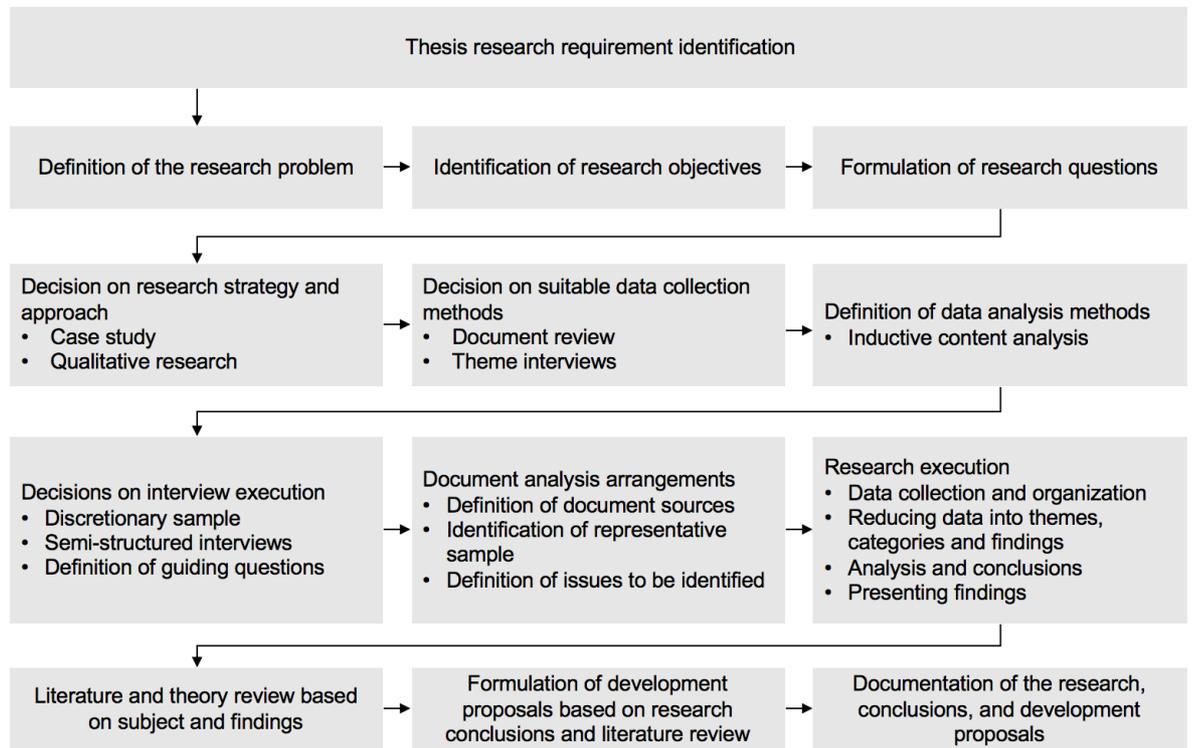


Figure 7: Thesis research process and conceptual framework aspects

3 Knowledge in organizations

This chapter reviews the literature and theoretical concepts of Knowledge Management in an attempt to highlight the most beneficial KM aspects relevant to the thesis.

3.1 The characteristics of knowledge

Knowledge is a fundamental resource allowing humans and organizations to act intelligently. As a resource, knowledge has certain exceptional characteristics: knowledge cannot be consumed by using it, transferring knowledge does not result losing, knowledge as an asset can grow without limits, and much of the valuable knowledge possessed by organizations are embedded in the employees of companies and organizations. Especially the latter characteristic is a strong justification for the attempt to manage knowledge, but there does exist several features which urge to establish practices for organizational knowledge asset management. When organized in a sufficient manner, Knowledge Management can be used to support decision making, to diffuse best practices, to develop the innovations and professional skills of the organization's members, and to build an organizational memory. Knowledge also allows both organizations and individuals act proactively. In other words, possessing and utilizing knowledge promotes organizational resilience. (Dalkir 2011, 2-6, 25. Dahlman, Routti & Ylä-Anttila 2006, xiii). To further describe the possible and potential benefits of the KM from business perspective and to identify the features to be considered in the management of the knowledge in organizations, Ray-Howitz (2018) has stated that KM allows better use of existing intellectual assets and resources, increases productivity and consistency in operations, helps to establish the best practices, it allows fast learning curves and capacity to replicate success, as well as contributes to the team functionality retention.

In general, knowledge can be divided into two types: tacit knowledge and explicit knowledge. Tacit knowledge exists in the employees and members of the organizations in an inarticulate form, it is difficult to formalize and communicate. Tacit knowledge is often a result of experience, highly personal and expressed in insight, intuition, routines and actions, values or emotions. Rooted for example in the procedures and routines, tacit knowledge epitomizes know-how and skill. In turn, explicit knowledge can be easily expressed in a formal manner, processed and shared. Explicit knowledge is typically codified, turned into easily communicable form. The two types of knowledge are complementary and are both required also in the creation of new knowledge (Nonaka, Toyama & Byosiere 2001, 494). Table 2. describes further the key characteristics and properties of the two knowledge types.

Table 2: Properties of tacit and explicit knowledge. Adapted from a table by Dalkir (2011, 10).

Properties of tacit knowledge	Properties of explicit knowledge
<ul style="list-style-type: none"> • Allows ability to adapt, to deal with new and exceptional situations 	<ul style="list-style-type: none"> • Allows ability to disseminate, to reproduce, to access and re-apply throughout the organization
<ul style="list-style-type: none"> • Personal and inarticulate expertise, know-how and know-why 	<ul style="list-style-type: none"> • Enables ability to teach and to train
<ul style="list-style-type: none"> • Enables ability to collaborate, to share a vision, to transmit culture 	<ul style="list-style-type: none"> • Enables ability to organize, to systematize, to translate a vision into a mission statement and into operational guidelines
<ul style="list-style-type: none"> • Coaching and mentoring allow transferring experiential knowledge on a one-to-one, face-to-face basis 	<ul style="list-style-type: none"> • Transfer of knowledge via products, services, and documented processes

Dalkir (2011, 10) has summarized the nature of the two types of knowledge by defining that tacit knowledge forms adjacent to understanding of observable actions and is therefore tied to processing, whereas explicit knowledge typically represents a finalized product. Due to its nature, codified explicit knowledge is easier to share and therefore more likely to be reused in organizations (Choi & Lee 2002, 174). Ichijo & Nonaka (2007, 84-85) have also concluded that tacit knowledge involves human processes such as experiencing, learning, understanding relations and practicing judgement. Nonaka, Toyama & Byosiere (2001, 494) point out that without the aspect of experiencing and the involvement of human processes, gaining understanding will be difficult. Also, the quality of knowledge can increase only by analytically reflecting the experiences. These fundamental features of knowledge set challenges to the attempts to manage the resource, but also encourage to seek understanding of the underlying human processes.

3.2 Knowledge creation and conversion

Nonaka, Toyama & Byosiere (2001, 493-495) state that knowledge is context-specific, in many ways relational to the human processes and therefore of dynamic nature. The conversion of tacit knowledge into explicit is therefore a social process between individuals. The dynamic knowledge creation and conversion process has been described with the SECI model by Nonaka, Toyama & Byosiere (2001, 494-495). The SECI consists of four knowledge conversion stages; socialization, externalization, combination and internalization. In the socialization stage, tacit knowledge is brought together and passed on in a shared experience between individuals. There are many possibilities to facilitate the socialization. Examples such as apprenticeship, working in pairs or teams and even informal meetings have been given by Nonaka, Toyama & Byosiere (2001, 494-495). The externalization stage is a process of articulating tacit knowledge as explicit. Externalization occurs

for example when embodied technical skills are being documented and codified as instructions. According to Nonaka, Toyama & Byosiere (2001, 495), effective tacit knowledge conversion into explicit relies typically on metaphors, analogies and models. With such explanatory tools, basis for new explicit concepts and are being created. The explicit concepts can be modelled to share again more definitive knowledge.

The SECI stage of combination is a process for connecting and linking elements of explicit knowledge into complex and systematic entities. In the combination phase, knowledge can be exchanged, integrated and processed for example to create new knowledge. The combination stage includes collecting the explicit knowledge, disseminating new knowledge and processing the new knowledge to suit the needs of the organization. In the internalization stage, knowledge is again transformed into tacit form by embodying explicit knowledge in action and practice. The internalization can take place with learning-by-doing approach, and it can reframe, cultivate and supplement tacit knowledge already possessed by organization's members. The continuous execution of the SECI process creates an evolving and amplifying settings for organizational knowledge conversion (Nonaka, Toyama & Byosiere 2001, 494-498). The SECI process, knowledge conversion indicators and a spiral representing the evolving organizational knowledge has been illustrated in the figure 8 adapted from the illustration by Nonaka, Toyama & Byosiere (2001, 498) and Nonaka & Takeuchi (1995).

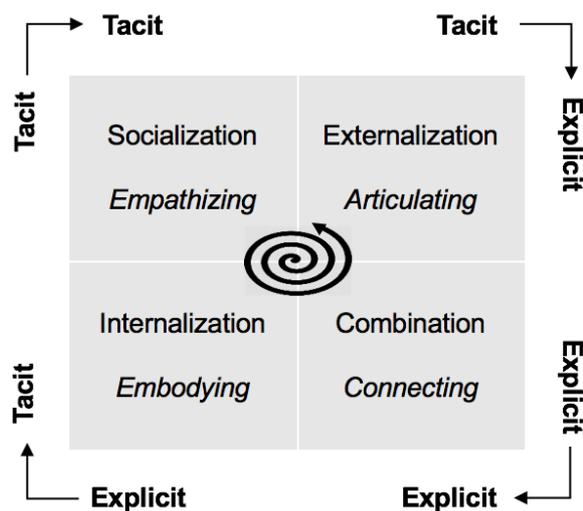


Figure 8: SECI process; the four modes of knowledge conversion and evolving knowledge spiral. Adapted from an illustration by Nonaka & Takeuchi (1995).

In the theory of knowledge-creation process, Nonaka, Toyama & Byosiere (2001, 493) present a multi-layered model of knowledge creation. Originally defined by Nonaka, Konno, & Toyama in 1998, the organizational knowledge-creation model includes three interacting parts consisting of SECI process, platforms for knowledge creation and

knowledge assets as the inputs, outputs and a moderator of the knowledge-creation process. The platforms for the knowledge creation, based on Japanese concept "ba", could be interpret as communities of practice or a shared context focused on developing the knowledge, or non-physical settings providing enriching interaction for the knowledge processing. The platforms for knowledge creation integrate the organizational knowledge assets, as knowledge assets provide support in the knowledge conversion process. The SECI process should in turn result creation of new knowledge assets (Nonaka, Toyama & Byosiere (2001, 499-500).

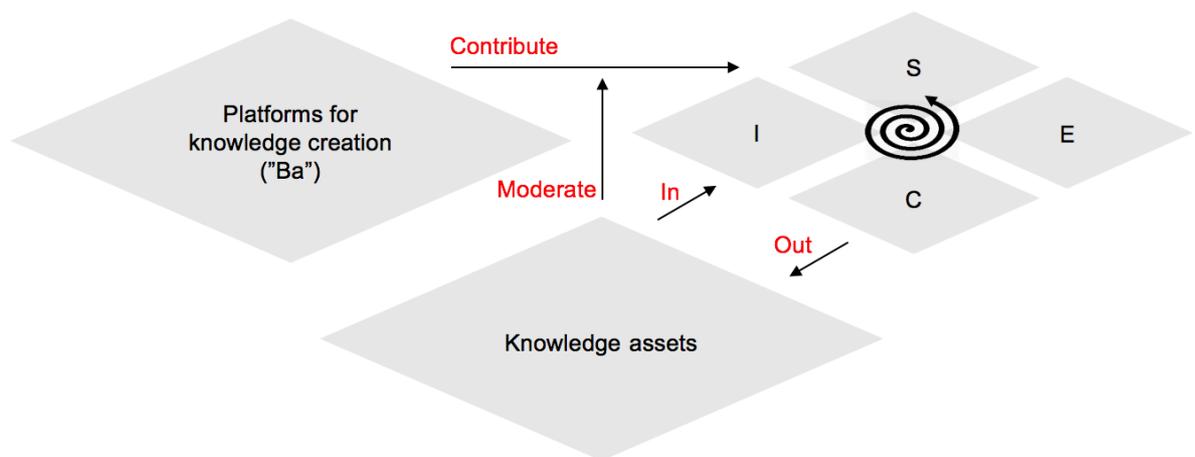


Figure 9: The three layers of knowledge-creation process. Adapted from illustration by Nonaka, Toyama & Byosiere (2001).

The knowledge-creation process has been illustrated in the figure 9. In addition to the presented elements, the platforms for knowledge creation contain aspects of originating, dialoguing systemizing and exercising nature. Each of the aspects support certain stage in the SECI process: an originating ba is characterized by close interaction between individuals in the socialization stage, dialoguing ba represents the settings where skills and mental models are being converted during the externalization stage into common concepts and terms, a systemizing ba offers collaborative settings in the combination stage for transferring the explicit knowledge to organization and the exercising ba is a place where conversion of explicit knowledge into tacit is being facilitated (Nonaka, Toyama & Byosiere 2001, 499-501).

Nonaka, Toyama & Byosiere (2001, 503-505) emphasize, that the knowledge creation process cannot be managed with traditional means. Instead, organizations should focus on creating suitable settings for the knowledge creation platforms and for the SECI process, provide vision for knowledge development, facilitate the knowledge-creation activi-

ties among individuals and develop knowledge management functions especially from cultural and human-centric aspects. The overall settings and environment for these organizational Knowledge Management objectives, elements and activities have been described by Ichijo & Nonaka (2007, 18) in a following manner:

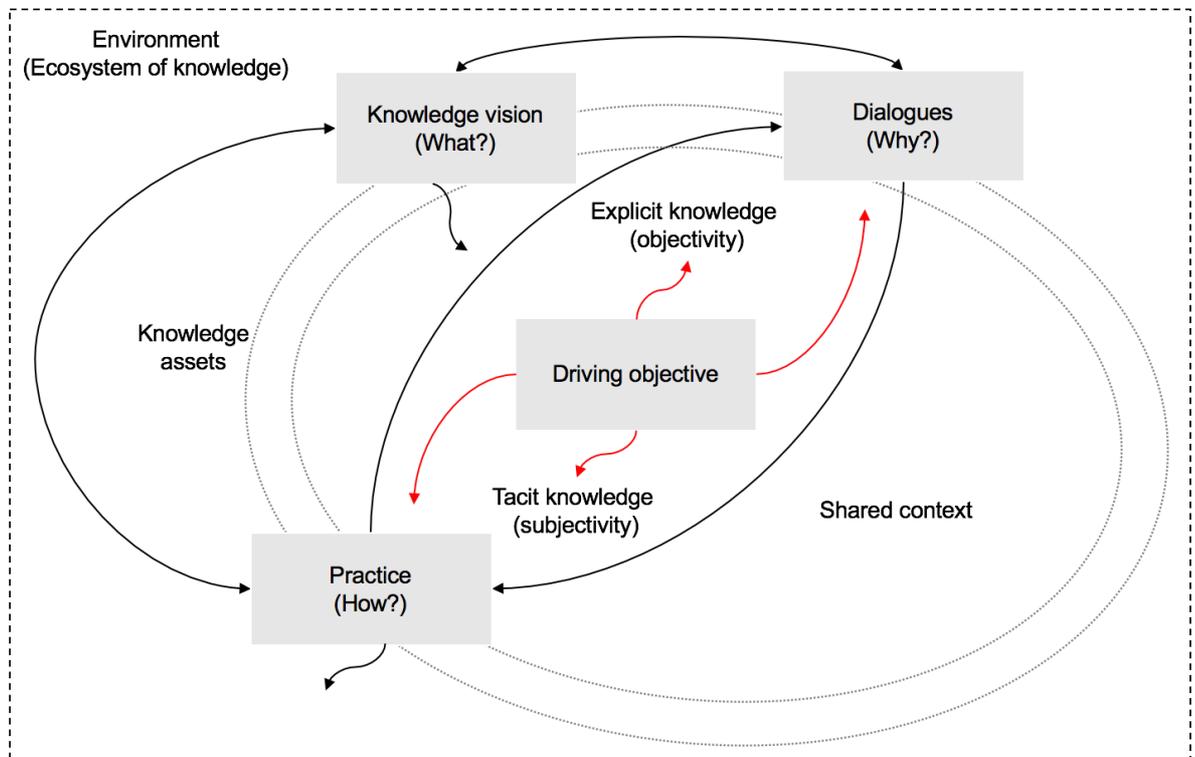


Figure 10: Components and relations of a knowledge-based organization. Adapted from an illustration by Ichijo & Nonaka (2007).

