Proactive Competence Development in Technical Services

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Abstract

This study aims to improve competence development within a Technical consulting Services business. As it stands, competence development is not proactively managed in the case company. The objective for the study is to identify issues related to the current ways of operation and propose improvements to the development of competence in order to stay proactive.

This study is mainly of a qualitative nature. In the study data is collected through a survey and interviews. This data is then reviewed and compiled in order to form a AS – IS analysis of the current state of operations. This data is then combined with best practices retrieved from a literature review in order to form an improvement proposal.

The outcome of the study is a proposal for improvements to the competence development within the case company. The foundation for the proposal originates from a Knowledge Management value chain which has four distinct areas, knowledge identification, knowledge storage, knowledge implementation and knowledge application. The outcome of this study will aid the case company in staying proactive to incoming required knowledge, resulting in an increased efficiency, reduction of potential cost spent and provide an increased level of adopting new competence with a higher job satisfaction of their employees.

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Contents

1. Introduction

Providing high quality products and solutions to marine- and power plant operators is one of the bigger targets of the case company in focus for this study. In order to prevail at this, the capability to deliver not only quality products but also quality services, is required.

Quality and competent service functions is the key for building customers' confidence and establishing long-term relationship with the customer.

Providing this high-quality service to both external customers as well as for internal resources requires in addition a highly knowledgeable technical support team. The support function in the case company needs to be up to date in terms of knowledge and information, while also maintaining the current knowledge and information on older products and solutions still in need of support. In order to ensure that technical support functions are equipped with the latest knowledge required to support the different products and solutions, a crucial part in the big picture is the transfer of knowledge and competence between the original source(es) of the new technologies to the technical support teams.

In today's industrial market it's not only common, but perhaps expected, that companies providing products or solutions continuously tries to enhance their products in order to stay ahead of the competition. Another driver behind this continuous strife for improvement is the ever-changing market that continues to put further and further restrictions and legislations on the case company's products. For a company relying on technical expertise and technical support to aid both internal and external clients when desired or required, the ever-changing portfolio of products and systems presents an additional issue in terms capability and coverage when it comes to providing competent support.

To keep up with this demand of competence the supporting functions are most often than not given a buffer time ranging from product development to product sales and final installation. As the development teams collect competence of the new release as part of the development process the key for the supporting technical teams is to capitalize on this available competence and to implement it in the most efficient way possible. To that end, this thesis investigates the current way of operating within the supporting teams, when it comes to new required competence and proposes improvements based on in-depth literature review and data collected from participants.

1.1 Case Company Background

The case company considered in this study is a provider of both products and complete solutions for both the marine and energy markets. It has its global headquarter in Finland with regional headquarters located worldwide in 70 different countries. In 2020 it had approximately 18.000 employees. As indicated by the introduction this study will focus on a specific business area of the case company, dealing mainly with technical support for internal and external clients. This prioritized business area within the case company is called Technical Services (TS). Technical Services is a branch of a larger division within a global energy supply company. As described in the official company statement;

Technical Services is one of the most important technical knowledge centres within the company, supporting technically internal and external stakeholders during the whole life cycle of the products, solutions and services delivered or serviced by the company. Technical Services offer specialized technical services like component investigations, calculations, measurements services both for internal and external customers. Technical Services maintains, develops and makes available technical knowledge in an efficient and effective way for the benefit of the end-customers to several stakeholders in the Business. Technical Services has a key role in improving product quality and securing customer satisfaction with collecting and sharing feedback from the field. Technical Services participate in the development of new products by sharing experiences and expertise from existing products and on technical life cycle support. (Internal Documentation, 2019).

In other words, the business area is mostly responsible for maintaining and distributing technical knowledge both internally and externally in the company. Additionally, they are also responsible for developing new technology for life-cycle products, along with trouble-shooting technological issues. In order to also improve product quality, they perform continuous warranty screenings in order to identify non-reported issues or trends with the end goal of reducing warranty costs.

1.2 Problem formulation

In the present, there is a widespread indication that the Technical Services support is not up to par with new technology development, or at least not on the level that it used to be in the past. The core issue that the organization might face if the product and system support is not in place at the right time is a loss of time and working hours. If the supporting functions aren't aware of how new technology is designed to operate, they run the risk of having to "lean on the fly", causing unnecessary costs and time spent on solving issues. A gain in product and system knowledge could potentially solve these issues in a timelier manner or alternatively mitigate them completely before they even get out to the operators in the field. In the eyes of the customers and operators a well-trained and briefed supporting function can also build trust and entice the customer to stay with the company instead of opting for rival solutions for future projects.

As the Technical Services, as earlier mentioned, also are responsible for screening field issues they will also have to take unforeseen issues into consideration, such issues that, no matter how well you might know and understand the new products or systems, you cannot foresee or understand. This is a known fact that we just must accept as it is. What we can alter however, is the preparedness of the supporting function. If the supporting function has a high competence when it comes to introduction of new products or systems, any potential failures will be easier to manage. With a sound approach to adapting incoming new technology, the Technical Services function can stay proactive in their way of working instead of acting reactively.

The case company experience also suggests that customer and operator cases are often escalated from the supporting functions to the developing functions whenever new products or systems are taken into use. While some support from the developing function in the organization always might be needed to some extent, the potential to cut down this required effort would save time across the whole organization. One of the reasons behind the issue (acknowledging that there are several other factors in play) is the transfer of knowledge from developing teams to the support function. As of today, there are large variances on how this information flows thorough the organization and input sources tend to vary.

1.3 Objective and Outcome

The objective of this study is to create a proposal to improve the competence of Technical Services, when it comes to new introductions of products or systems. Instead of just being aware of new incoming technology the target is to be prepared for the required support of said technology.

The scope of the study is a competence management model related to the case company support function (TS). In order to achieve this, the study will establish both a AS - IS (also known as a CSA = Current State Analysis) and a TO - BE model of the ways of working. The goal of the model will be to establish proposal ideas and describe how the study can get from the AS - IS model to the TO - BE model in the most feasible and comprehensible way possible.

By achieving this objective, the study will help to increase the profitability of the supporting functions and reduce total costs spent on solving early identified issues in the field.

1.4 Limitations

The focus of this study is in identifying and implementing new required competence within Technical Services L2. By the specific mentioning of L2 ("Level 2") it is indicated that there are different levels to the Technical Services function within the organization. In addition to L2 there is also a L1 distributed on a larger scale globally in order to offer support on a local level when required. The root cause behind specifically focusing on L2 is that their function within the organization is to operate as the first point of contact for new information and especially information categorized based on specific products- or systems. Additionally, Technical Services L2 are divided into different function based on their respective competence area. This study will focus on most of these focus areas while selectively leaving out a few areas in order to manage the scope of the study. The focus areas left out was agreed upon by concerned stakeholders before the initiation of the study and will thus not be mentioned here. The focus areas that will be in the scope of the study are Ancillary Systems, Engine Automation and 4-stroke Products within Technical Services L2. From here on, whenever Technical Services are mentioned, it is assumed that it refers to Technical Services L2.

2. Method and Material

This chapter discusses the methods and the material used to collect the data for this thesis project. The chapter describes the research approach, research design and highlights aspects such as why the methods where chosen, along with their respective validity and reliability.

2.1   Research Approach

This research is made, mainly as a qualitative case study, which is a method that is used to describe the complexity of the subject of study by investigation and analysis. Engaging in systematic inquiry about your practice involves choosing a study design that corresponds with your question. The qualitative research defines the methods and techniques most suitable for collecting and analyzing data. (Merriam & Tisdell 2016, 2)

Qualitative types of research use several methodological approaches based on diverse theoretical principles. It employs methods of data collection and analysis that are non-quantitative, aims towards the exploration of social relations and describes reality as experienced by the respondents. Qualitative research methods have long been used in the field of social sciences. For instance, these are the principal methods employed by anthropologists to study the customs and behaviors of people from other cultures and are also used in such diverse areas as sociology, psychology, education and cultural studies. These methods have much to offer in studying people and their daily lives in business and home. (Adams, Khan & Raeside 2014, 3)

Above mentioned studies are usually dependent on context to its research, which mostly relies on qualitative data. As stated, case studies are used to describe the complexity of the subject, which can be difficult to describe with quantitative data. Qualitative data is used to describe or express the data by natural language description while quantitative data express the result in terms of numbers.

Normally the case study is initiated with the determination of the research question, which already has been formulated in earlier chapters. Once the research question has been established, it is necessary to select the case and the data collection and analyse techniques. In this thesis the study is made through qualitative research which aims to establish the current approach to proactively attaining knowledge within the case company. The study includes a total of 4 individual within the company functioning as consultants and supportive figures for the work, with an additional 15 managers from different countries targeted directly by the study.

2.2 Research Design

The research design of the study, presented below in Figure 1, is based on the logic of the case study. Here the main goal of the study is defined at the earliest stage of the project. As been mentioned before, the main goal for this study is to create a proposal to improve the competence of Technical Services, when it comes to new introductions of products or systems.
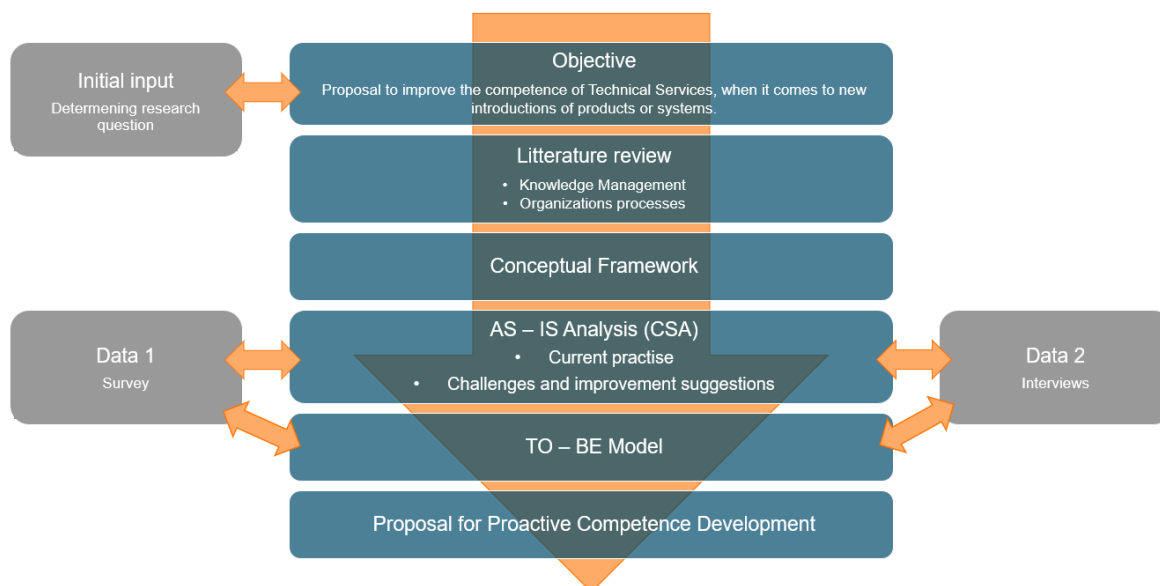
Figure 1. Research design of the thesis. (Own Figure)

To further elaborate on Figure 1, the identification of the objective is the starting point of the whole project while the study itself is formally initiated by the literature review. The goal of the literature review stage is to first and foremost familiarize with the literature and the topic itself. This will then aid the research down to line and ease the establishment of both AS – IS analysis and the TO – BE model.

In the literature review, focus is put on both knowledge management and the organizations own processes, both on current practices as well as on potential best practices when it comes to other similar or equivalent work and material. The literature review will then create the foundation for the conceptual framework. Once the conceptual framework has been established, it also helps formulating both the survey- & the interview questions for both to be used to map the current state of competence development within Technical Services.

One important part of both the survey and the interviews will also be to not only establish current ways of operating but also to highlight the issues and the good aspects with the current ways of operating. To also put the data points in logical order the survey (represented as Data 1) will be the first step in the data collection process. Once completed and analysed the data collection will provide deeper knowledge on the state of the current ways of competence development in the organization. Additionally, based on the results from Data 1, the interviews (represented as Data 2) will be formulated for any potential open issues and questions. Also, the target scope of the interviews will be based on both initial agreed scopes covered by the Initial input as well as on results from the survey itself. The results from both

Data 1 will primarily be utilized to establish the AS -IS analysis, while the Data 2 will be used to establish the TO – BE model. Later, for the TO – BE model specifically, the best practise derived from the literature review combined with the AS – IS analysis will be used to create the improvement proposal for the proactive competence development. In addition, it should also be noted that short discussions outside of the Data 1 and Data 2 have been made to cover certain gaps and unclear issues along the way, however, for convenience sake these are not illustrated separately in Figure 1 but is rather seen as being a part of Data 2.