The model presented in the figure 10. contains the elements of Dialogues and Practice, which represent the SECI process. With the division, Ichijo & Nonaka (2007, 18) and Nonaka, Sasaki & Senoo (2004) emphasize the synthesizing nature of Dialogues in the social interaction, while the Practice represents the synthesis of action. The element of Shared context represents the different platforms for knowledge creation, which are considered as the foundation of knowledge-creating activities. Vision and Objectives are the central elements directing and justifying the knowledge conversion and creation processes, and knowledge assets on the background form the backbone of knowledge value creation. The model illustrates the relations and interaction between the elements, which also should be considered in the facilitation of the knowledge creation and conversion (Ichijo & Nonaka 2007, 18-29).

3.3 Knowledge assets

Based on a definition by Nonaka, Toyama & Byosiere (2001, 502), knowledge assets are the inputs and outputs of the knowledge-creation process, as well as types and units of knowledge indispensable to the creation of value in the organizations. Due to the tacit nature of the knowledge, it is difficult to precisely determine the value or importance of the knowledge assets. However, Nonaka, Toyama & Byosiere (2001, 501-502), have categorized the knowledge assets into four groups based on their characteristics. The categorization presented in table 3. should ease the management, exploitation and processing of the knowledge assets.

Table 3: Four categories of knowledge assets. Adapted from table presented by Nonaka, Toyama & Byosiere 2001, 502.

Experiential knowledge assets	Conceptual knowledge assets
<ul style="list-style-type: none"> • Tacit knowledge shared through common experiences • Skills and know-how of individuals • Care, love, trust, and security • Energy, passion, and tension 	<ul style="list-style-type: none"> • Explicit knowledge articulated through images, symbols, and language • Product concepts • Design • Brand equity
Routine knowledge assets	Systemic knowledge assets
<ul style="list-style-type: none"> • Tacit knowledge routinized and embedded in actions and practices • Know-how in daily operations, organizational routines • Organizational culture 	<ul style="list-style-type: none"> • Systemized and packaged explicit knowledge • Documents, specifications, manuals • Databases • Patents and licenses

The knowledge asset categories presented in the table 3. are somewhat self-evident excluding the experiential knowledge assets. The experiential knowledge assets are built through socialization, and they relate heavily to the human processes and emotional knowledge. These assets are especially important for creating commitment and shaping the organizational culture (Nonaka, Toyama & Byosiere (2001, 502 -510). Organizations tend to categorize their knowledge assets also from the more practical point of view. As an example, table 4. presents Microsoft corporations' categorization model for knowledge assets. The list has been adapted from a presentation by Ray-Howett (2018):

Table 4: Knowledge asset categories by Microsoft.

Examples of organizationally meaningful aspects of knowledge:
<ul style="list-style-type: none"> • Documented knowledge: explicit and codified • Skills: tacit, trainable and gained through practice • Methods: implicit and embedded. E.g. company or competence area specific means • Relationships: knowledge network & social relationships • Experience: tacit, non-trainable. enables adaptivity • Natural talent: abilities that cannot be constructed but can be nurtured

The traditional belief is, that knowledge conversion produces knowledge assets for the organization to be utilized in the future (Nonaka, Toyama & Byosiere 2001, 502). Jakubik (2016, 199-200) suggests, that as knowledge emerges in the advanced organizations through co-creation, also knowledge-producing chain on individuals should be considered a knowledge-based asset. Anyhow, the identification of knowledge asset types is seen a critical enabler for the knowledge utilization, knowledge conversion functionality and the value-creation potential of the knowledge (van Ewyk 2018, 1171-1173).

3.4 Common Knowledge Management models and processes

Dalkir (2011, 3-6) has defined Knowledge Management as a deliberate and systematic endeavour to capture, structure, refine, store and disseminate knowledge for different purposes. Effective knowledge management requires organizations also to identify, generate and diffuse the knowledge that provides strategic advantages to organization. Several cyclical management models have been created to organize these processes and activities into continuum-like KM approach. Dalkir (2011, 33) has summarized four major knowledge management cycle models and respective sub-processes into a chart presented in the table 5:

Table 5: Different models for organizational knowledge management cycle (Dalkir 2011, 52).

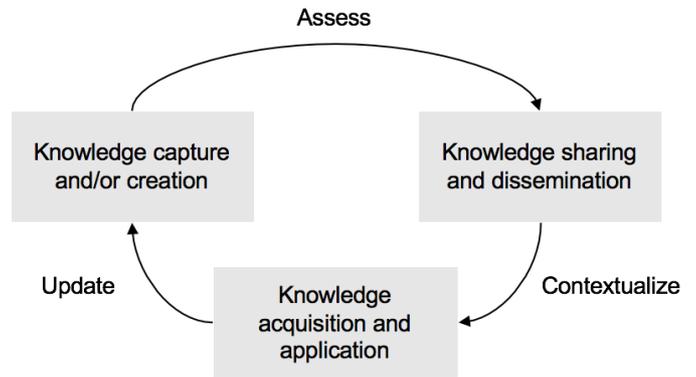
Meyer and Zack (1999)	Bukowitz and Williams (2000)	McElroy (1999)	Wiig (1993)
Acquisition	Get	Individual and group learning	Creation
Refinement	Use	Knowledge claim validation	Sourcing
Store/retrieve	Learn	Information acquisition	Compilation
Distribution	Contribute	Knowledge validation	Transformation
Presentation	Assess	Knowledge integration	Dissemination
	Build/sustain		Application
	Divest		Value realization

The presented KM cycles offer a wide perspective to the processes needed for transforming information into valuable, strategic knowledge assets within organizations. As the SECI model is used to understand and facilitate the knowledge creation and conversion, the listed approaches in table 5. attempt to model the total lifecycle of knowledge processing in organizations to a certain degree more detailed (Dalkir 2011, 31-51). Dalkir (2011, 51-53) has created a synthesis of the knowledge processing steps defined in the four KM cycle models. The proposal combining the main aspects of the knowledge processing requirements (Dalkir 2011, 51-54) has been described as an integrated KM cycle in table 6.

Table 6: Organizational knowledge management processes in integrated cycle. Dalkir (2011).

Integrated KM cycle

1. Knowledge capture
2. Knowledge creation
- 2a. Knowledge contribution
- 2b. Knowledge filtering and selection
3. Knowledge codification
- 3a. Knowledge refinement
4. Knowledge sharing
5. Knowledge access
- 5a. Knowledge learning
6. Knowledge application
- 6a. Knowledge evaluation
7. Knowledge reuse
- 7a. Knowledge reuse or divestment



The integrated KM cycle by Dalkir (2011, 53-54) consist of six phases, which include the key processes for organizational knowledge management. The starting point of the cycle is the knowledge capture, which includes activities for valuable existing knowledge identification and codification. The target is to recognize previously unnoticed or tacit knowledge such as know-how and externalize it. Additionally, new knowledge can be created as a result of the cycle, and similar externalization should occur with it. After the externalization of the knowledge, an assessment against a selection criteria should take place to decide if the newly identified knowledge will be valid for retention and sharing. Dalkir (2011, 53) states, that the assessment criteria should follow organizational objectives and the evaluations should consider if the codified knowledge is sufficiently valuable to be treated as a knowledge asset. When the knowledge passes the assessment, it is being codified and refined in order to be shared. The knowledge should be also contextualized to ensure the usability. This step includes identification of knowledge attributes such as possible use cases and users, but also embedding the knowledge into business processes to maximize the knowledge value creation. In the final phase, the knowledge will be utilized by the organization and updated when necessary to initiate the next KM cycle iteration (Dalkir 2011, 54).

The next logical question is, how do these KM processes and cycles fit into organizational settings? Choo & Bontis (2002, 16) have modelled a Knowledge Management framework

addressing this challenge. Illustration of the framework is presented in the figure 10. The figure 10 has been adapted from the KM framework by Choo & Bontis (2002, 16).

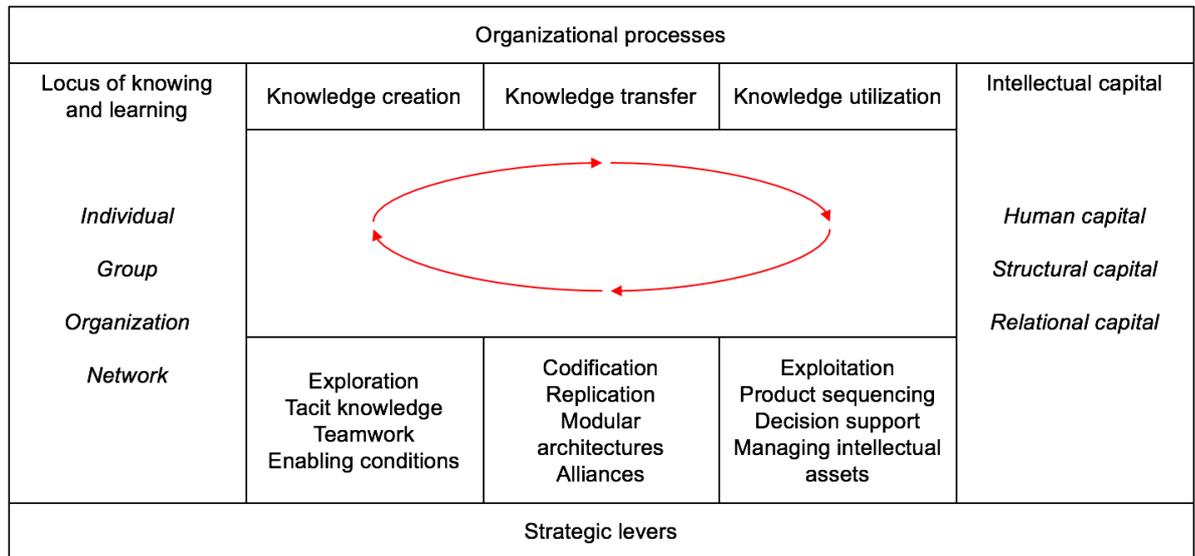


Figure 11: A framework for strategic knowledge management. Choo & Bontis (2002).

Based on the presentation by Choo & Bontis (2002, 16-18), the framework incorporates the typical knowledge processing phases and the central cyclical management model of organizational knowledge with the larger perspective of the organization. The features of strategic levers and objectives, as well as other organizational processes have been included in the model, and the framework takes into consideration the different types of intellectual capital and the repositories of knowledge. The boundaries of the framework's elements in the illustration act as interfaces in the organization, therefore integrating the framework with the organization's processes. The strategic levers of the figure 11. knowledge management framework includes activities presented in the table 7. According to Choo & Bontis (2002, 16-18) these levers will be critical for the KM success in the organization.

Table 7: Strategic levers of the Knowledge Management framework by Choo & Bontis (2002, 17)

Strategic levers

- Promoting exploration or creation of the knowledge according to the SECI model
- Creating cross-functional teams able to access and integrate diverse knowledge of organizational members
- Establishing enabling conditions conducive to organizational knowledge creation, conversion and dissemination
- Developing modular architectures for deliverable creation to encourage knowledge reuse and recombination
- Transferring knowledge and learning through networking
- Including exploitation and exploration of knowledge into the strategy
- Designing knowledge-based decision support as a strategic learning and adaptation system
- Reconceptualizing the role of leadership in the context of learning, enabling KM processes and innovation
- Purposefully measuring, evaluating and managing the intellectual assets

Although the presented framework is a high-level proposal, it suggests how the dynamic interplay between organizational KM elements could be arranged. As the authors point out, the framework offers a tool for crafting an effective knowledge-based strategy.

While the above presented KM cycles and frameworks offer generally approved models for knowledge processing, Dalkir (2011, 85-89) presents also more comprehensive approach for integrating Knowledge Management into the organizational ecosystems. Considering the requirements for organizational agility and flexibility, a KM approach based on intelligent complex adaptive systems (ICAS) could be reviewed. The ICAS theory sees organizations as evolving entities, which contain autonomous, self-organizing subsystems interacting with each other. The subsystems consisting of individuals, teams and units are seeking ways to fulfil their distinctive objectives, adapt to change and form collaborative networks within the organizational boundaries. The result is a complex, intelligent enterprise. The key challenges in the organizations according to ICAS theory are the utilization of the strengths and capabilities of people while orchestrating their cooperation, leveraging the knowledge to create the competitive advantage for the organization, and maintaining the sense of purpose and unity (Bennet and Bennet 2004, 1-18).

Bennet and Bennet (2004, 1-18) have described the theoretical basis of ICAS by stating that organizations acquire inputs for activities from their environment and transform those inputs into higher-value outputs in the form of deliverables. The inputs in the knowledge-based economy are largely ideas, know-how, skills and knowledge. The ability to utilize these abstract resources requires judgement, insight, and awareness of right context. According to Dalkir (2011, 86), these resources and abilities result organizational intelligence, which in turn becomes a form of competitive intelligence helping in the facilitation of learning, driving innovation and responding to change or unanticipated situations. Knowledge is considered a fundamental, critical resource in this process, as it enables taking effective action in a wide variety of situations.

Dalkir (2011, 86) has summarized the ICAS KM approach by defining how the foundational factors of creativity, complexity and change provide inputs through the permeable boundaries of the organization and the function of selectivity to support the organizational functions and features contributing to the creation of organizational intelligence. The simplified structure of the approach adapted from Dalkir's illustration (2011, 88) has been described in the figure 12:

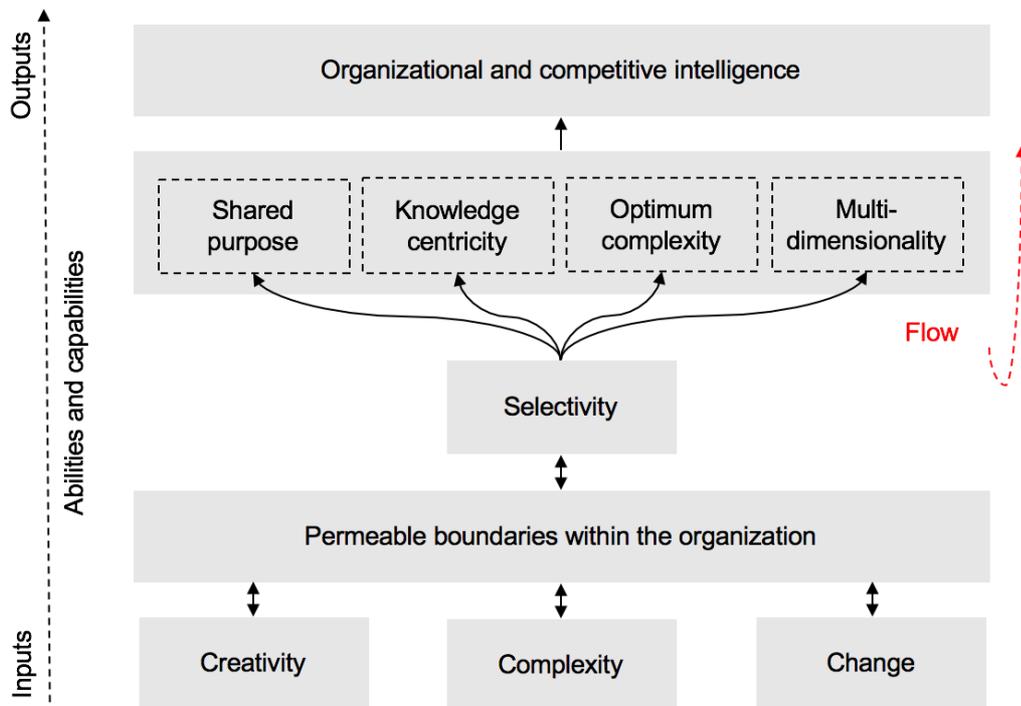


Figure 12: ICAS Knowledge Management model. Adapted from an illustration by Dalkir (2011).

Dalkir (2011, 86) continues to describe how the function of Permeable boundaries as a concept allows and ensures the sharing and dissemination of knowledge within organization in a necessary extent. The process of Selectivity acts as a filter for the collected information with a target to enable refining, storing and sharing of only beneficial content that supports the organizational goals. The concept of Shared purpose represents the ability of the organization to integrate and utilize resources from different subsystems in order to support common goals and to share generally beneficial knowledge. Knowledge centrality refers to the aggregation of knowledge from collaboration and strategic alignment, as well as the accumulation of assets from knowledge-oriented processes within the organization. Optimum complexity represents the balance between the organization's internal structure and external environment. The optimum complexity requires organization to consider collaboration requirements and alignment with external stakeholders, while the overall goals and common identify should be maintained. Multidimensionality represents organizational flexibility and as a function it attempts to ensure that knowledge workers have sufficient competencies and abilities to address challenges and issues faced in their duties. The Flow enables knowledge centrality and promotes connections and continuity needed to maintain coherence in the organizational intelligence (Dalkir (2011, 86-89).

Furthermore, Dalkir (2011, 86-87) defines five central processes supposed to be facilitated within the organization utilizing the ICAS KM model: gaining general understanding,

creating new ideas, solving problems, making decisions and taking action to achieve desired results. The ICAS model in general is flexible and should fit for example in the organization consisting of Agile delivery functions, but also traditional deliveries. The model presents concepts and the flow of knowledge-processing related activities on a high level, therefore allowing different existing KM functions to be fitted into the model in practice.