2.3 Survey data Collection and Analysis

In this study, the data is collected in two sessions (Data 1 & Data 2) as highlighted above. Data 1 includes a survey for TS Line Managers & Team Managers in accordance with the pre-determined scope of the study. Data 2 features interviews for a select group of individuals with questions based both on the results of the Data 1 results as well as tailor-made questions for their specific role within the company. As both these data sets are mainly based on qualitative data there will be several similarities between the collection and especially the analysis. Since the layout still differ due to the different nature of data collection, they will be split into two different sub-chapters, starting off with Data set 1.

2.3.1   Survey data collection

The first set of data is gathered through a questionnaire featuring some initial points of quantitative data mainly seen as categorical data to start of the survey and categorize the respondents into different expertise areas. After this the main focus point of the survey introduces the qualitative data points using open-ended questions. The open-ended questions are most crucial as this gives the respondent the possibility to give their own divergent response to the different questions. The survey itself was initially drafted and reviewed among the 4 persons functioning as consultants in this project before proceeding. After the review the agreed upon questions where put into Microsoft Forms as this platform offers an enough base to both create the survey and collect the data. As Microsoft Forms is a tool frequently used within the case company, the familiarity to the platform among the respondents was seen as a strength. The design and layout of the survey itself followed guidelines originating from the literature review. The questionnaire must be designed with the specific research objectives in mind. The style in which questions are asked varies from one person to another and from one research topic to another. Therefore, the majority of questionnaires is, at least in part, custom made. Because research objectives are unique to every study and questions are influenced by them as well as by data collection methods, there is no standard procedure in the development of a 'successful' questionnaire. In addition to asking the right questions to the right people, you must also consider the question styles and design layout. Therefore, questionnaire design is often considered an imperfect science. Having said that, there are logical steps and wording principles that you need to follow in order to produce a well-structured questionnaire. Figure 2 introduces the questionnaire process model for design. (Ekinci 2015, 77).

Questionnaire design process   **Questionnaire design principles**

Step 1: Determine the required information and the target respondents	Revisiting study type, research objectives and the theoretical framework.
	Translating research objectives and theoretical framework into data requirements.
	Determine the questionnaire administration method, target respondents and data analysis method.

Step 2: Prepare a draft questionnaire	Decide on the purpose of each question.
	Decide on the type and form of each question.
	Decide on the questionnaire language and wording.
	Decide on the type of measurement scales.
	Evaluate questions on the basis of comprehensibility, knowledge, ability and willingness to respond.

Step 3: Determine the sequence of questions and layout of the questionnaire	Determine the question order and physical appearance of the questionnaire.
	Determine the questionnaire length.
	Determine the introduction to respondents.
	Determine the return instructions.

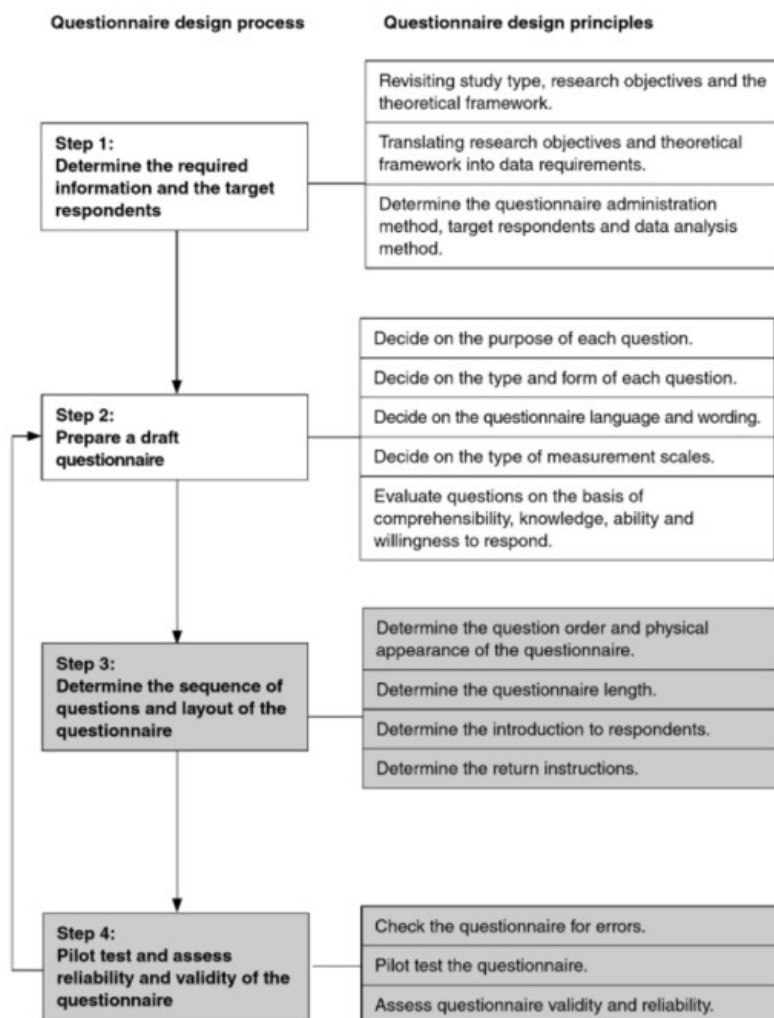| Step 4: Pilot test and assess reliability and validity of the questionnaire | Check the questionnaire for errors. |
| | Pilot test the questionnaire. |
| | Assess questionnaire validity and reliability. |

Figure 2. The process and principles of questionnaire design.
Source: (Ekinci 2015, 76 [Figure 4.1])

Step 1 from Figure 2 contains topics mostly covered by this chapter. In short the research objective is to identify both what Technical Services do today and what they should be doing when it comes to acquiring future required knowledge that may or may not require development of new competence. The format type is briefly explained as a study which will involve both closed-response questions (i.e. where you work, which product etc.), and open-response questions (i.e. in your own words, how should we achieve results). The theoretical framework (Cases and Variables) consists of TS L2 Managers targeted with closed and open questions concerning competence development in Technical Services. Finally, the administration method is best explained as a self-administered one, or perhaps better explained as an interviewer administered survey. This means that the interviewer manages both the input and execution of the survey as well as the collection of the data.