3.5 ITIL-based view on Knowledge Management

ITIL framework provides recommendations for Knowledge Management approach in organizations as a part of the Service Transition guidance. Knowledge Management is relevant in for all ITIL-based processes and elements of the IT service management, but knowledge processing comes especially important in the ITIL's service lifecycle-based "transition" phase due to the needs to support the constantly changing business and services. In general, ITIL KM purposes include knowledge provision for example during problem solving, in dynamic learning, strategic planning and decision making. In other words, ITIL-based Knowledge Management aims to facilitate sharing of reliable and accurate information or knowledge to appropriate roles of the organization, in appropriate place and in correct time to enable informed decisions related to IT services and processes.

More detailed objectives for KM include enabling improving for service efficiency and quality, and raising awareness of the constraints, challenges and other qualities of the services. Moreover, the KM should build understanding of the benefits and value creation of the services in scope of the delivery (ITIL 2007).

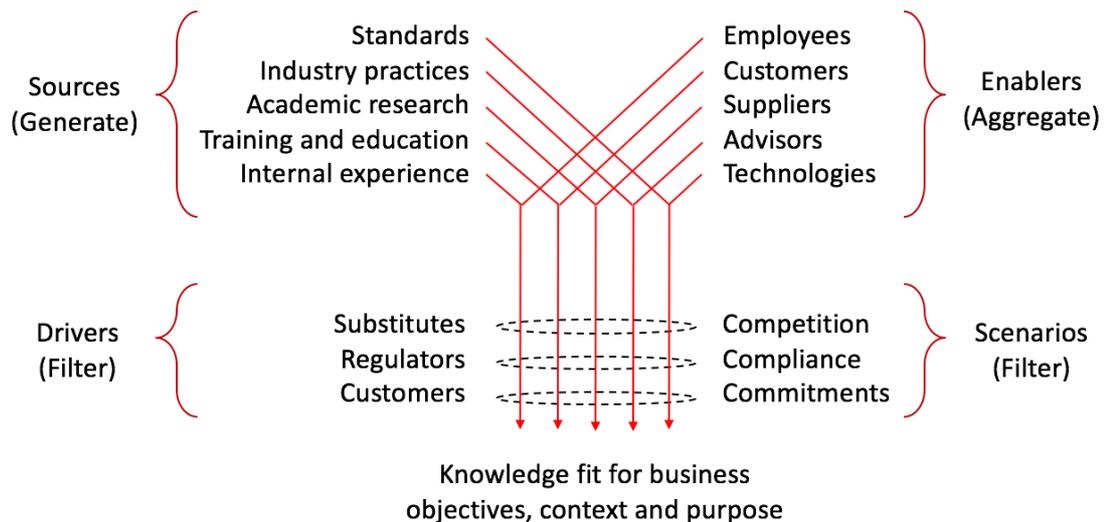


Figure 13: ITIL diagram "sourcing for service management". ITIL 2007.

To enable the needed support for business and service functions, ITIL's Knowledge Management approach emphasizes collecting the valuable knowledge widely for reuse. The

figure 13. presents a diagram used to describe how ITIL's service management foundation constitutes. In addition to the primary purpose, the diagram sets basis for the ITIL's knowledge sourcing; information and knowledge will be needed from different sources to successfully manage the services, while there exist enablers for knowledge-driven processes. Certain drivers and scenarios regulate and direct the requirements and utilization of knowledge. (ITIL 2007). Extending to knowledge identification, capture and maintenance, ITIL addresses all the identified KM processes and recommends establishing fit-for-purpose means for controlling those.

As a continuation of the objective to capture the valuable knowledge, ITIL gives a strong recommendation for establishing a Service Knowledge Management System (SKMS). The SKMS is used as a central repository in the KM processes, primarily for storing and enabling the efficient utilization of service related knowledge. The SKMS should enhance also forming knowledge-based competencies. In addition, ITIL defines the needs to establish requirement specifications and management procedures for data, information and knowledge to ensure sufficient processing, accesses, and measurement of utilization regarding the knowledge resources. (ITIL 2007).

3.6 Agile, DevOps and Knowledge Management

Agile software development (ASD) is a dynamic, knowledge-intensive and team-oriented activity. ASD prioritizes human-centric and collaborative working practices, informal interaction and direct communications due to flexibility of these practices. At the same time, Agile values guide the deliveries to minimize the creation of extensive documentation and alignment with bureaucratic, formal processes (Ouriques 2019, 2). A characteristic element to Agile deliveries from the knowledge perspective is, that while communication is encouraged, the knowledge is highly concentrated in the members of Agile team in a tacit form. (Amritesh & Misra 2014, 500-501; Ouriques 2019, 2).

Considering the technical and cognitive dimensions of the tacit knowledge, the technical knowledge consists of proficiency over technologies and for example language skills, while the cognitive dimension is formed by values, insight and mental models. The cognitive tacit knowledge allows individuals to evaluate, analyse and altogether adjust into context. Tacit knowledge and its cognitive aspects are important factors regarding the operating in Agile deliveries, and creation of collaborative culture within the Agile team or organization (Amritesh & Misra 2014, 500-501).

With the tendency of nurturing primarily tacit knowledge, Agile deliveries may face certain challenges on the Knowledge Management sector. The accumulation and conversion of knowledge may be limited due to the lack of sufficient knowledge codification or externalization, the sharing and utilization of knowledge may be inefficient due to lack of KM processes and inadequate management from KM perspective may lead into incoherent practices. The option of sharing tacit knowledge is typically costly, time-consuming and uncertain. (Amritesh & Misra 2014, 500-501; Ouriques 2019, 3). While there may be only limited amount of codified knowledge available, members of the deliveries may need to spend time resolving similar issues from time to time. Furthermore, the possibilities to lose valuable knowledge due to personnel turnover are greater in the project-like settings common in Agile deliveries (Amritesh & Misra 2014, 500-501). The informal communication typical for ASD cannot serve as a record, there will be less support for knowledge reusability, less contribution to organizational knowledge and therefore reduced contribution to organizational intelligence (Kavitha 2011).

Anyhow, Agile software methodologies do contain certain built-in practices facilitating knowledge sharing. In ASD, the knowledge conversion to some extent should take place within working practices such as pair programming or test-drive development, while certain level of knowledge sharing occurs also during the ceremonies of the delivery, and while working in a cross-functional manner. As the working methods may include intensive brainstorming and negotiations within the team extending to customer participants, these occasions are also fertile ground for innovation that may steer the development process (Amritesh & Misra 2014, 500-501; Kavitha 2011). As a result of these listed Agile characteristics, managing knowledge assets and knowledge-based resources becomes a critical activity (Ouriques 2019, 2). From the general Knowledge Management point of view, the focus in Agile-based deliveries should be in facilitation of efficient and frequent tacit knowledge sharing between all stakeholders (Kavitha 2011).

The typical relationships between the identified practices in ASD have been modelled in figure 14. The modelling and illustration is based on the research and presentation by Pamulapati & Bodicherla (2019, 48).

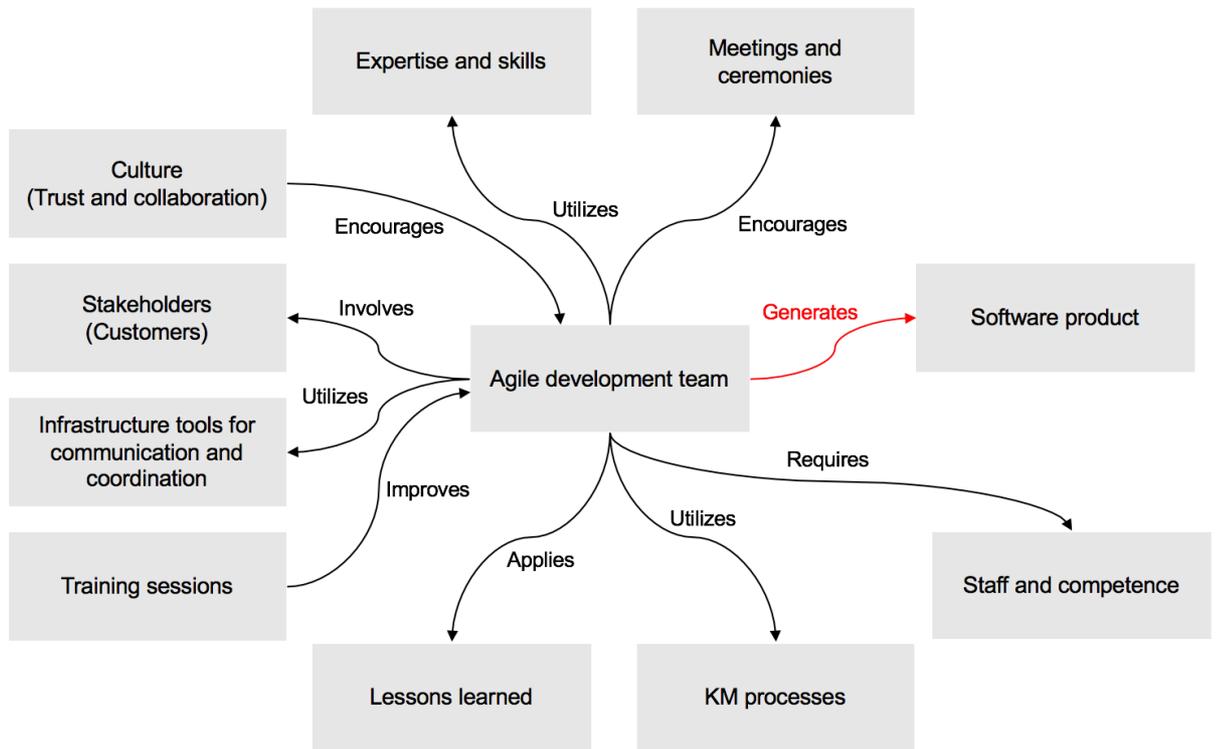


Figure 14: Relationships between practices in ASD. Pamulapati & Bodicherla (2019).

The common nominator in the relationships is the Agile team. From the Agile team perspective, all relationships involve also some level of knowledge exchange and communication, and therefore are elements in the knowledge conversion. The model may provide useful details in an attempt to set priorities, scheduling the exchanges or otherwise optimizing knowledge flows in ASD.

Based on the categorization by Andriyani. Hoda & Amor (2017, 201) the common knowledge within ASD can be summarized and presented as follows:

Table 8: Agile delivery key knowledge types by Andriyani. Hoda and Amor (2017, 201)

Knowledge types	Description	Example
Product knowledge	Knowledge concerning product features and how they relate to other products, standards, protocols etc.	Domain context knowledge, product features on user stories, coding, testing requirements
Project knowledge	The knowledge about resources, functional requirements, work products, budget, timing, milestones, deliverables, increments, quality targets and performance parameters	Project/daily goals, activity timeline, work targets and related attributes such as lack of time
Process knowledge	The knowledge about business processes, workflows, responsibilities, supporting technologies and interfaces between processes	Systems flows, business processes, other team member's role and their interdependencies, synchronizing teamwork, ideas of improvement, workflow of coding and working code

Merging the ASD and software Operations responsibilities, DevOps also combines both challenges and beneficial aspects of the two service delivery sectors. According to Verona (2016), many of the practices described in ITIL correspond DevOps practices, and typically there remain justifications for maintaining certain traditional ways of working. Knowledge Management is one of such practices, and for example knowledge repositories are a valuable best practice serving both development and operations activities during the software service lifecycle.

Amritesh & Misra (2014, 507) have concluded that modelling the role-based nodes and paths for concurrent and recurring knowledge sharing in Agile-based operations is critical for designing optimal knowledge flows. Secondly, Amritesh and Misra (2014, 508) have proposed establishing an “experience factory” utilized by Agile delivery teams to process feedback and lessons learned in order to support learning. This idea borrows the characteristic features from the ITIL-based Service Knowledge Management System and the concept of Communities of Practice, while the content would concentrate to support more effectively requirements of an Agile team. In an environment utilizing DevOps, establishing SKMS based on ITIL’s recommendations should be a natural step to improve the knowledge sharing and application. When utilizing the ITIL’s recommendations to establish information requirements in SKMS, for example reusable knowledge regarding Non-Functional Requirements could be retained in the SKMS.

3.7 Knowledge Management strategy, goals and governance

The significance of knowledge and intellectual assets in gaining competitive advantage, as well as the varying aspects of knowledge processing in organizations justify the development of a strategy for Knowledge Management. Based on the suggestion of initial strategic assessment, Zack (2002, 266) guides organizations to evaluate options of either aligning their current strategy with the utilization of merely existing knowledge assets or developing the knowledge and capabilities to support the desired strategy. While defining a KM strategy, Zack (2002, 255) suggests considering the foundational elements of how the organizational structure supports knowledge processing, establishing sufficient human-centric capabilities for the organization to contribute to the KM and building a comprehensive technological infrastructure as a platform for the KM activities. Most importantly, there should be defined and maintained the links between the business strategy and knowledge management to achieve a sustainable relationship between KM and business. The overall strategic intent should be clear to align business with the KM.

Zack (2002, 259) continues to define the roadmap for KM strategy creation by suggesting organizations to carry out a knowledge-based SWOT analysis. As a traditional tool for developing strategy, SWOT can be used to define the most influential strengths, weaknesses, opportunities and threats for the organization's business plans. In the knowledge-based version of the SWOT, Zack (2002, 259) instructs organizations to map their knowledge resources and capabilities against the strategic threats and opportunities to gain understanding the actual weaknesses and threats. The resulting evaluation should be used to guide the KM efforts in the organization. The strengths and weaknesses typically represent the organization's capabilities to act, and the threats and opportunities dictate the requirements for actions. At this phase, companies should at the latest map their knowledge assets to allow efficient development activities. Taking into account the types of knowledge assets previously listed also in this thesis, Zack (2002, 260) proposes to create also an inventory of the organizational knowledge also from the perspective of core knowledge, advanced knowledge and innovative knowledge. The characteristics of these three knowledge types have been described in the table 9.

Table 9: Knowledge types categorized from strategic significance perspective

Strategically categorized knowledge types	
Core knowledge	The minimum scope and level of "industry-specific" knowledge enabling the functionality of the business.
Advanced knowledge	Knowledge enabling the viable competition and differentiation in the market.
Innovative knowledge	The type of knowledge allowing the development and leadership within the industry

As the knowledge and businesses are evolving constantly, these knowledge types and their actual implications in organizations should be evaluated in a recurring manner. Considering still the SWOT results and the mapped knowledge assets, Zack (2002, 261-262) suggest to clarify the strategic knowledge requirements by executing a gap analysis based on a framework illustrated in the figure 15. The primary focus of the KM in this model is on the knowledge gap, while KM should be used to facilitate catching up the strategic gap as well. In general, utilizing the gap analysis allows organizations to determine what knowledge to acquire or develop. This gives KM also the strategic focus.

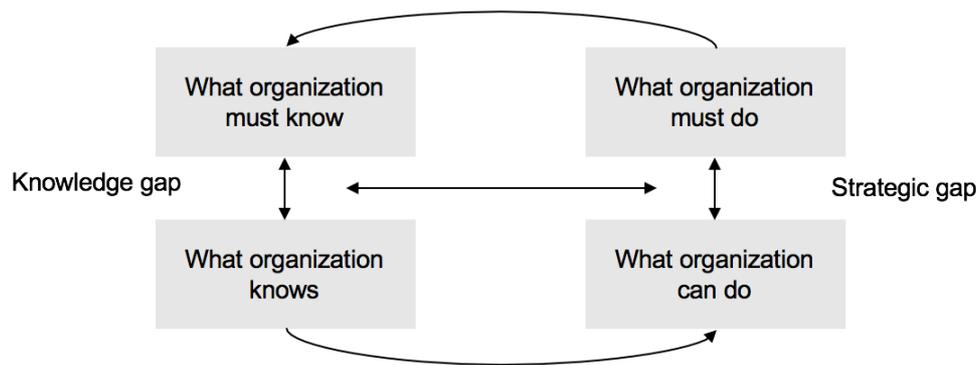


Figure 15: Framework for knowledge-based gap analysis. Zack (2002).

Zack (2002, 262) suggests also organizations to evaluate the reasonability to either explore or exploit knowledge assets. The knowledge creation and conversion model defined by Ichijo & Nonaka (2007) includes both exploration of new knowledge and exploitation of existing knowledge. With suitable facilitation, both approaches can be maintained in balance and steered according to case-specific prioritization needs. According to Choo & Bontis (2002,11) organizations should anyhow clarify the conditions under which emphasizing knowledge exploration or knowledge exploitation would be most beneficial. The approach of knowledge exploitation likely creates benefits due to increasing efficiency, but extensively applied may decrease the capabilities to adapt and innovate. The approach of knowledge exploration likely results increased capability to innovate and to create new competitive advantages, but requires resources without guarantees to gain the advantages.