Steps 2 & 3, consisting of both the draft for the survey as well as sequence of questions and the layout of the questionnaire was conducted with the end goal of the project in mind. As such the majority of the questions are asking questions such as "what we are doing today", to establish the AS – IS. In order to then later on establish the TO – BE model, questions such as "what is working well / not working today" with the addition of "what would you like to change" are asked as this highlights the targets that the TO – BE model should aim

to achieve. By asking what is seen as a poor function of today's way of operation the study can also avoid potential pitfalls and errors that could otherwise lead the outcome of the final model into the wrong direction. To further visualize the process behind the survey layout as well as the difference in closed and open-ended questions, see Figure 3 below. Figure 3 also highlights the intention with the closed questions further with their intention being specifically categorical, in other words, used primarily in order to later filter the respondents if needed. The open-ended questions again are used as the primary source of input for Data set 1.
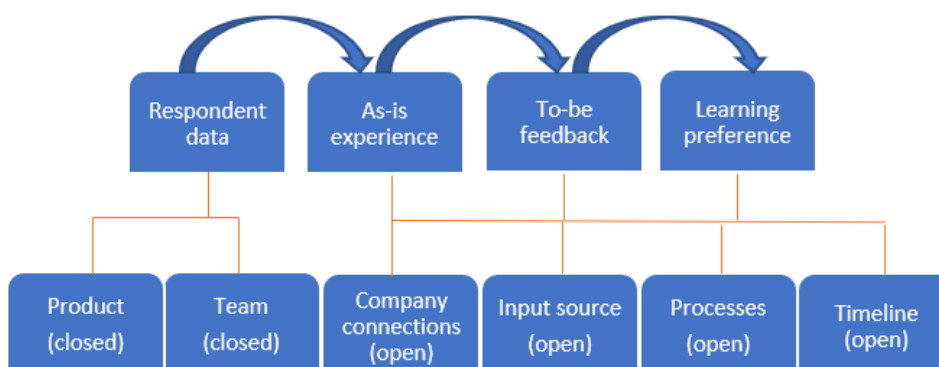

Figure 3. Schematic diagram of theoretical framework for the survey. (Own Figure)

As for the final step in the design process of the survey, Step 4, the finalized survey was sent to one of the 4 supporting individuals that had a consulting role in the project. The survey was proof-read by two different individuals before a final test of the complete survey was conducted.

Going into specifics of the survey content, the survey initially features a section of foreword. The purpose of this is to give the respondents a breif overview of purpose, scope and terminology of the questions to come.

The survey is created to establish an overview of the current environment of competence development and needs within TS L2. The result of the survey will be used to further standardize how TS L2 should operate in terms of identifying and promoting new required knowledge and competence within the concerned teams.

When answering the survey, keep the following in mind: The survey will be focusing on knowledge and competence; therefore, it should be clarified that the knowledge and competence in this case refers to technical knowledge and competence. In other words, skills such as linguistic-, written-, or administrative skills can be neglected. In this survey, both new knowledge and new competence will indicate that it is a skill not yet established and that it will, to some degree, require development of knowledge (i.e. on the job training / external training / attending factory / pilot).

Terminology:

Knowledge – Theoretical knowledge of systems or products.

Competence – Knowledge put into action, competence is knowledge including both theoretical and practical abilities.

TS – Technical Services.

TS L2 – Technical Services Level 2.

Team – The team the manager is currently responsible for.

For the questions themselves, they can be found listed below in Table 1. At this point, as the focus is still only on the layout, the response options for the closed questions as well as for the Likert scale questions will be left out of Table 1. For further details on these, please see Appendix 1 (due to case company sensitive material this Appendix will not be included in the published version), where both visualization, response options as well as results as given from Microsoft Forms are listed. Concerning the closed questions there are all similar in the sense that they have a set number of response options relevant to the question asked. This is true for all the closed questions except for questions number 3, 5 & 6. The reason behind this is that these specific questions feature a possibility to answer an optional question that can be filled to the respondents own liking, resulting in it being a possible open question, hence it's given a question type description of "Closed + optional open".

When it comes to the Likert scale questions number 22 & 23, the response scale used in the survey presents the respondent with a scale of 1-5 ranging from "Not familiar at all" to "Very familiar" and "Unclear and Undefined" to "Well executed and fulfilling".