To ease the inclusion of KM into the existing corporate strategy, there could be used a lean strategy process proposed by Collis (2016, 64-68) for initiating the strategic planning in an agile manner. Lending the ideology from the lean startup methodology, lean strategy process relies on the incremental definition of the strategic direction and certain level of experimentation to acquire the justifications for long-term decisions. The process for shaping the lean strategy begins with the high-level definition of the vision regarding the organization's future. The vision sets the direction and is used to build the alignment within the company. The vision should be detailed enough to prevent conflicting agendas, whereas the second phase contains the SWOT-type analyses to enable the actual definitions for objectives, activity scopes and means for pursuing the competitive advantages in the third phase. The lean strategy process continues with the experimentation described in the fourth phase to finally emerging the viable long-term strategy. As the strategy definition process is based on the idea of incremental development, the feedback, findings and experiences are used to restart the process.

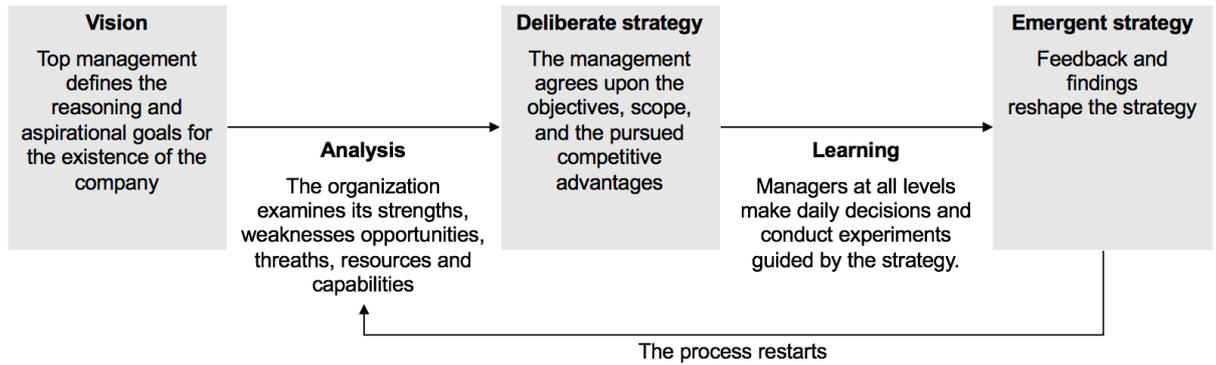


Figure 16: A lean strategy process. Adapted from the illustration by Collis (2014).

Approaching the more detailed level of the strategic Knowledge Management, ITIL (2007) presents a comprehensive approach for establishing a KM governance model. The prioritized suggestions include establishing roles and responsibilities regarding KM functions, introducing technologies and resources supporting KM activities, and modelling the policies, processes, procedures and methods for KM purposes. To enable the steering of the KM functions, ITIL (2007) proposes designing performance measures for the key KM activities. Funding specifically assigned for the identified Knowledge Management roles and functions is recommended to ensure the actual functionality of the KM initiative.

From the strategic perspective, ITIL (2007) defines a link between the identification of needed knowledge on management layer of the organization and the processes for actually generating, gathering, organizing and making use of the knowledge. Also Probst (1998, 20) stresses that in case internal knowledge management processes or knowledge development actions are not connected to the organizational goals or have not been taken into account in the strategic planning, the benefits of practicing KM and gaining advantage from knowledge assets will be at risk. Furthermore, according to Choo & Bontis (2002, 5-11) the objectives of the knowledge management leadership and related strategic decisions should focus to the enabling conditions for the knowledge creation, knowledge conversion and knowledge asset management.

Grant (1996, 380), refers to the organizational competitive advantage dependency on the dynamic capabilities to integrate, build and in general manage the portfolio of knowledge and complementary assets. For other strategically significant KM features Winter & Szulanski (2002, 208) propose the replication of routines as a significant method for organizations to reuse the knowledge already in use.

3.8 Knowledge management relations with corporate culture

Tseng (2010, 272) states that organizational performance correlates extensively with the organizational culture and Dalkir (2011, 232) proposes that corporate culture is a key element for ensuring information and critical knowledge flow in the organization. Furthermore, the commitment and organizational strength created along the culture are more important factors in the knowledge processing than technological capabilities. Dalkir (2011, 233) lists the most significant cultural aspects affecting KM initiative in the organization by naming knowledge sharing as a practice a key function, collaborative climate as an important enabler of the effective knowledge-intensive work and sense of shared understanding of the values, attitudes and paradigms as a force driving the organization towards a common goal (Dalkir 2011, 226).

Dalkir (2011, 259) also defines the typical barriers interfering the collaboration and the development of a common KM culture. The barriers and respective solution proposals have been listed in the table 10. Addressing the cultural barriers issue should be a priority in the strategic KM governance.

Table 10: Typical cultural barriers and respective solutions. Adapted from the list by Dalkir 2011.

Cultural barriers	Possible solutions
Lack of time	Redesign of responsibilities, routines, workspaces, implementing efficient tools
Rewards to knowledge owners	Establish incentives, develop role models, include in performance reviews
Lack of absorptive capacity	Pursue transparency, train and educate personnel
Problems of taking responsibility	Non-hierarchical approach based on quality of ideas
intolerance of mistakes, lack of trust	Accept and reward creativity and collaboration
Lack of common language between roles	Establish a knowledge taxonomy and dictionary, standard formats, metadata definitions

3.9 Value network analysis

The importance of networks and connections between employees or members in the organizations has been noted in many Knowledge Management studies and theories. The knowledge creation and conversion models, the idea of organizational learning and for example the working practices of ASD rely on the networked knowledge workers. In the scope of the organization, mapping and managing the exchanges of knowledge in the networks of human interaction allows monitoring and stimulating the knowledge-based value creation (Allee 2008, 2-3). Based on the studies by Allee (2008, 2-3) the value in the form of intangible assets such as knowledge is converted within the activity-focused networks

to economic gain or other beneficial results. This value conversion and creation could be optimized and the networks manipulated with the help of a value network analysis (VNA).

According to Allee (2008, 7) the VNA method provides a perspective for understanding the roles and connections involved in the value creation, as well as tool for mapping the recurring value conversion and creation connections for optimization purposes. The actual VNA mapping collects the information regarding roles, transactions and deliverables within a network of knowledge exchanges. The analysis is being carried out first for the network transactions from the perspective of the exchange patterns, as it is beneficial to understand the functionality and capabilities of the network. Secondly, there will be carried out an impact analysis explaining the value of the exchange from the perspective of different parties. The third phase of the analysis attempts to understand which are the best ways to carry out the transactions. The creation of value can be increased by adjusting the roles, connections and content of the exchanges within the network. Allee (2008, 11) defines also certain key questions for the analysis. The question of coherent logic and flow of the exchanges could be examined to ensure fluent creation of value within the system. Any bottlenecks, overall capacity or transactions with unbalanced value realization should be investigated for optimization purposes.

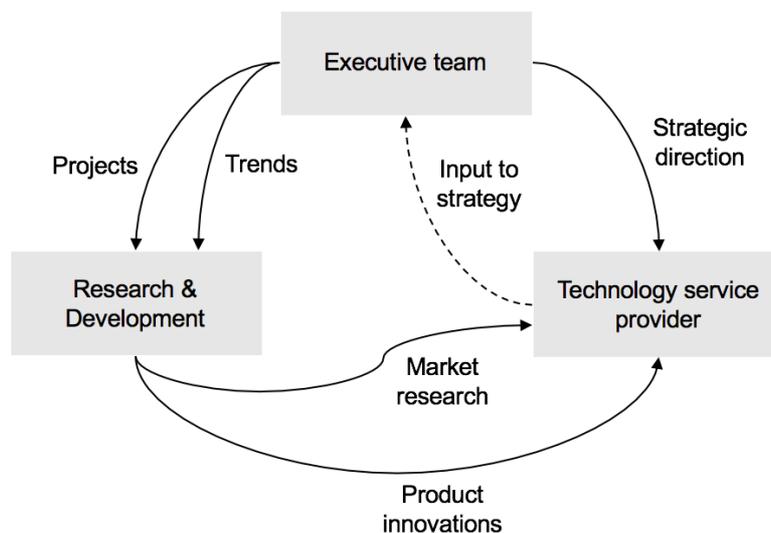


Figure 17: A simple example of value network with low number of transactions. Adapted from an illustration by Allee (2008).

Figure 17 presents a simplified example of value network without the evaluations of the transaction value. Estimating the value for each transaction in the VNA allows also prioritization of certain connections. A VNA with a larger scope and more details would also enable adjusting the effectiveness of the organizational knowledge exchanges (Allee 2003, 620). As an important finding, Mäntyneva & Salminen, (2017, 3) have concluded that

value networks also act as platforms for generating innovation incrementally. When the potential of knowledge exchanges within larger organizational networks would be harnessed deliberately to address certain challenges, resulting innovation capabilities would be considerable. Mapping the network from the perspectives of competences and exchanges of certain types of knowledge should turn out profitable when facilitating innovations through networked collaboration. When preparing the facilitation of knowledge exchanges and knowledge sharing in the organizational networks, Ndlela (2014, 728) suggests adapting and adjusting also the communication means and manners to the requirements in order to ensure efficiency in the knowledge exchanges.

4 Research findings

This chapter presents the research findings.

4.1 Findings based on interview analysis

The inductive content analysis used to process the interview responses and statements led to the formulation of concepts representing the issues significant in the scope of Knowledge Management and behaviour of the organization, and concept categorization regarding the most meaningful KM-related themes in the company. Figure 18. gives an example of the interview analysis unit reduction into concepts and concept categorization.

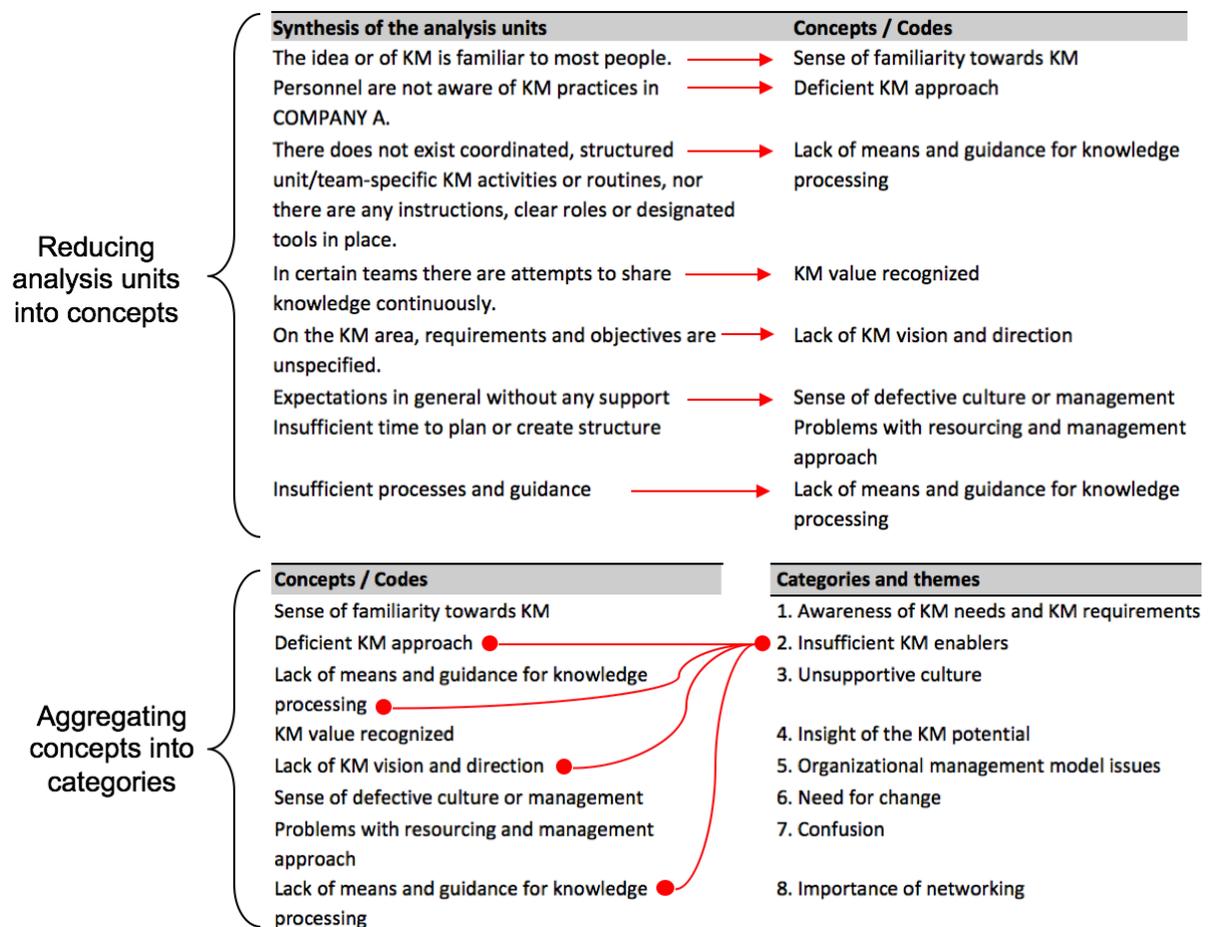


Figure 18: The process of content analysis used to form concepts and concept categories from the data

While Knowledge Management was the key theme of the interviews, questions and conversations brought up issues relevant in the scope of the whole organization.

The guiding questions for interviews have been presented in appendix 1 and the analysis units formed as a synthesis of the interview answers per each question have been presented in appendix 2. The concept categorization resulting from the interview content analysis has been presented in the table 11.

Table 11: Interview content analysis concept categorization

Concept categorization

-
1. Awareness of KM and KM requirements
 2. Insufficient KM enablers
 3. Unsupportive culture
 4. Insight of the KM potential
 5. Organizational management model issues
 6. Requirement for change
 7. Confusion
 8. Importance of networking
 9. Issues concerning organizational learning
 10. Lack of trust

The categories should be interpreted in terms of the interview questions and notes, which allows explaining the generalizations and findings. Following chapters review, explain, interpret and elaborate the aggregated concept categories. Interview quotations have been provided to give representative examples of the answers.

4.1.1 Knowledge Management awareness, practices and enablers

Regarding the topics of general KM awareness and practices, as well as KM enablers in the Company A, following concepts formed from the interview data were aggregated in the categories 1,2 and 7:

1. Awareness of KM and KM requirements

- KM value has been recognized
- Sense of familiarity towards KM

7. Confusion

- Confusion regarding the operating model

2. Insufficient KM enablers

- Deficient KM approach
- Lack of KM vision and direction
- Lack of means and guidance for knowledge processing
- Limitations in the KM knowledge

The research revealed that while majority of the interviewed personnel recognized and understood the idea of Knowledge Management, the persons weren't aware of any company specific Knowledge Management principles, practices or activities. Instead, there existed a confusion over the requirements on the KM sector. The interviewed Service Directors had the most experience regarding the service management in the company, yet they were unable to specify any aspects of an actual KM framework existing in the company.

“Our perception concerning these matters is hazy... The idea and concept of KM is familiar to me, but I'm not aware of any objectives regarding the management of knowledge [in the Company A]. We don't have much related activities, and there isn't any actual routines or

checklists for these activities in place either that I know of. I've carried out all of my tasks according to my own best practices.” (Interviewed Company A Service Director #1)

The Service Delivery Managers with more operative roles were uncertain about the Knowledge Management as well, while they were still able to provide details of the KM guidance and practices.

“I can't say that the Knowledge management as a concept would be very clear to me, neither there are any related processes in the company according to my knowledge. This is pretty unfamiliar territory for me in its totality ... We distribute information based on the current needs on a daily basis, and don't really have any long-term plans or conventions.” (Interviewed Company A Service Delivery Manager #2)

“None of these are familiar to me in [Company A], it just isn't something we do here ... On Customer-led services and Customer's DevOps teams we have objectives for knowledge sharing as a part of the dailies and planned work. We intentionally share some documents and other knowledge, but on [Company A] side we don't have those routines.” (Interviewed Company A Service Delivery Manager #4)

“There does not seem to be any objectives defined or operating model in place for knowledge management.” (Interviewed Company A Service Delivery Manager #5)

There were indications of discontinued KM practices, which had been in place in the past within the services and personnel. Changes in organization and management personnel had left the Knowledge Management in unclear situation.

“In principle I am familiar with the Knowledge Management subject, but we don't have any common coordinated activities for that area, or real tools for Knowledge Management either in the company ... We had those before the merger, but I'm actually a bit unsure what can we do in this area now”. (Interviewed Company A Service Director #2)

To some extent answering to the KM awareness related questions was clearly challenging, even when the subject itself was to some extent familiar to the respondents. Some of the interview respondents did question the functionality of the Knowledge Management in Company A.

“I would say that actual KM practices are virtually non-existent. The work is mostly ad-hoc tasks. There are some daily meetings, perhaps those are the best tools we have for knowledge processing.” (Interviewed Company A Service Delivery Manager #3)

The concepts aggregated in category 2 indicate that the sufficient KM enablers are not in place for KM activity execution in the Company A. The interview respondents were unaware of any strategy or objectives related to Knowledge Management. There aren't any guidance, routines or arrangements intended to facilitate KM processes or procedures in the company according to the interviews. Internal practices to process knowledge vary by units and teams, although these seem to happen naturally and do not fulfil any specific long-term objectives.