Question number	Question type	Question description
1	Closed	Where are you currently situated (home base)?
2	Closed	How long have you been working in Technical Services?
3	Closed + optional open	Which product or system is your main focus area?
4	Closed	How many resources are currently reporting directly to you?
5	Closed + optional open	From where does TS L2 get input on potential future required competences? Select the most relevant options.
6	Closed + optional open	Referring to question no. 5, in which form is this input usually given? Select all relevant options.
7	Closed	For portfolio products, how often do you experience that TS L2 are exposed to new knowledge or competence that will require training to ensure both internal and external support?
8	Closed	For non-portfolio products, how often do you experience that TS L2 are exposed to new knowledge or competence that will require training to ensure both internal and external support?
9	Open	Identifying new knowledge: Using your own words, how would you describe the current ways of identifying new competence needs that will be required for the future?
10	Open	Identifying new knowledge: Regarding question number 9, describe what has been working best with the current ways of identifying new competence that will be needed for the future?
11	Open	Identifying new knowledge: Regarding question number 9, describe what has been the biggest challenge with the current ways of identifying new competence that will be needed for the future?
12	Open	How would you like to change the current ways of identifying new competence that will be needed for the future?
13	Open	Building up new knowledge: How would you describe the current ways of building up new competence that will be required for the future?
14	Open	Building up new knowledge: Referring to question 13, what is the best aspect of the current ways, when building up new competence that will be required for the future?
15	Open	Building up new knowledge: Referring to question 13, what is the main challenge with the current ways of building up new competence that will be required for the future?
16	Open	How would you like to change the current ways of building up new competence that will be required for the future?
17	Open	As a manager, how do you ensure that new competence is developed and maintained in your team?
18	Open	Based on your answer in question 17, explain what you see as the biggest challenge with this method.
19	Open	In your own experience, how long does it take from introduction of new knowledge, to TS L2 being able to support internal and external clients on said new knowledge. (Note that this might vary heavily dependent on type of new knowledge, but please give your best average estimate.)
20	Open	Feel free to provide a practical example in reference to your answer in question 19.
21	Open	As a practical example; List some of the competences in your expertise area you are aware of, which will have to be developed in the near future.
22	Likert scale	How familiar are you to the MB Develop-to-Market process that is used for introducing new products to the market?
23	Likert scale	In your own opinion, how well is the Develop-to-Market process executed?
24	Open	Apart from the Develop-to-Market process mentioned above, are there any other potential processes that needs to be considered when it comes to the developing and ensuring competence within TS L2?
25	Open	How does your team get involved in new technology development processes?
26	Open	How often have you or someone from your team been involved in any of the above-mentioned processes?
27	Open	In case there has been involvement from TS L2 in new technology development processes, do you know at which stage of the development?
28	Closed	Using the Develop-to-Market as a guiding process description of new product development (see simplified process overview below), at which stage of the process do you feel TS L2 should be involved to ensure new required competence for the future?
29	Closed	What would be the earliest suitable time for TS L2 to get involved in the Develop-to Market process, to ensure new required competence for the future?
30	Closed	What would be the latest possible time for TS L2 to get involved in the Develop-to Market process, to ensure new required competence for the future?
31	Open	Based on your answer given in question 28, what do you feel TS L2's role in this stage should be?
32	Open	Based on your answer given in question 29, what do you feel TS L2's role in this stage should be?
33	Open	Based on your answer given in question 30, what do you feel TS L2's role in this stage should be?
34	Open	Concerning the role of TS L2, is there anything you would like to change with the Develop-to-Market process?
35	Open	Feedback or other comments?

Table 1. Overview of survey questions. (Own Table)

To further elaborate, the survey questions, several process questions refer to something called the Develop-to-Market process (DTM). The DTM is wah the case company today uses as its main guiding process to incorporate new products and systems into its portfolio. The Develop-to-Market process is one of the main processes identified during the litterature review that was seen as the focus point for development processes. As the litterature review also found additional processes describing similar, but not eqivalent ways of operation the survey also tries to identify other options, one of the resons behind questions number 24.

For questions 28 -30, the survey in Microsoft Forms also utilizes a visual description of the Develop-to-Market process, presented below in Figure 4. The main focus of this visual description is to highlight the different design tasks that are gate dependent. This is included in the survey as an aid, as without it, it could be challenging for the respondents to know the full extent of the DTM process. It is also likely that the respondents does not know what different process gates do and what their purposes are. The visual description of the DTM in the survey tries to mitigate any of these issues.
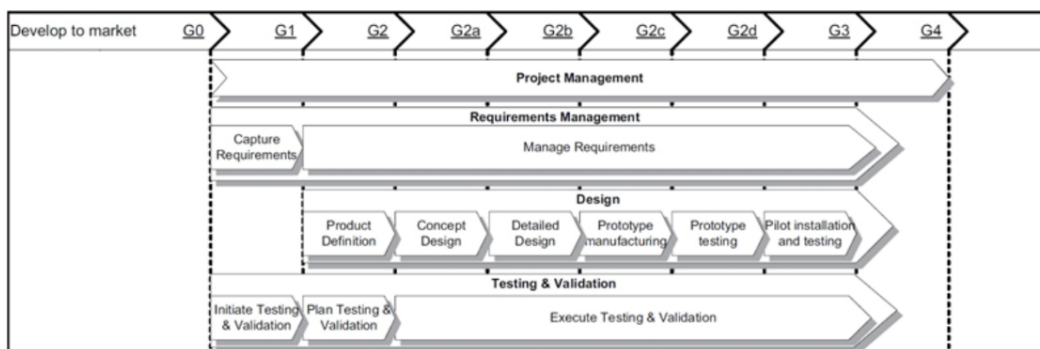

Figure 4. Illustration of the Develop-to-Market process.
Source: Develop-to-Market process description. (Internal documentation).

2.3.2 Survey data analysis

Data analysis is the process of making sense out of the data. And making sense out of data involves consolidating, reducing, and interpreting what people have said and what the researcher has seen and read — it is the process of making meaning. (Merriam, Sharan, & Tisdell 2015, 202)
As the survey in question features most open-ended qualitative questions the challenge will be to convert these responses into data that will be easier to digest.

To start the analysis the qualitative data must be prepared— in the scientific method this is inevitably reductionist. All the observations, inflections in tone and the way words were combined can't be captured. But you try to keep as much as possible (Adams 2014, 153). In accordance to the above mentioned the raw data was withdrawn from Microsoft Forms and converted to Microsoft Excel as well as to Microsoft PowerPoint to give the full survey a more presentable view.

The results from the raw data can be found in Appendix 2, while a summary of converted data can be found in Appendix 3 (due to case company sensitive material these Appendices will not be included in the published version). Taking gained knowledge from the literature review the aim for the survey data analysis will be to find the most suitable approach for analyzing qualitative data, as earlier mentioned, the data gain from the survey mostly consists of open-ended, and thus qualitative, answers. A more recent approach to qualitative analysis is gaining popularity in research is Framework Analysis. In contrast to grounded theory, Framework Analysis was explicitly developed in the context of applied policy research. Applied research aims to meet specific information needs and provide outcomes or recommendations, often within a short timescale. Framework Analysis shares many of the common features of much qualitative analysis, and of what is often called 'thematic analysis'. This can be important in many applied studies, where there are specific issues that the funders or other stakeholders want to be addressed. (Lacey & Luff 2007, 13)

This concept if further supported by Adams, Khan & Raeside, (p, 157), where the key points of the Framework Approach are described:

- Familiarization of data.

This part of the framework approach involves immersion in the data in order to gain an overview of the dept and diversity of the material.

In practice, as the survey in question had 14 respondents and since the survey was self-administered one (interviewer administered) the base knowledge of the questions along with the low quantity of respondents led to the familiarization being quite manageable.

- Creating a thematic framework.

Having identified a number of key themes at the familiarization stage, these are examined in further detail with a view of setting up a theoretical framework or index.

For this study the creation of a thematic framework led to the reduction and interpretation of data (Adams 2014, 153) while trying to ensure that any interpretation is grounded in the original response.

- Indexing.

The next stage involves applying numerical values to the data. The numerical values given based on the interpreted data was based on reoccurrence per question. In other words, trying to establish common trends through the responses given. An example of this can be seen in Table 2.

Question #15		
Building up new knowledge:		
Referring to question 13, what is the main challenge with the current ways of building up new competence that will be required for the future?		
Response #	**Original response**	**(Key theme) & Interpretation**
1	Lack of budget and cost restrictions (especially when trainings require travelling).	(budget / training) Budget and trainings
2	without new knowledge we can't support our business in accurate way.	(training) Difficulties supporting our business in a accurate way.
3	competence should be part of development process	(training) Competence not part of development processes.
4	More learning and understanding before the products are on field are required, we cannot make mistakes when introducing a product, when something new is coming we need to be ready.	(training) Not enough understanding of new products and solutions when introduced.
5	Too many people are too short sighted.	(short sighted) Too many people are too short sighted.
6	Big effort and responsibility on technician shoulders.	(individual effort) Too big responsibility on the individual technician.
7	We need more resources in order to give everyone time to focus on building expertise for new technologies. It can only be done in cooperation with R&D and the laboratory and one of knowledge sharing sessions is not enough to make anyone an expert.	(lack of resources) Lack of resources to be able to participate in new development.
8	Learners start focusing on other stuff due to priority = lack of resources	(lack of resources) Lack of resources, cannot keep up with development due to
9	It requires time and involvement from the whole team.	(lack of resources) requires time and involvement from the whole team.
10	The bad part is that it is not so structured or tight. This can lead to sub optimizing: we train for what is not needed at the same time when there is high demand for certain skills that may take Years to acquire. Too tough restrictions on training budgets and especially OJT costs.	(training / budget) Unclear guidelines and no structure. We don't know what we need to train for in advance. Too thigh budget results in trainings / OTJ suffering
11	Resources, we have existing systems and we get more and more new systems to support. Recent product introduction was a good example as the team was established and had time to focus on the development and introduction of the new engine = in EA team it was "part of work for existing team" Today we also have a challenge that we do not have direct contact persons within A&C (R&D) meaning that we do not have anyone to direct our questions to. This will also put more challenges to learning new systems (depending on A/C way of working)	(lack of resources) Lack of resources, we keep getting new systems while having to support old ones. W31 example poses issues specific for EA.

Table 2. Example description of interpretation and indexing of data. (Own Table)

- Charting.

Distilled data summaries can now be charted according to "coded" text given numerical values. A similar example as provided above can be seen specifically for the charting in Table 3. In this specific study it allows the analyst to build up a picture that is easier to interpret and get an overview of in comparison to the original data. Note that Table 3 features a side note concerning the pro-rated values of the numerical data. The reason behind this is that not all questions received a full response rate, with some questions simply being replied to with a "-"(dash) or similar. Hence the numerical value within the parenthesis gives the true numerical value for said key theme, while the initial value most of the time will exceed 100% due to the lack of a complete response rate for certain questions.

Key themes from question #15
Training: 45.5% (38.5%)
Lack of resources: 36.4% (30.8%)
Budget:
18.2%
(15.4%)
Individual effort: 9.1% (7.7%)
Short sighted: 9.1% (7.7%)

*(x%) = Pro-rated value to fit 100% scale

Table 3. Example of key theme charting. (Own Table)

- Mapping and interpretation.

The final stage in this process of analyzing qualitative data is about interpreting the data and making assertions. The analyst reviews the research, compares and contrast perceptions, accounts or experiences and searches for patterns and connections that will help explain the phenomenon under study.

Based on the outcomes of the mapping and interpretation, it was possible to establish the AS – IS analysis and create of visual description of the current state of the proactive competence development within the case company.

2.4 Interview data Collection and Analysis

As previously mentioned, the data for the study was collected in different stages and in two different manners. One being the survey represented by Data set 1, the other being the interviews, represented by Data set 2. While both feature a similar kind of qualitative data, they will still be given different chapters as the collection and analysis of each of them differ to some degree. As previously dealt with in the previous subchapter dealt with the collection and analysis of the survey Data set 1, we will now naturally continue by looking deeper into the interviews. Note, since a fair share of qualitative data analysis already has been covered this sub chapter will be a bit shorter than the previous one, as this chapter will focus more on the practical approach of the collection and analysis of qualitative data.

2.4.1   Interview data collection

The second set of data is gathered, as mentioned, through interviews. Despite the practical difference to layout and data collection, the interviews also differ in terms of target interviewees. While the survey only targeted TS L2 resources the interviews target both TS L2 sources as well as "external" resources outside of the TS L2 organization. It should still be pointed out that all "external" sources still are employed by the same case company, but they all represent different organizations with different expertise areas.

This process (interviews) is typically slower and more costly than surveys and it fails to benefit from the power of synergism that can be obtained from focus groups. Interview styles run the gambit from highly structured to completely open-ended with the informant having great freedom when providing responses. Interviews can collect a variety of qualitative, quantitative, and objective information. Typically, the investment in money and time is relatively high per informant contact, but the richness of information gathered can make interviews a good choice. (Walle 2015, 69) It is this added richness in information that is one of the core ideas with also implementing interviews into the study as well. The benefit the project can gain is one of in-depth answers along with potential clarification on earlier survey questions, if needed.

The interviews themselves are of a semi-structured nature used to further establish current ways of operating and potential flaws in the case company. The interviews were conducted via remote meetings through Microsoft Teams. The full scope of the interviews consisted of 8 interviews with 11 interview participants from 3 different countries.

The target for the different interviewees where initially reviewed already during the planning for the scope and limitations of the study. Based on further input from the survey itself, especially question number 5 (From where does TS L2 get input on potential future required competences?) the target interviewees could be established to cover both necessary interviews internally from TS L2 and externally from the most influential competence development input sources. Table 4 highlights the details of the interviews that where conducted during this study.