“There isn't any structure or recurrence even in our team communications, this area of knowledge management is considered even less. In our daily meetings we focus on going through operative issues such as change plans and customer's feedback to manage the team's activities, prioritize tasks etc. which I think leads to some exchange of knowledge. Our days are hectic, so there's only little time for these meetings as well.” (Interviewed Company A Service Delivery Manager #2)

In many answers, the lack of time and prioritizing billable work over everything else were mentioned. These are on the practitioner level major reasons due to which coordinated knowledge discovery or capture does not seem to occur in the company.

“We used to have CoPs in place and different meetings for overview purposes, but those were shut down to cut expenses. It's the same thing with KM as with the improvements; it's not bringing in money.” (Interviewed Company A Service Director #2)

The only organized, recurring knowledge sharing takes place on a company level in a form of general information sessions and email messages. The results are considered shallow from the interviewee's of point of view. On the unit level, general team meetings are being arranged. These conventions don't contribute much to the creation or development of knowledge and therefore do not support the knowledge asset creation in the company. Only small number of interviewees were able to identify the knowledge assets and business critical knowledge on their responsibility areas. The lack of KM enablers, namely guidance and coordination will affect the possibilities to create new knowledge and utilize existing knowledge.

“KM should make several activities in the organization more efficient and create feeling of certainty, competence and trust in the organization. KM enables also personal growth and it would be highly good from business continuity perspective to share knowledge.” (Interviewed Company A Service Director #1)

Based on the interviews, the company does not have a tool designated to act as a Knowledge Management System, but it has a multi-purpose documentation storages without standard content structures. Available tools support knowledge sharing to some point, but any documentation or knowledge in the existing tools have not been organized for efficient sharing or utilization. Different units, teams and areas of deliveries have their own arrangements for documentation management. In the interviews, the lack of proper tool for knowledge retention and sharing was a brought up as an important improvement issue.

“Tools and practices aren't on the level that they would offer significant help for anything. With the tools it's almost the contrary. Communications tools are poor and Confluence is basically an unstructured fileshare. These things are prerequisites for successful interaction and leadership in the team level, and they would help to create structure and clarity in the operations. That would support our delivery objectives. But none of this is happening, which is a shame.” (Interviewed Company A Service Delivery Manager #2)

None of the interview respondents mentioned roles or responsibilities regarding knowledge management. In a sense the Service Delivery Managers are taking care of the knowledge flow facilitation, but not in a planned, structured or recurring manner.

4.1.2 Findings regarding the organizational culture and management model

The concepts and codes aggregated in the categories 3, 5 and 10 concern the main reasons for the absent KM framework and the characteristics of the organization culture. Several challenges were found in the interviews affecting the company operative capabilities.

3. Unsupportive culture

- Ineffective organizational learning
- Lack of trust and transparency hinder the organizational functionality
- Sense of defective culture or management

10. Lack of trust

- Management lacks trust on organization's capabilities

5. Organizational management model issues

- Insufficient time for activities including KM
- Lack of KM direction due to unclear roles and responsibilities
- Lack of long-term planning
- Management prioritization concerns
- Need for fact-based decision making
- Problems with resourcing and management approach
- Sense of underperformance
- Organization is siloed
- Lack of priorities affecting the functionality of the organization
- Lack of processes and established operating model

According to interview responses the management does not trust, promote transparency, allow autonomy and attempts to control deliveries over subordinate service responsible

persons. The lack of time was found as a cause for several KM problems, but there isn't either support or mandate to set up or execute real KM practices. All of these features result from the working culture, but also from a management approach.

"We don't have proper organizational culture from this perspective; no support and no transparency whatsoever. Resourcing is inadequate and due to that there is very little time for anything. These kinds of functions aren't exactly what management is endorsing either. That is something also worth of pointing out... The good practices we've had have crumbled due to some micromanaging VPs trying to decide about everything. It stops the development in the organization in many ways." (Interviewed Company A Service Director #1)

"Knowledge is being withhold due to personal gain.... The corporate culture does not support collaboration and knowledge sharing or other KM tasks." (Interviewed Company A Senior Consultant #2)

"Optimizing the consumption of time is certainly a big challenge. With lots of differences between teams organizing, it is difficult to recognize the needs of different organizational levels.... The main and connecting problem is the lack of mutual consistent operating culture and operating model. Also, the networks have changed in the transformation so much, it's tough to get things done efficiently. There are a lot of communications channels, but no agreements how they should be used." (Interviewed Company A Service Delivery Manager #4)

Certain additional critique was expressed during the research interviews towards the Company A management. Significant amount of the respondents noted that the delivery unit leaders tend to reject transparency in decision making and overall planning, limit collaboration over the unit boundaries and obstructed activities targeted to develop or improve the ways of working. As examples, a working Communities of Practice model had been discontinued some years ago, and more recently part of the service directors and service delivery managers were denied taking part in the company level Continual Improvement initiative. Whether such management practices would be reasonable from cost-efficiency perspective or an attempt to maintain decision making authority, they were found short-sighted from the company functionality point of view. In addition to the negative effects on the company culture, such management practices entail difficulties also in the Knowledge Management sector.

"The top management does not support these activities, so it's difficult to effectively practice KM". (Interviewed Company A Service Director #2)

“There is needed comprehensive solution for KM activities and arrangements, but the real problem is the culture and management model. We need more transparency, shared responsibility, trust and long-term planning from the company perspective, at the moment units act too differently.” (Interviewed Company A Service Director #1)

4.1.3 Recognized KM potential and requirement for change

The categories 4 and 6 of aggregated the concepts regarding recognized value and potential of Knowledge Management, and the anticipation for changes in the organization.

4. Insight of the KM potential

- KM value has been recognized
- Organizational learning possibilities through KM have been identified
- Positive attitude towards the transformation and its effect on KM
- Ideas and will to improve KM exist

6. Requirement for change

- Needs for proper tools, practices, processes for KM
- Positive attitude towards the transformation
- Proposals for changes
- Requirement for comprehensive change in the organizational culture

According to several assessments given in the interviews, Knowledge Management has potential to create value for organization through increased interaction, networking and essentially knowledge capture. The idea of Communities of Practice was a common among the interviewees, as those could be used to raise awareness and to develop skills.

“It would bring much value. The CoPs we had previously, made specialists grow. The knowledge gathered from projects earlier helped us to use the details later. The latest requirements to review process performance and share the analyses will help us to see what’s happening in deep in the services. Sharing that knowledge will help us to manage the services better. So yes, there is much potential value in the KM if we would just utilize it.” (Interviewed Company A Service Director #2)

“...We could do the same things Customer does: CoPs would be excellent practices within competence areas. Pair working and such practices would be ideal for learning and sharing tips. Sharing instructions is a clear, viable way to share knowledge. Those are needed constantly due to the complexity of the environment.” (Interviewed Company A Senior Consultant #2)

The Service Director interview statements sum up the fact that Company A organization has recognized the needs for a change, and the KM as a practice was identified helpful in building a more efficient and functional organization. In the current situation interviewed personnel saw the transformation as a way to achieve the needed changes in the organization.

Concerning the Agile practices and the transformation towards DevOps practices, the interviewees had positive attitude and expectations for improvements.

“There will be more collaboration on the operational level with people. On the managerial level situation is unclear. Maybe this is a chance to improve KM issues.” (Interviewed Company A Service Delivery Manager #3)

4.1.4 Personnel networking and organizational learning

The categories 8 and 9 of the aggregated concepts concern organizational learning and networking between personnel inside the company. These topics correlate to a great extent.

8. Importance of networking

Problems due to limited networking and connections

Value of networking and connections

Need for central KM hub in the company

9. Issues concerning organizational learning

Ineffective conversion of knowledge

The level of internal networking in the company is low, which affects negatively in knowledge conversion, knowledge sharing and organizational learning. The formal and informal knowledge exchange via networking would build the organizational resilience, but this does not seem to happen due to current small number of connections and knowledge exchanges. The Company A organization consists of globally distributed units, but there does exist strong tendency to turn inwards in the country-specific delivery teams. From KM perspective, there were very few indications of recurring knowledge exchange with the globally distributed teams. According to the interviews, the utilization of organizational networks in planned organizational learning and dissemination of knowledge such as best practices would benefit the deliveries greatly.

4.1.5 Other significant Knowledge Management findings

The interviews uncovered certain distinct issues and observations beneficial to note. Regarding the identified challenges, the lack of codified knowledge was brought up on several occasions: instructions, guidance, requirements related to KM and also other company functions do not exist or are not up-to-date. Only limited possibilities exist to utilize the personnel’s tacit knowledge in time-critical service delivery situations, therefore knowledge externalization and codification would be sustainable practice to maintain and utilize company knowledge assets.

The company has had practices for such as Communities of Practice for knowledge sharing and learning, but those have been discontinued. There has been also attempts to utilize shared working methods and pair working, but such have been discarded as unprofitable practices. The organizational transformation was seen in the interviews as an opportunity to initiate profound development activities on the area of Knowledge Management and perhaps take into use the practices facilitating knowledge sharing and conversion. The actual effects of the transformation to the Company A organization were found still very limited.

The research did not encounter any evidence of KM functions supporting the Knowledge Asset management, nor there were found any actual Knowledge Assets or knowledge repositories used to store the refined knowledge. Several interview respondents were anyway able to identify critical knowledge worth of retaining and sharing, and stressed the need to identify and share knowledge during the recurring team meetings. The value of knowledge has been understood.

“There should be asked "how", rather than "why" when concerning the KM. The operative culture should allow sharing of knowledge, this is not happening at all now. The attitude towards the knowledge sharing should change, mandate to organize this should be more on the SDMs and DCSs, not on the VPs. There should be incentives in the KM and culture should be created with positive stories and by changing the management's attitude towards the organization's capabilities.” (Interviewed Company A Senior Consultant #1)

4.2 Findings based on document analysis

Company A service delivery processes and functions have basis on the Operating Model (OM) documentation. The Operating Model provides general descriptions for common service delivery processes and functions, information regarding the function objectives, scope and related key activities as well as references to instructions, responsibilities and other support documentation. The OM is a central tool for Company A in achieving consistent quality in the service deliveries and a controlled method for implementing the operative framework in the company.

The Knowledge Management documentation current state analysis was based on the company Operating Model documentation review. The review was carried out for all Operating Model processes and features, guided by questions similar to the interviews. The answers to the questions were summarized, conceptualized and categorized, and resulting findings categorization has been presented in table 12. The categories resulting from

the document review have been aligned with the categories familiar from the interview analyse to allow easier comparison between the research method findings. The questions for the document review have been presented in appendix 3 and the synthesis of the document review analysis units have been presented in appendix 4. Following chapters examine the categorization, related interpretations and findings in more detail.

Table 12: Categorization results of the document review content analysis

Document review content analysis categories

1. Insufficient KM approach
2. Management model issues
3. Insufficient KM tools
4. Routines enabling KM

Due to the small number of actual positive KM-specific findings during the document review, table 13 lists the summaries of key observations regarding the OM processes and sections. Out of the 20 processes and sections, only 10 had certain level of references to Knowledge Management functions.

Table 13: Evidence of the KM features in Operating Model documentation

Process areas and functions with positive KM findings	Findings forming the analysis units for document review
Templates	Templates include following KM-related documents: "document on understanding", "handover form", "knowledge article template", "improvement case study"
Guidelines	The guidelines contain knowledge transfer instructions for AD/AM service transition related KT, or transitions between Company A and other parties
Checklists	The checklists repository contain "ADtoAM" handover checklist
Change management	Change Advisory Board and Change Post-Implementation Review procedures have been created to intentionally share and process knowledge of the process area
Request fulfilment	Knowledge sharing takes place due to meetings with customer, the intention is review performance to steer the process
Continual improvement	There have been modelled and instructed service improvements practices targeted to share and process knowledge, although these are not executed currently
Governance	Company level general meetings are the only activity with a reference to KM in the documentation
Security	Evidence exist to show that knowledge transfer takes place with email-based infoletters. Tests and trainings are used to develop knowledge of the security area
Transition	Service Transition model includes knowledge transfer procedure with guidance documentation

Trainings	Trainings documentation shows that different types of trainings are being held occasionally in an attempt to facilitate learning and internalization of knowledge
Quality assurance	Based on reviewed content, on QA area informational emails and meetings have been designated for the knowledge sharing purpose

4.2.1 Overall documentation-based Knowledge Management approach status

Based on the Operating Model document review and analyse, the category 1 definition stands for the evidence that Knowledge Management as a distinct function or as set of processes has not been included in the Operating Model documentation. Collected evidence shows that the term of Knowledge Management has not been referred to in the OM at all. The KM strategy and objective references, KM process area or activity descriptions for KM functions have not been included in the OM. Suggestions and definitions of responsibilities and intentional usage of tools in the Knowledge Management activities are non-existent in the Operating Model.

However, the OM guidelines section for different activities, templates and checklists contain documents and information suggesting that intention has been to execute KM practices in the organization. There also exists reference to the Knowledge Management –related procedure in the Operating Model’s Service Transition process. The Service Transition process describes a generic transition of an application service from development phase to continuous management phase, and one of the related procedures guide to execute knowledge transfer between parties changing the management responsibilities. The Service Transition process description is accompanied by knowledge transfer guidelines presentation intended to specify how knowledge is passed between application development and application management unit in the case of the mentioned service responsibility change. The findings within the OM templates, guidelines and checklists relate to this procedure.

In addition to the Service Transition, few other process areas and functions under the OM execute the ideals of knowledge capture and knowledge dissemination. There was identified recurring meeting structures and reporting routines stimulating the knowledge-creation in the company as expressed in the category 4 definition. Evidence shows that under processes of Change Management, Continual Improvement, Request fulfilment and function of Quality Assurance knowledge is being processed and reused in a recurring manner, while the intention of the procedures was not deliberately KM-focused. The document analysis result category 2 refer to the characteristic of unintentional KM facilitation, as there does not seem to exist any coordinated, organized management activities on the Knowledge Management area.

The document analysis findings referred to in the category 3 present a conclusion of the lack of proper KM tools in the company. There does exist document storages for the knowledge assets in principle, but not any tools or methods allowing efficient structuring, categorization and sharing of knowledge. The Operating Model documentation itself also acts as a medium for knowledge sharing, but the OM is a static web-page –based solution and source of only process-oriented information.

4.3 Findings regarding knowledge creation and conversion

According to the interview and document analysis research data, SECI process has not been included to the company Operating Model or embedded in organizational conventions. Majority of the interview respondents were not aware of practices aimed to convert tacit knowledge into explicit. Furthermore, the research indicates that there does not occur routinely planned activities or practices facilitating the company knowledge creation, knowledge identification or knowledge flows. Any objectives related to such functions were not encountered either. Document analyse results show, that some amount of organizational knowledge has been codified or turned into explicit form in the OM and related instructions. Also, certain process and tools guidance of permanent nature has been turned into video material and text-based presentations for training purposes. OM content is being updated in a recurring manner, but evidence of actual planned, intentional knowledge creation was not encountered.

4.4 Conventions for knowledge capture, sharing and utilization

Based on the research findings, the ideas, experiences, observations or other findings beneficial to be externalized will not be generally captured or shared in the company. This will hinder the organizational learning and creation of reusable Knowledge Assets.

“Knowledge capture isn't natural part of routines or tasks, but it should be. Knowledge is being produced, but KM tasks are too demanding for current operations teams. Someone should coordinate these activities ... Tools should be developed or implemented to allow easier knowledge capture and reuse. The tools we need could be some kind of templates to carry out tasks and routines, this would support capturing and reusing knowledge. Documentation should be in a more usable form and contain details in a structure actually needed by the different roles of the organization. The different perspectives to documentation or in the codification should be taken into account in the creation of documentation. (Interviewed Company A Senior Consultant #1)

There does occur only occasional facilitated and some spontaneous transitions of tacit knowledge into explicit in the normal service delivery settings. Explicit knowledge is being externalized in the form of documentation included in the service deliverables. Documentation creation and updates are being done when deliverables are changing, however this documentation contains only technical details. Such detail can be collected and codified by anyone having sufficient accesses to Customer service environment, therefore the value of system documentation as knowledge assets is minor from the competitive advantage point of view. As promising features, knowledge capture is being facilitated in the Change Management and Problem Management processes. References to these were encountered in the OM document review and partially during the interviews. Related to the Change Management, a Post-Implementation Review attempts to capture experiences and details with reusable value. Problem Management investigation findings would be beneficial from the company service delivery responsibility perspective, but according to interviews none of these details are being analysed and used to improve delivery performance.

According to interviews, knowledge transfers take place also in the situations of personnel changes, but only short periods of time have been reserved for such activities. Nor does there exist practices for individual employees working in pairs or utilizing exactly similar ways of working enabling the tacit knowledge. The conclusion is, that tacit knowledge with the most value remains effectively with the employees. Based on the interviews and document analysis findings, knowledge sharing occurs in the AM teams according to emergent needs. AM team level routines for knowledge sharing do not exist, although there are company-wide operational practices such as change advisory board offering the knowledge sharing possibilities. The coverage of the knowledge sharing conventions is minor and there isn't in practice any long-term plans for knowledge sharing. The research methods did not find any evidence of knowledge usage, and there does not exist a SKMS for retaining knowledge for easy access and utilization.