Participant function	Topic	Duration	Date	Documentation
Ancillary systems	Auxiliary support functions + Competence input source	63 min	14.6.2021	Notes taken during the interview + recording of the interview
Product management (2 interviewees)	Relations with TS + Competence input source	52 min	14.6.2021	
Automation and control (2 interviewees)	Relations with TS + scope of Tuning center	85 min	15.6.2021	
4-stroke Finland	Competence development + Process related discussion	72 min	17.6.2021	
Engine Automation	Competence development + Process related discussion	70 min	16.6.2021	
Research & Technology Development	Develop-to-Market Process + Gate checklist	52 min	21.6.2021	
4-stroke Italy	Competence development + Process related discussion	58 min	23.6.2021	
Research & Technology Development (2 interviewees)	Relations with TS + core team functions of the Develop-to-Market process + Competence input source	84 min	9.8.2021	

Table 4. Summary of interviews. (Own Table)

As seen from the Table 4 above the interview participants (interviewees) represent different organizations and different areas within those organizations. Due to the nature of the interviewees different roles the topic also varies accordingly, although some topics are similar to each other on a general level. Most of the interviews lasted approximately one hour each with some even getting close to 1 ½ hours long.

Most of the data collection took place around the same time of the year and the data was stored both as a written text file as well as a MP4-file containing the whole interview, serving mostly as a back-up of information. The topics for the interviews were based partly on the pre-literature reviewed during the literature review. A big part of the origin to the questions asked were also based on the data retrieved from the survey. This is especially true for interviewees working within TS L2 as the nature of the interviews hands an opportunity to further elaborate on certain survey answers.

2.4.2   Interview data analysis

The data collected from the interviews was initially analyzed by reviewing the written material and by listening to the recorded interviews. In contrast to the survey data utilizing Framework Analysis, the data collected from the interviews were in no direct need of deep analysis as the nature of the questions were direct. Since the majority of the survey data already had been analyzed the questions of the interviews could be more specific, with the end goal of filling potential gaps needed for the finalization of the AS – IS analysis as well as the creation of the TO – BE model.

In conclusion, based on the outcome of both the interviews and the survey, it was possible to gain an overview of the current way of operation, create a visual representation and describe the current state of the competence development in Technical Services. Additionally, both Data sets finally led to the improvement proposal visualized by the TO – BE Model.

2.5 Validity and Reliability

For every study the validity and the reliability serve as an assessment made to reinforce and ensure that the research is acceptable, and it meets the requirements of the research method. (Saarela 2016, 16).
The important part to consider for this work, concerning both survey and interview, is to maintain the validity which easily can be hard to do considering the qualitative data along with the earlier mentioned data analysis, based on interpretation. This interpretation, while done according to the best capability of the researcher, needs to be continuously validated to ensure that the interpreted data stays as true as possible to the original respondent's intention.

Validity deals with the question of how research findings match reality. How congruent are the findings with reality? Do the findings capture what is really there? Are investigators observing or measuring what they think they are measuring? Internal validity in all research thus hinges on the meaning of reality.
(Merriam, Sharan, & Tisdell 2015, 243)

Reliability refers to the extent to which research findings can be replicated. In other words, if the study is repeated, will it yield the same results? Reliability is problematic in the social sciences simply because human behavior is never static.
(Merriam, Sharan, & Tisdell 2015, 250)

Furthermore, scientific and quantitative researchers seek to control the procedures of research in order to demonstrate that similar experiments will have similar results. This is one view of consistency. Scientific experiments simplify reality for the sake of rigor, but much qualitative research (and the environment in which it is conducted) is very complex and controlling all relevant variables is impossible.

Qualitative and humanistic researchers want to know if informants consistently acknowledge that something took place. This measure is different from those used by scientific and quantitative investigators. (Walle 2015,140)

In this study one of the main indicators of validity will be the outcome of the key theme charting itself. By confirming that multiple sources indicate the same thing the study can with greater precision assume that both the original intent of the respondent, as well as the correct answer(s) to the questions can be retrieved. When it comes to the reliability and consistency of the survey and the interviews, it will firsthand be ensured by implementing commonly used practices of qualitative data analyses. The origin of this knowledge originating from the initial literature review. Additionally, both the reliability and consistency of the study goes hand in hand with the validity. Without proper validity, reliability and consistency can't be achieved.

3   AS – IS - Current State Analysis

This chapter will describe the outcome of the AS – IS model, which will depict the current state of competence development within the Technical Services organization in the case company. The chapter will initially give an overview of the input to the analysis, how it's been interpreted and then finally the results.

3.1 Input for the CSA

As earlier mentioned, the AS – IS analysis utilizes the survey results to form an in-depth picture of the current situation, when it comes to competence development in Technical Services. The main goal of the survey was to try and get the respondent to elaborate further on crucial topics. One example of this is question number 9, earlier presented in Table 1:

- *Identifying new knowledge: Using your own words, how would you describe the current ways of identifying new competence needs that will be required for the future?*

The initial question tackles the topic directly. The idea with the initiating question is that it first makes it clear for the respondent that this concerns an open-ended question. The respondents own opinion, written with his or her own words is what is at the core of the question. Secondly, the question itself focuses on current ways of working, something that will be directly implemented into the AS – IS analysis. The question is then wrapped up by further elaborating that the competence requested is one that isn't needed now but will be in the near, or far, future. As seen from the Table 1 there are also several follow up questions based on question number 9, among others. These however will be further reviewed when the input for the TO – BE model will be reviewed.