While the document analysis indicates that there exists a basis for certain Knowledge Management routines in the company, there does not exist a separate Knowledge Management process area documentation collecting the respective guidance into one manageable initiative in a same manner than the company Operating Model sections do. The interview responses confirmed that AM service delivery responsible persons are not aware of or are not able to identify the company specific KM strategy, objectives, routines or instructions.

Based on the interviews and the OM analysis, there does not exist coordinated attempt to capture and manage knowledge assets. The OM analysis shows, that there does not either exist a structured storage for knowledge nor practices for utilization and reuse of knowledge. The absence of SKMS was noted during the interviews as well. Responses for the interview questions revealed that identification and capture of critical or beneficial knowledge does not take place often, and there does not exist any plans or instructions for such either. The knowledge captured and shared within the organizational networks remains within a small perimeter, in the closest team. Regarding the networks of personnel, the interviewees were not able to prioritize their contacts. The OM does not take into account the networks or Communities of Practice in any way. Neither the interviewees or OM were able to specify practices or guidance for knowledge capture, refinement and planned sharing to elevate the knowledge in the company. The interviewed personnel were able to express the interest and benefits of the KM, while only small part of the OM processes were aligned to enable the KM procedures such as knowledge capture or sharing.

5 Conclusions

This chapter presents the conclusions regarding the thesis research execution and the actual research analysis.

5.1 The current state of the Knowledge Management in Company A

During the thesis research, the current state of the Company A Knowledge Management framework and organizational KM performance was analysed thoroughly. In addition, collected data disclosed certain managerial and cultural aspects of the company. Based on the findings derived from the central service management practitioner interviews and document analysis covering the official Company A Operating Model documentation, the conclusion is that the company KM framework does not meet the qualifications nor the requirements of an business-supporting Knowledge Management approach.

In practical terms, the lack of common, recognized Knowledge Management strategy, related objectives, established principles, instructions, designated KM tools and cultural settings will impede the functionality of the knowledge processing in the company. The interviews or document review did not bring up any evidence regarding company level or unit level Knowledge Management vision, strategy or objectives, nor any steering activities or common guidance. Support or managerial enablement for Knowledge Management activities were not encountered either. Knowledge creation and conversion practices haven't been implemented and aren't facilitated in the organization. Certain Knowledge Management features have been adopted or exist in the company, but as a result of the overall lack of coordination the knowledge assets possessed by the company do not seem to provide benefits as efficiently as possible. In addition, it can be stated that an actual objective-guided Knowledge Management framework does not seem to exist in the Company A. Based on several interviews, the current Knowledge Management model and the company leadership management practices on the KM sector cannot be justified with only lean-agile management principles. The working culture, issues regarding trust and lack of cross-organizational communications play also an important part in the KM deficiency.

There does exist certain scattered features and routines contributing to the Knowledge Management in the company, while all the intentional KM activities on the level of AM deliveries concentrate only to fulfil the minimum contractual requirements. The matter of transformational Agile and DevOps effects on Knowledge Management within the AM services is trivial, since coordinated KM activities are near obsolete. Nonetheless, Agile and

DevOps practices are known to introduce certain Customer KM activities in the Company A organization, since delivery teams jointly operated with Customer are needed to fulfil in the future at least the Customer's Non-Functional Requirements (NFRs). The KM tasks included in the NFRs will be coordinated and facilitated by Customer, forcing Company A delivery teams to effectively act as a part of the Customer's Knowledge Management framework. The knowledge accumulation and value creation will benefit in these situations mostly Customer. The development of the working practices is leading into the Knowledge Asset transition to Customer.

5.2 Conclusions on KM development requirements

The thesis examination revealed, that a comprehensive KM renewal would be required in the Company A. In addition to Application Management and Application Development functions, for example Business Development and company support functions would benefit from the properly organized knowledge management processes. The clarification of Knowledge processing and related strategy would be needed, and value network analysis and organizing or optimizing company functions based on knowledge-based value streams should be examined further. Based on the research findings and literature review, the Company A KM renewal requirements include developing a strategy framework for Knowledge Management, designing an enhanced KM framework with business-driven KM objectives, modelling the CSFs for the KM in general, as well as documenting principles and operational KM guidance for different levels of the company. One of the primary concerns should be designing and establishing a knowledge conversion model for the company and ensuring effective implementation for these changes.

Choo & Bontis (2002, 16-18) point out, that there does not exist a universally applicable Knowledge Management framework. Instead, most beneficial results can be achieved by designing and implementing a case-specific, fit-for-purpose KM framework and management models, which consider the special needs and challenges of the organization. The KM processes, models and frameworks presented in the thesis offer references for this. Regarding Agile and DevOps, the general conclusion is that KM practices such as establishing SKMS, a model for knowledge conversion and formal processes could be fitted successfully together with the service delivery management approaches. Taking into account the theoretical Knowledge Management details presented in the thesis and the empirical data collected in the research, the two organizational features would seem even to support each other.

The research findings analyse covering the company personnel interviews, Operating Model document analysis and supported by a literature review led to a conclusion of several Knowledge Management development requirements within the Company A. In the Company A settings, it would be reasonable and required to clarify how the components and relations of a knowledge-based organization modelled by Ichijo & Nonaka (2007, 18) interact and attempt to facilitate similar functional relations. From KM process perspective, establishing means to facilitate SECI process would create a basis for practicing more structured and result-oriented Knowledge Management. The notions of the strategic levers of the strategic knowledge management framework (Choo & Bontis 2002, 16-18) and utilizing the framework itself to model the Company A overall KM approach would allow organization to grasp the initial Knowledge Management orchestration. Considering the ASD and the lean-agile –oriented management practices, the ICAS KM model would be a more advanced approach for the KM basis, and a highly suitable framework to start modelling the KM for ASD and DevOps purposes.

The research findings indicate that incorporating Knowledge Management aspect into the decision making and planning processes in the company would intensify the utilization of the existing knowledge resources. This would also allow anticipating the future knowledge needs and risks, therefore enabling proactive Knowledge Management. The requirements however are the transparency and shared responsibility in the decision making. The presented suggestions based on ITIL KM would offer a practical perspective on the needed strategic goals on KM sector, while the development of the knowledge repositories or knowledge tools would require further investigation.

The research also shows that the most significant factors to be considered in the strategic Knowledge Management steering relate to the organizational culture, including the values of transparency, trust and collaboration, while internal networking among personnel and technical solutions fit for purpose play an important role in the Knowledge Management functionality. In the process of developing the functional KM framework, these features act as enablers and should be addressed prior to initiating the actual improved Knowledge Management activities.

6 Discussion

This chapter reviews additional thesis and research-related issues worth to note.

6.1 Research reliability and validity

The ten stakeholders interviewed during the examination represented Company A delivery management roles on two organizational levels and on different organizational units. Out of the total, 60% of the interviewees were Service Delivery Managers with operative responsibilities and 20% of the interviewees were Service Directors having more of tactical roles. The last 20% of the persons interviewed were Senior Consultants with varying organizational roles. The differences in roles and experiences may either expand or narrow the person's perception of the examination subject, but considering the interview questions, all interviewees should have had the same basic knowledge.

Based on the Company A Operating Model, Service Delivery Manager and Service Director roles are in central position in respect of the delivery process and practice execution. In addition to the management of customer-facing services and related delivery team leadership, Service Delivery Managers should put into effect activities such as the operational level SECI process. The interviewed SDMs represented 44% of the staffing of the role in the company. The Service Directors in general and the interviewed Senior Consultants are in the positions of creating the favourable settings for deliveries, including Knowledge Management practices.

The interviewed Service Directors and Senior Consultants were partially involved in Application Development deliveries, while Service Delivery Managers took care the Application Management services. From the organizational transformation point of view, the Agile and DevOps practices affect AM units most and therefore interviewing personnel according to the above-mentioned distribution should effectively reveal the transformational challenges.

Considering the amount and coverage of the interviews in addition to the presented interviewee attributes, the acquired information should be trustworthy, comprehensive and representative in the Company A settings. Documentation review also supports the data collected from the interviews, therefore the credibility of the findings should be on good level. In general, the interviewee experiences, viewpoints and awareness concerning the company Knowledge Management status should be adequate for KM development purposes and due to the interviewee roles in the organization, the research results should be considered reliable.

6.2 Considerations on Knowledge Management success

As stated earlier, the Knowledge Management approach, practices and tools in the organizations should be crafted fit for purpose, while several best practice-type suggestions exist for the orchestration of KM. To succeed in practice with the Knowledge Management endeavours, Probst (1998, 17-18) has suggested organizations to consider the aspects of comprehensibility and compatibility, action orientation and problem orientation as well as implementing appropriate knowledge asset manipulation instruments in the Knowledge Management framework. In short, Knowledge Management should be established in an understandably fashion by utilizing terms and concepts familiar to the organization, and above all, Knowledge Management should be included in the decision making and routinely executed activities. These are issues that weren't examined thoroughly in the thesis research, but would require attention in the process of developing KM in the Company A. This would ensure that KM can contribute efficiently to the organizational success.

An aspect covered only briefly in the research was the suggestion to measure KM activities, results and value of the knowledge assets. In addition, organizations should also measure from time to time of the maturity of KM practices. Yokell (2010) has demonstrated that higher maturity in the knowledge management and processing practices will statistically improve the return on sales and return on assets, while the KM requires active steering to enable this. The issue that would also still require research and activities in the Company A settings is the integration of knowledge into the activities of the organization. According to Grant (1996, 380) knowledge integration is more critical feature in the formulation of competitive advantage than merely possessing the knowledge for retention. This means that the knowledge is actually used and cultivated in the tasks of the company. Grant (1996, 380) also suggests that the efficiency, scope and flexibility of knowledge integration are the key features to be considered in Knowledge Management framework. Efficient knowledge integration can be achieved for example through creation of organizational or team-level routines, while pursuing to control the frequency and variability of the knowledge-intensive routines. Anyhow, building organizational capabilities involves the integration of multiple types of knowledge sources (Grant 1996, 382-384).

Regarding the human-centric and social aspects of the KM, Nonaka, Toyama & Byosiere (2001, 508) advocate establishing roles and responsibilities in the organizations to oversee the knowledge-creation process and the to manage the knowledge assets. Such were not encountered in Company A, but defining roles for KM with a mandate and agreed responsibilities would clarify the KM situation and allow effective KM development actions to be taken in the company. Supporting the idea of knowledge embedded in the employees

and members as the real nature of knowledge assets of the organizations and companies, Ichijo & Nonaka (2007, 7) suggest that the traditional practices of management should be adjusted to more effectively and efficiently focus to knowledge-based competences and support the human-centric knowledge processes in order to gain the knowledge-based competitive advantages. This suggestion should be worth of speculating in the Company A.

Based on the knowledge-creation theory and importance of knowledge worker networking in organizations, a suggestion by Jakubik (2016, 199-200) has been that a knowledge-producing networked group of individuals with common goal act as a value chain of knowledge-creation. Such network of knowledge-workers established and aligned to work together may optimize their dynamics and utilization of shared contexts in a fashion that exceeds the typical expectations. Therefore, the teams and networks are an asset for the organizations. This observation should be considered in the Company A, while transformation and other changes shape the company and networks formed by personnel.

Regarding the organizational possibilities to practice knowledge exploitation and knowledge exploration, a combination of these knowledge management approaches should turn out reasonable, as promoting innovations is needed while reusing knowledge is from time to time an effective solution. The bimodal approach anyway requires resources with understanding, as well as organizational capabilities to change direction in an Agile manner. Pursuing this objective should be anyhow a plausible approach for elevating knowledge utilization capabilities in the Company A.

Following the preferences of process efficiency, the Agile practices discourage to some degree the codification of knowledge due to an attempt to reduce the amount of documentation. In addition, the general efficiency-orientation may impede other organizational endeavours targeted to build sustainable advantages, overall Knowledge Management practices included. This challenge may require the organizational management to consider the long-term sustainability of the Agile teams, as this would be a method to ensure the knowledge conversion and building resilience (Amritesh and Misra 2014, 507). In the Company A DevOps teams, the utilization of the existing networks, the capabilities to reuse stored knowledge efficiently and defining responsibilities to work on the knowledge utilization should be therefore ideas worth of exploring further.

7 Development proposals

The information and details collected with the thesis research were found beneficial for understanding the overall organizational behaviour, the challenges and requirements of the service delivery management in the KM sector, and in general the status of the Knowledge Management in the company. The development proposals presented in this chapter are based on the findings and conclusions of the research, and aim to enable the Knowledge Management strategy development in the lean-agile settings of Company A. In addition, the proposals should allow enhancing the knowledge asset value creation in the organization. While the proposals would require further adjustment in the actual contexts, they are justified and applicable in the examined settings.

7.1 Knowledge Management strategy development

The most important development proposal relates to the conclusion regarding the absence of KM strategy in the Company A. As the thesis research did not find evidence of separate, generally recognizable strategy for Knowledge Management in the company, nor there are any references to Knowledge Management in the general strategic outlines or objectives of the deliveries, it is highly recommendable to develop a strategy for Knowledge Management on the corporate level. Considering the KM status, the transformational challenges and the nature of the lean-agile management orientation of the company, a lean strategy process presented in the thesis should provide a gentle approach for initiating the KM strategy definition. The lean strategy process would offer a possibility to develop a strategy for distinct subject such as KM in an incremental way. The iterative nature of the process enables also adjusting the strategic decisions and shifting the strategic management focus in an agile manner. As the lean strategy process itself is light and flexible, the adoption and experimentation of the methodology should be viable in Company A settings.

Based on the research and suggestions derived from the literature review, the main themes of the KM strategy should relate to the development of a sufficient KM enablers within the company, but also including the knowledge processing into objectives of the management roles on different organizational layers. The role-based clear objectives bound to the activities of a sufficiently modelled KM approach would effectively enforce the processing of knowledge in the company. Regarding the Knowledge Management enablers, the research findings emphasize the requirement for collaborative, transparent and trust-based culture within the organization. Such features would offer a fertile ground for

organizational learning and knowledge conversion. Another factor with strategic significance is the networking of company personnel, as networking facilitates the natural flow and conversion of knowledge. The value network analysis utilization allows modelling and prioritization of the connections within the network, therefore offering company management a strategic tool for steering for the knowledge value creation. For example, competence development in the company, disseminating best practice knowledge and organizational learning could be efficiently managed according to mapped value network. As presented in the thesis conclusions, incorporating Knowledge Management into organizational functions would enhance several organizational capabilities. Modelling and establishing the SECI process functions in the company would be especially important considering the presented challenges of the company, yet the refreshed KM approach should be designed comprehensive and pervasive.

Figure 19 presents a proposal for Company A KM strategy framework. The proposal relies on the lean strategy process and combines into one presentation several KM aspects reviewed in the thesis. The proposed framework also links the research findings and conclusions into the KM strategy process, therefore supporting the overall changes needed in the company. The core process of the framework starts with the review of knowledge-driven business needs and definition of a vision for knowledge asset utilization. The framework suggests incorporating the elements of knowledge vision and dialogues of the knowledge-based organization (Nonaka, Toyama & Byosiere 2001, 18) into the initial strategy formulation phase. This way the SECI process and the related interaction within organization can contribute to and supplement the strategic vision of the knowledge asset utilization. Both business and operational service delivery requirements concerning the knowledge utilization should be represented in the vision.

Also Zack (2002, 261-262) suggest to clarify the strategic knowledge requirements by executing a knowledge gap analysis in the organization. This analyse should be started already in the first phase of the proposed framework, continued adjacent to the knowledge-based SWOT analysis in the second phase and observe the strategy definition process through until the feedback phase. This should allow identification of the knowledge requirements and monitoring of the strategically significant knowledge development throughout the KM strategy iterations. In addition to the SWOT, the analysis phase should take into account the knowledge inputs based on the ICAS KM model. This allows the changes and other features of the evolving organization to be considered in the SWOT analysis. A significant set of principles to be included in the analyse phase and following deliberate strategy creation phase steps would be the strategic levers, which contribute to the long-term functionality of the organization.

According to Choo & Bontis (2002, 16-18) the strategic levers will be critical for the KM success in the organization and in the Company A's situation the levers would address exactly the challenges affecting the KM in company: knowledge leadership issues, functionality of the knowledge creation and transfer in the organization and learning possibilities through networking. The strategic levers should be initiatives of their own, while producing input to the strategic KM planning in the form of experiences, insight and feedback. The strategic levers also support the creation of the initial deliberate KM strategy by linking existing objectives and decisions into the process, while the intention of the ICAS KM-based selectivity indicator (Dalkir 2011, 86) in the framework is to ensure that KM strategy will take into consideration only issues actually supporting the organizational goals.

The strategy process continues from the deliberate KM strategy definition into learning phase, during which the KM principles and practices will be put into test. The learning phase is also the occasion to work on the corporate culture and the cultural barriers listed by Dalkir (2011, 259). The learning phase is used to execute KM according to the strategy and collect feedback and findings leading eventually to functionality-driven changes in practices. These give the basis for emerging KM strategy. In order to validate the emergent strategy, the process cycle will start over from the analysis phase.

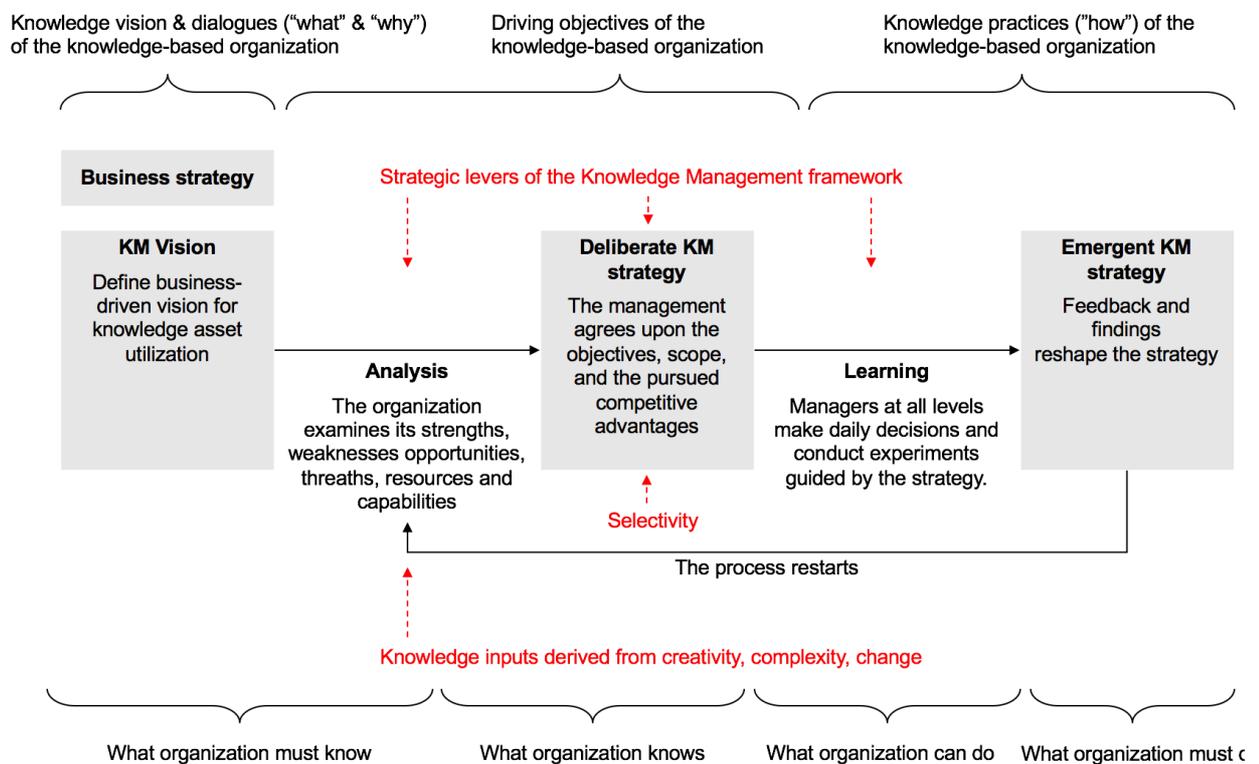


Figure 19: Proposal for KM strategy framework

The technical prerequisites of the framework are the identification of roles and responsibilities to manage knowledge, and sufficient KM guidance forming the KM approach.

7.2 Knowledge Management approach, processes and guidance renewal

Since the Company A lacks the functional Knowledge Management framework, proposal is to create and establish such. The KM aspects presented in the thesis should be considered in the creation of the sufficient set of practices, while an actual KM framework is needed to execute the KM strategy. A high-level proposal or a reference model for Company A Knowledge Management framework has been presented in the figure 20.

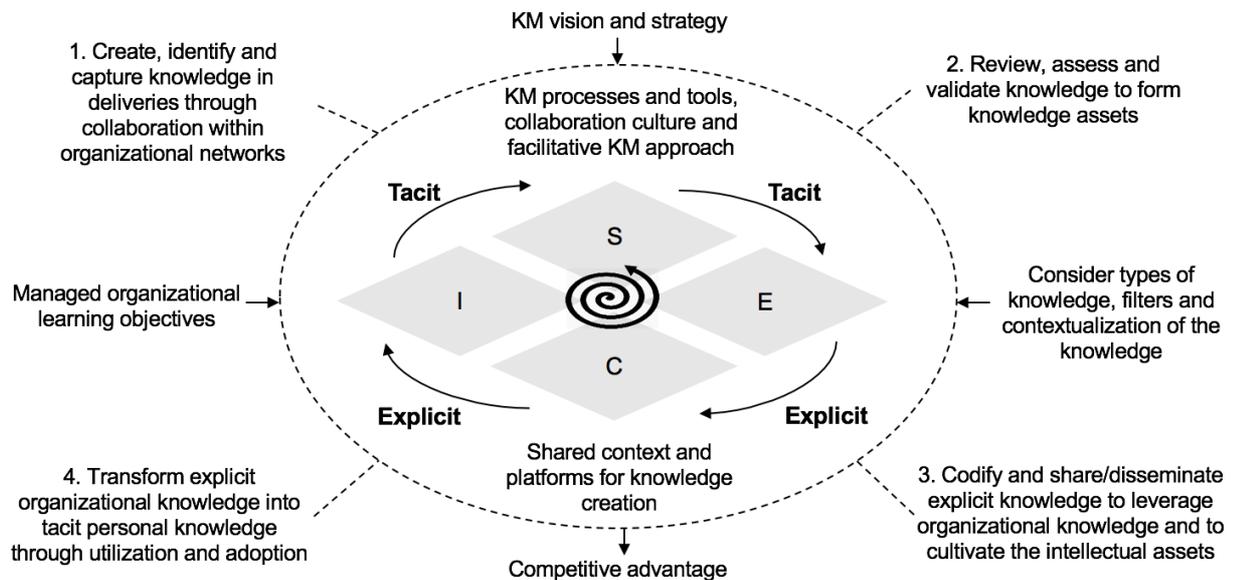


Figure 20: Proposal for core KM framework

In the core of the proposed KM framework lies the SECI process, since the continuity of the knowledge-intensive business requires a formal approach for facilitating the knowledge creation and conversion in the company. Emphasis on the SECI facilitation should be on objective-driven networking, collaboration and cross-functionality from knowledge utilization and knowledge flow perspective, which also supports the practices of DevOps delivery model. The platforms for knowledge creation should be established from the perspective of competence areas and knowledge value streams, thus contributing to the idea of shared contexts and elimination of organizational siloes. The recommended solution for the facilitation of the SECI and the collaborative ways of working from KM perspective would be establishing roles and defining clear responsibilities with a mandate for the purpose. For example in Agile delivery teams nearly equivalent practical delivery steering roles already exist.

The processes and tools of the KM framework should be designed and modelled based on and to support the modes of the knowledge conversion, and reinforced with the procedures ensuring the functionality of knowledge asset maintenance and management. The four categories of knowledge assets proposed by Nonaka, Toyama & Byosiere (2001, 502), should be considered in this area, while in practice also the strategic knowledge types defined by Zack (2002, 259) and key knowledge types defined by Andriyani, Hoda & Amor (2017, 201) important in Agile deliveries would be beneficial to fit together. To maintain efficiency in the knowledge asset management, filtering and contextualization should be executed. Rules and routines for these should be created before initiating the knowledge asset management in larger scale. The framework aims to enable also the organizational learning and adaptive ways or working.

In general, the KM framework should also adopt the ICAS KM model core ideas of facilitating general understanding of the company's KM vision and approach, creating new ideas, solving problems, making decisions on all levels of the organization, thus taking action to achieve desired results. On a level of processes, Knowledge Management in Company A should attempt to enable the SECI-based knowledge conversion and knowledge flow through the units and teams of the organization, with a help of tools and enhanced cultural practices. A strong emphasis should be put on creation of the experiential knowledge assets. VNA should be used to map the current knowledge exchanges, then company should review and map its knowledge assets as defined in the thesis KM literature review. Company should also establish and utilize a lightweight SKMS to standardize the knowledge asset retention, control and utilization in respect of VNA knowledge exchanges.

7.3 Culture, learning and people-centric organizational aspects

The research indicates that aspects of working culture should be taken into consideration in the Company A from the Knowledge Management functionality perspective. Sveiby (2003, 3) suggests that efficient and long-term techniques for developing the culture and knowledge worker management include promoting learning in the service deliveries, allowing person-to-person knowledge transfers with different methods, trust-building and creation of collaborative climate. These suggestions apply to the Company A as well, but according to Sveiby (2003, 3) they are dependent on the management commitment. However, the proposal regarding the working culture development is to address following human-centric organization management aspects in the company strategy:

- Investments and improvements on personal competence development management plans and platforms, focusing on the creation of learning organization by rotating roles and creating cross-organizational roles.
- Improving the knowledge worker motivation and incentives supporting desired cultural behavior, e.g. knowledge sharing.
- Enabling Communities of Practice and seeking other methodologies facilitating tacit knowledge transfer among personnel.

Continuity of operations is an important factor in the Company A's business sector, and a special concern during the transformations. As organizations according to Dalkir (2011, 2-6, 25) are continually at risk of losing knowledge and therefore parts of the competitive advantage due to personnel turnaround or similar changes affecting knowledge networks, a suggestion is to especially focus on creating the culture promoting sharing and knowledge conversion. This would prevent or reduce the loss of valuable knowledge assets.

7.4 KM development proposals regarding Agile and DevOps-based deliveries

As development proposals specifically concerning Knowledge Management in Agile and DevOps-oriented deliveries, following activities based on the research documented by Ouriques (2019, 89) should turn out beneficial:

- Matching the codified knowledge and supply of knowledge assets to the needs of the delivery organization members would improve the efficiency and quality of the delivery. The standardization for required knowledge assets based on roles and responsibilities would also enhance the utilization of the knowledge. The needs should be clarified frequently and the codification of the needed knowledge should be improved with the means presented in the thesis.
- Knowledge structure in repositories should be modelled according to the understanding of why certain knowledge is needed and how it might be applied. Different knowledge types should be considered in the process.
- Knowledge codification conventions in the company could be linked to the routines of the ASD or DevOps delivery, while it should be also ensured that the available knowledge is reliable. In general, a structured knowledge externalization practices with clear objectives and instructions should enable these.

7.5 Development proposals concerning KM area tools and technologies

The Company A does not have a knowledge management system (SKMS), therefore a proposal is to either acquire such or develop existing documentation repositories and tools to allow fluent capturing, storing and sharing knowledge. The SKMS tool should provide possibilities to create sufficient structures for different types of knowledge assets and integration capabilities with the company service deliveries to utilize the knowledge assets when needed. The existing tools and knowledge asset repositories should be evaluated from these perspectives to initiate the needed development actions.

7.6 Summary of development proposals

Below table lists the key development proposals utilizing the categorization of “people”, “processes” and “technology” in order to link the needed development issues to the common organizational aspects. The categorization has been used to raise understanding of the development requirement. It must be also noted, that the issues between categories overlap and are dependent to each other. Therefore, a careful planning will be needed to initiate the development actions.

Table 14: Summary of key Knowledge Management-related development proposals categorized

The development requirements considered from the aspect of “People”:

- A collaborative, learning-oriented culture supporting different roles and responsibilities
- Transparency and clarity of objectives, responsibilities, and the guidance in the ways of working
- Trust and shared responsibility among all the parties in the organization
- Personal incentives to take part and execute knowledge management activities
- Networking and building cross-organizational connections in a global scale
- Roles and responsibilities adjusted to enforce Knowledge Management

The development requirements considered from the aspect of “Processes”:

- Renewal of the KM framework supporting at the same time the lean-agile management models of the company, different organizational activities, and different organizational levels
- Designing and establishing processes for executing the KM vision, strategy and the knowledge conversion
- KM processes and procedures to be linked and integrated to other service delivery processes in the company
- Designing KM processes to enable identification, capture, refinement and efficient utilization of knowledge assets
- KM processes and practices designed to consider and support different management practices and delivery functions, e.g. DevOps delivery practices and traditional organizational management decision making
- Identification of Critical Success Factors and measurement model for KM functions, activities and value of knowledge assets
- KM activity guidance, suggestions, examples and templates to ease the adoption of desired practices
- Linking KM processes into company improvement framework

The development requirements considered from the aspect of “Tools and technology”:

- Technological solutions (e.g. Service Knowledge Management System) enabling effortless knowledge capture, structured knowledge retention, fast context-specific knowledge utilization and reuse, supporting role-based knowledge dissemination
- Collaboration tools for enabling efficient communication or conferencing parallel to utilization of retained knowledge

7.7 Suggestions for further studies

Although the subject of Knowledge Management was examined thoroughly during the preparation of the thesis, there remains several additional issues to be addressed and considered in the process of developing a functional KM framework in the Company A. A proposal is to continue the research and focus more deeply into the organizational culture and management practices of the company to identify possibilities for developing the transparency, trust, collaboration and utilization of competence. Advancing on these sectors would strengthen the basis of Knowledge Management strategy implementation.

The topic of Knowledge Management process-specific critical success factors and measurements possibilities were only referred to in the final version of the thesis. These are topics, which especially should be included in the KM framework. The development of the metrics should be carried out based on the KM strategy and objectives, while different types of knowledge and knowledge processing functions would be also taken into account. A proposal is to identify the CSFs and design metrics for distinct KM features, and ensure that the measurements can be used to steer the Knowledge Management.

The Company A utilizes globally distributed resources in the service deliveries, while communications, collaboration and inclusion of the offshore teams is not very intense. From the competence utilization and continuity perspectives it would be recommended to focus certain efforts to improve Knowledge Management processes with these teams and resources. The matter of collaboration in global scale and utilization of connections or organizational network of personnel would be also a financially viable solution.

References

Ackerman, M. Pipek, V. & Wulf, V. 2002. *Sharing Expertise: Beyond Knowledge Management*. MIT Press. URL: <https://ebookcentral.proquest.com/lib/haaga/reader.action?docID=3338818>. Accessed: 9.10.2020.

Allee, V. *Value Networks and Evolving Business Models for the Knowledge Economy*. In: Holsapple, C.W. 2003. *Handbook on Knowledge Management: Knowledge directions*, pp.605-621.

Allee, V. 2008. Value Network Analysis and value conversion of tangible and intangible assets. *Journal of Intellectual Capital* Volume 9, No. 1, 2008, pp. 5-24.

Amritesh & Misra, S. 2014. Conceptual modeling for knowledge management to support Agile software development. *The Knowledge Engineering Review*, September 2014, pp. 496-511. URL: <https://www.cambridge.org/core/journals/knowledge-engineering-review/article/conceptual-modeling-for-knowledge-management-to-support-Agile-software-development/FD3DA610F0217EE6810F1BB132FE35F4>. Accessed: 23.10.2020.

Asih, A. Rumanti, I. & Wiratmadja, I. 2013. Individual Tacit Knowledge for Organization's Competitive Advantage. 2013 IEEE International Conference on Industrial Engineering and Engineering Management. URL: <https://ieeexplore-ieee-org.ezproxy.haaga-helia.fi/stamp/stamp.jsp?tp=&arnumber=6962366>. Accessed: 20.7.2020.

Andriyani, Y. Hoda, R. & Amor, Robert. 2017. *Understanding Knowledge Management in Agile Software Development Practice*. URL: https://www.researchgate.net/publication/318496996_Understanding_Knowledge_Management_in_Agile_Software_Development_Practice. Accessed: 8.4.2020.

Barbour, R. 2014. *Introducing Qualitative Research: A Student's Guide*. Sage Publications Ltd. London. URL: <https://dx-doi-org.ezproxy.haaga-helia.fi/10.4135/9781526485045>. Accessed: 6.10.2020.

Bennett, A. & Bennett, D. 2004. The intelligent complex adaptive system model for organizations URL: https://www.academia.edu/17435912/Introducing_the_Intelligent_Complex_Adaptive_System_Model_for_Organizations. Accessed: 22.10.2020.

- Bowen, G. 2009. Document Analysis as a Qualitative Research Method *Qualitative Research Journal* 9, pp 27-40. URL: https://www.researchgate.net/publication/240807798_Document_Analysis_as_a_Qualitative_Research_Method. Accessed: 20.9.2020.
- Brinkmann, S. 2013. *Qualitative Interviewing*. Oxford University Press, Incorporated. URL: <https://ebookcentral.proquest.com/lib/haaga/reader.action?docID=1274289>. Accessed: 20.9.2020.
- Choi, B. Lee, H. 2002. Knowledge management strategy and its link to knowledge creation process. *Expert Systems with Applications* 23 / 2002, pp. 173–187. URL: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.98.9061&rep=rep1&type=pdf>. Accessed: 16.11.2020.
- Choo, C. & Bontis, N. 2002. *The Strategic Management of Intellectual Capital and Organizational Knowledge*. Oxford University Press. URL: <http://ebookcentral.proquest.com/lib/haaga/detail.action?docID=279796>. Accessed: 11.7.2020.
- Collis, D. 2016. Lean strategy: Start-ups need both agility and direction. *Harvard Business Review*, March 2016.
- Dahlman, C. J. Routti, J. & Ylä-Anttila, P. 2006. Finland as a Knowledge Economy: Elements of Success and Lessons Learned, pp. 1-6. World Bank Institute. URL: <https://openknowledge.worldbank.org/bitstream/handle/10986/7138/393780FI0Knowledge0economy01PUBLIC1.pdf?sequence=1&isAllowed=y>. Accessed: 11.8.2020.
- Dalkir, K. 2011 *Knowledge Management in Theory and Practice*. Second edition. The MIT press. Cambridge, Massachusetts. London, England. URL: <https://ebookcentral.proquest.com/lib/haaga/detail.action?docID=3339244>. Accessed: 1.8.2020.
- Delgado-Verde, M. Martín-de Castro, G. & Navas-López, J. 2011. Organizational knowledge assets and innovation capability. *Journal of Intellectual Capital; Bradford* Vol. 12, Iss. 1. URL: <https://search-proquest-com.ezproxy.haaga-helia.fi/docview/840166338/fulltextPDF/B1811EB71BA34C5EPQ/1?accountid=27436> Accessed: 1.9.2020.
- Du Plessis, Marina. 2007. *The role of knowledge management in innovation*.

Journal of knowledge management vol. 11 NO. 4 2007, pp. 20-29, Q Emerald Group Publishing Limited. URL: <https://www.emerald.com/insight/content/doi/10.1108/13673270710762684/full/html>. Accessed: 23.10.2020.

Grant, R. 1996. Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration. *Organization Science*, Vol. 7, No. 4. (Jul. - Aug., 1996), pp. 375-387. URL: <https://www.researchgate.net/publication/237713466>. Accessed: 23.10.2020.

Plenert, G. Dey, R. & Arindam, B. 2011. *Lean Management Principles for Information Technology*. URL: <https://ebookcentral.proquest.com/lib/haaga/detail.action?docID=4744207> Accessed: 23.10.2020.

ITIL. 2007. *Service Transition*. The Office of Government Commerce. TSO. London.

Farquhar, J. 2012. *Case study research for business*. Sage Publications. URL: <https://www.vlreader.com/Reader?ean=9781446258767#>. Accessed: 1.9.2020.

Ichijo, K. & Nonaka, I. 2007. *Knowledge Creation and Management: New Challenges for Managers*. Oxford University Press, Inc. URL: <https://ebookcentral.proquest.com/lib/haaga/detail.action?docID=415467>. Accessed: 1.9.2020.

Jakubik, M. 2016. Talent engagement framework as a journey to performance: Transfer and Management of Knowledge. In: *Review of innovation and competitiveness; a journal of economic and social research* Vol 2 Issue 3, 2016. URL: https://fet.unipu.hr/_download/repository/Download/RIC_volume_2_issue_3_web.pdf Accessed: 4.7.2020.

Kavitha, R. 2011. *A Knowledge Management Framework for Agile Software Development Teams*. URL: <https://www.researchgate.net/publication/238522217>. Accessed: 1.6.2020.

Lapan, S. Riemer, F. & Quartaroli, M. 2011. *Qualitative Research: An Introduction to Methods and Designs*. Jossey-Bass. URL: <https://learning.oreilly.com/library/view/qualitative-research-an/9781118118832/chap10-sec002.html>. Accessed: 15.9.2020.

Leonard, D. 2011. *Managing Knowledge Assets, Creativity And Innovation: Selected Works by Dorothy a Leonard by Dorothy A Leonard*. World Scientific Publishing Company.

URL: <https://ebookcentral.proquest.com/lib/haaga/reader.action?docID=3050918>. Accessed: 11.8.2020.

Mäntyneva, M. & Salminen, V. 2017. Knowledge sharing practices supporting continuous incremental innovation. Manchester: The International Society for Professional Innovation Management (ISPIM). URL: <https://search-proquest-com.ezproxy.haaga-helia.fi/docview/2183484342?accountid=27436>. Accessed: 11.8.2020.

Ndlela, M. 2014. Critical Success Factors for Effective Knowledge Sharing: Integrating Intra-Organizational Communication and KM Tools. European Conference on Knowledge Management; Kidmore End Vol. 2, pp. 724-729. Kidmore End: Academic Conferences International Limited. URL: <https://search-proquest-com.ezproxy.haaga-helia.fi/docview/1672879965/fulltextPDF/E19DB2B054734F2FPQ/1?accountid=27436>. Accessed: 4.7.2020.

Nonaka, I. & Takeuchi, H. 1995. The Knowledge-Creating Company: How Japanese companies create the dynamics of innovation. Oxford University Press.

Nonaka, I. & Toyama, R. 2005. The theory of the knowledge-creating firm: subjectivity, objectivity and synthesis. *Industrial and Corporate Change*, Volume 14, Number 3, pp. 419–436. URL: https://pdfs.semanticscholar.org/eb97/3cc684507abc16179781309b2213be5dd718.pdf?_ga=2.81506324.2093864431.1602839949-1931479293.1602839949. Accessed: 16.10.2020.

Nonaka, I. Toyama, R. & Byosiere P. 2001. A Theory of Organizational Knowledge Creation: Understanding the Dynamic Process of Creating Knowledge. *Handbook of Organizational Learning and Knowledge*, Oxford University Press, pp. 491-517.

OECD. 2004. *Innovation in the Knowledge Economy*. OECD Publishing. URL: https://read.oecd-ilibrary.org/education/innovation-in-the-knowledge-economy_9789264105621-en#page5. Accessed: 11.8.2020.

Ouriques, R. 2019. Understanding and supporting knowledge management in Agile software development. Licentiate dissertation. Department of Software Engineering, Blekinge Institute of Technology. Karlskrona. URL:

<http://bth.diva-portal.org/smash/get/diva2:1340069/FULLTEXT03.pdf>. Accessed: 5.5.2020.

Pamulapati, D. & Bodicherla, S. 2019. Knowledge Management Maturity Model for Agile Software Development; A Systematic Mapping Study and a Survey. Master's thesis. Blekinge Institute of Technology, Faculty of Computing. Karlskrona. URL: <http://www.diva-portal.org/smash/get/diva2:1293191/FULLTEXT02.pdf>. Accessed: 5.5.2020.

Pitkäranta, A. 2014. Laadullinen tutkimus opinnäytetyönä: Työkirja ammattikorkeakouluun. Jokioinen: e-Oppi. URL: <https://haagahelia.finna.fi/Record/3amk.263814>. Accessed: 1.11.2020.

Powell, W. & Snellman, K. 2004. The Knowledge Economy. Annual Review of Sociology Vol. 30, pp.199-220. URL: <https://doi.org/10.1146/annurev.soc.29.010202.100037>. Accessed: 10.8.2020.

Puustinen, S. 2013. Qualitative research and theme interview as a method of collecting data. Aalto University.

Probst, G. 1998. Practical Knowledge Management: A Model That Works. URL: https://www.researchgate.net/publication/271508998_Practical_Knowledge_Management_-_A_Model_That_Works. Accessed: 1.5.2020.

Ray-Howett, R. 30.11.2018. Knowledge Engineering & Innovation Lead. Microsoft's approach to knowledge management. Microsoft. Redmond.

Stellman, A. & Greene, J. 2014. Learning Agile. O'Reilly Media Inc. URL: <https://learning.oreilly.com/library/view/learning-Agile/9781449363819/>. Accessed: 11.10.2020.

Sveiby, K-E . 1997. The new organizational wealth: managing & measuring knowledge-based assets. Berrett-Kohler Publishers, Inc.

Sveiby, K-E. 2001. What is knowledge management? URL: <https://www.sveiby.com/files/pdf/whatisknowledgemanagement.pdf>. Accessed: 8.7.2020.

Sveiby, K-E. 2003. Organizing for effective knowledge work. URL: <https://www.sveiby.com/files/pdf/sveiby-2003-knowledgeworkerdevelopment.pdf>. Accessed: 8.7.2020.

- Thakur, D.S. & Thakur, K.S. 2003. Knowledge Management: A Growing Discipline. LIBRARY HERALD Vol 41 No 4, pp. 259-274. URL: https://www.researchgate.net/publication/254876796_Knowledge_Management_A_Growing_Discipline. Accessed: 8.7.2020.
- Tseng, S. 2010. The correlation between organizational culture and knowledge conversion on corporate performance. Journal of Knowledge Management; Kempston Vol. 14, Iss. 2, pp. 269-284. URL: <https://search-proquest-com.ezproxy.haaga-helia.fi/docview/230302975/fulltextPDF/9DAB69EB70F475CPQ/1?accountid=27436>. Accessed: 5.10.2020
- Tuomi, J. Sarajärvi, A. 2018. Laadullinen tutkimus ja sisällön analyysi. Kustannusosakeyhtiö Tammi. Helsinki. URL: <https://www.ellibslibrary.com/book/9789520400118>. Accessed: 18.9.2020.
- Unger, R. 2019. The Knowledge Economy. OECD. URL: <https://www.oecd.org/naec/THE-KNOWLEDGE-ECONOMY.pdf>. Accessed: 25.8.2020.
- van Ewyk, O. 2018. Knowledge assets and knowledge conversion: Addressing issues of practical application. Kidmore End: Academic Conferences International Limited. September 2018. URL: <https://search-proquest-com.ezproxy.haaga-helia.fi/docview/2117333140?accountid=27436>. Accessed: 1.10.2020
- Verona, J. 2016. Practical DevOps. Packt Publishing. URL: <https://learning.oreilly.com/library/view/practical-devops/9781785882876/pr01.html>. Accessed: 11.10.2020.
- Warren, C. Qualitative interviewing. In: Jaber, F. G. & Holstein, J. 2001. SAGE Research Methods: Handbook of Interview Research, pp. 83-102. URL: <https://dx.doi.org/10.4135/9781412973588>. Accessed: 15.9.2020
- Winter, S. Szulanski, G. 2002. Replication of organizational routines. In: Choo, C. Bontis, N. 2002. The Strategic Management of Intellectual Capital and Organizational Knowledge, pp. 208. Oxford University Press. URL: <http://ebookcentral.proquest.com/lib/haaga/detail.action?docID=279796>. Accessed: 11.7.2020.
- Yokell, M. R. 2010. A quantitative correlational study of the relationship between knowledge management maturity and firm performance. University of Phoenix. URL:

<https://search-proquest-com.ezproxy.haaga-helia.fi/docview/878892492?accountid=27436>. Accessed: 25.8.2020.

Zack, M. 2002. Developing a knowledge strategy. In: Choo, C. Bontis, N. 2002. *The Strategic Management of Intellectual Capital and Organizational Knowledge*, pp. 255-266. Oxford University Press. URL: <http://ebookcentral.proquest.com/lib/haaga/detail.action?docID=279796>. Accessed: 11.7.2020.

Zerega, B. 1998. Art of knowledge management, *InfoWorld*, vol. 20, pp. 61. URL: <https://search-proquest-com.ezproxy.haaga-helia.fi/docview/194329316?accountid=27436>. Accessed: 4.7.2020

Appendices

Appendix 1. Guiding questions for the theme interviews

#	Interview questions
1	How familiar are you with the organizational Knowledge Management, including respective processes, activities and tools?
2	Are you aware of or do you have any unit/team level objectives, arrangements, routines or guidance for Knowledge Management activities?
3a	How would you describe the role and functionality of the KM practices in the organization or in the scope of your responsibilities?
3b	How do Knowledge Management related practices and tools support your work at the moment?
4	In your opinion, which kind of value does KM features such as capturing and sharing knowledge bring to the organization?
5a	Are you able to identify and define the business-critical knowledge or knowledge assets on your responsibility area? For clarification: Any knowledge that helps to ensure continuity, helps to succeed or would bring benefits to the organization?
5b	Are we able to capture and pass on in the organization the valuable knowledge (referred to in the previous question)? How would this be possible?
6a	Have you established a network of contacts for KM purposes in the scope of your responsibility area?
6b	What type of information or knowledge is being collected and shared in an organized and recurring manner within your network of contacts?
6c	Would you be able to classify your recurring knowledge sharing contacts according to the information exchange value?
7	Which KM practices would you consider especially beneficial on your responsibility area?
8	How would you describe or define the challenges of KM in the organization or on your responsibility area?
9	How is the agile operating model affecting KM practices or requirements according to your experiences?
10	Are you able to recognize any KM related risks or opportunities, namely in the agile operating model?
11	Do you have any ideas or proposals for improving the current KM approach?
12	Do you have any other suggestions or issues to be shared?

Appendix 2. Interview analysis units

Questions	Synthesis of the analysis units
Question 1	The idea or of KM is familiar to most people. Personnel are not aware of KM practices in COMPANY A.
Question 2	In certain teams there are attempts to share knowledge continuously. There does not exist coordinated, structured unit/team-specific KM activities or routines, nor there are any instructions, clear roles or designated tools in place. On the KM area, requirements and objectives are unspecified. Insufficient processes and guidance Expectations in general without any support Insufficient time to plan or create structure
Question 3a	Teams rely only on meetings and direct communication to occasionally share knowledge Management does not support KM due to prioritization of short-term gains Doing only the minimum on the KM sector KM is not established as a measured process or feature Lots of ad-hoc work without planning, no possibilities to develop working methods
Question 3b	Current KM approach is inadequate and do not support the work, KM is not linked to delivery processes officially or effectively Learning through work does not occur
Question 4	Worry and distress concerning organizational functionality due to lack of time to exchange information, learn and plan ahead while management take care of all decisions and won't collaborate Worry and distress concerning organizational functionality due to lack of time to exchange information, learn and plan ahead Knowledge management has potential to create value for organization through interaction and networking
Question 5a	Knowledge assets are seen mostly as the know-how, to some extent the documentation as well
Question 5b	Knowledge capture and sharing does not occur routinely, although there are some ideas how to do this
Question 6a	There isn't much collaboration on operative level between teams and units The importance of networking has been recongnized, but it does not occur widely due to insufficient enablers, networking is concentrated to operational contacts SMO as a central function is widely noted as a beneficial contact
Question 6b	Knowledge is captured generally for short-term needs in an non-organized manner and without a possibility to store it properly for reuse Threre has been identified a problem with the KM activities supporting only short-term activities withing a small network of members, mostly due to insufficient time
Question 6c	Prioritization of contacts within the organization has not been widely considered

- Question 7. Members recognize the needs and benefits of well-planned and executed knowledge exchange in order to successfully carry out responsibilities
Recognized need to have informal discussions with wider network to reflect and learn
- Question 8. There are several challenges originating the way units are being managed, as there isn't generally mandate to carry out any improvements on SDM/DCS area, nor culture, transparency or trust supporting KM
The organizational roles and responsibilities are unclear
- Question 9. The transformation affects units and teams unevenly, the experiences this far show growing knowledge exchanges and alignment with Customer KM approach
- Question 10. The transformation is expected to bring more collaboration, transparency and reduce risks related to knowledge gaps
- Question 11. Members identify the need for a comprehensive cultural change with properly organized knowledge management as a tool for enabling efficiency and other improvements
- Question 12. Everything except direct billable work is treated as less valuable and low-priority work

Appendix 3. Questions for document review and analysis

#	Questions / issues to be investigated
1	Evidence of Knowledge Management processes, activities and tools
2	Evidence of unit or team level objectives, arrangements, routines or guidance for Knowledge Management
3a	Evidence of KM practices in the organization
3b	Evidence of Knowledge Management tools
4	Evidence of knowledge capture, knowledge sharing or retention in the organization
5a	Business critical knowledge or knowledge assets defined
5b	Evidence on the knowledge exchange in the organization?
6	Evidence of KM-related networking among organization
7	Evidence of challenges regarding KM in the organization
8	Evidence of agile operating model affecting KM practices or requirements
9	Evidence regarding KM related risks or opportunities

Appendix 4. Document review analysis units

Questions	Synthesis of the analysis units
Question 1	No evidence of actual KM framework, only few intentional KT activities within processes.
Question 2	No evidence regarding KM objectives, some knowledge processing routines or occasional activities exist Activities exist only because of required interaction with customer
Question 3a	Only few knowledge sharing activities among processes In general there isn't steering or management activities facilitating KM
Question 3b	No designated tool, available tools do not seem to support KM very well
Question 4	Very little evidence supporting KC or KT
Question 5a	Knowledge assets have not been identified, identification principles of categorization for KAs have not been created
Question 5b	On certain areas recurring meetings act as platforms for knowledge exchanges
Question 6	OM or attached documentation does not contain evidence of employee networking taking place in the organization; no mentions, suggestions, links etc. to communities of practices or
Question 7.	No direct evidence of challenges. KM initiative on customer
Question 8.	No evidence or reference at all regarding changes in operating model
Question 9.	No evidence at all regarding KM related risks or opportunities