Based on the selection of respondents this AS – IS analysis also will have to be seen as a direct view of how Technical Services sees their current landscape, when it comes to competence development. This is because all participants are from within the Technical Services organization, despite their differences in scope of work and nationality. From collecting the Data 1 and summarizing the results according to methods mentioned in chapter 2 a rough visualization of the landscape could be created. The visualization initially containing the more crucial aspects such as input source, identification of competence and how Technical Services currently is building up said competence, the base draft of the can be found in Figure 5.
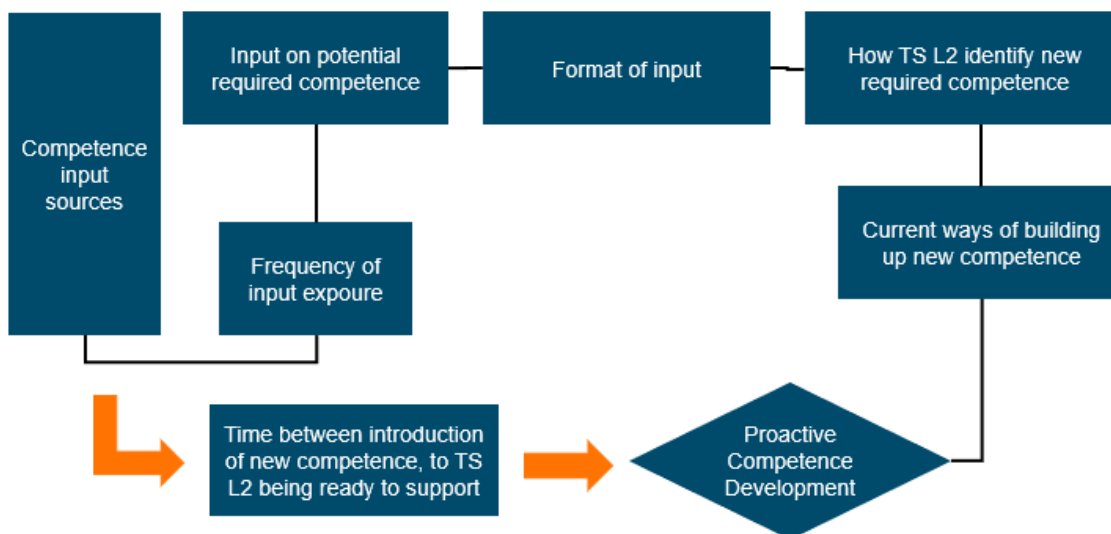
Figure 5. Initial visualization based on the survey results. (Own Figure)

In addition to the initial draft, the results of the survey gave an indication to there being both some skepticism and confusion among TS L2 Line Managers and Technical Managers when it came to processes related to competence development and the input of said competence. Processes in close relation to competence development will as such also have to be considered as they guide and control the flow of how things are done in both theory and practice. As the familiarization to different processes already had been part of the earlier literature review, on request of the consulting individuals taking part of the study, three processes had been identified early on as having direct impact on the study;

- Develop-to-Market
Develop-to-Market process description. (Internal documentation).

- New Product Introduction
New Product Introduction process description. (Internal documentation).

- Directive for Introduction of new Products
(Vestergren 2002 [Internal documentation])

The key aspect, that following process descriptions give, is that there is a clear established procedure available when it comes to case company designed and developed products and systems. Above mentioned processes also consider several aspects of supplier delivered components if their scope is big enough to warrant a substantial change in function and / or operational behavior. What the processes unfortunately fail to acknowledge, to more or less of a degree, is minor alterations or changes to products or systems that still might warrant the need for new competence development. This deviation in process coverage warrant the AS – IS analysis to factor in two streams based on whether the scope of change is large enough to warrant its own development process or not. This alteration to the analysis can be seen below in Figure 6.
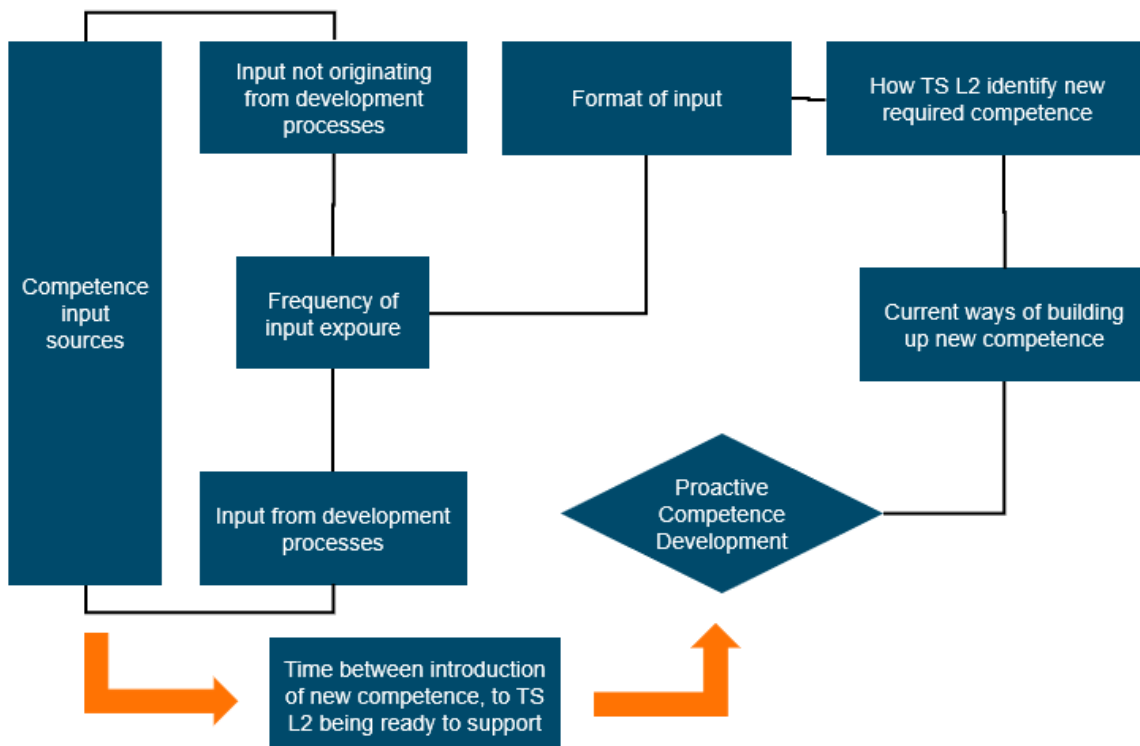
Figure 6. Initial AS – IS analysis implementing development processes. (Own Figure)

3.2 Knowledge Sharing Practices

Realizing, based on company literature review, that input of potential needed knowledge, requiring project guidance, originates via the above mentioned three processes the input from development processes can be mapped. When it comes to input not originating from development processes, the scope of input channels contains several options. From the survey question number 5 we can get an overview of which organizations within the case company the input originates from. Additionally, the study also define how much of the input originates from within Technical Services, from the case company in general and how much is direct external input originating from outside the company. By also asking in which form the main input is given along with open-ended answers given in questions 9-12 it is possible get a deeper understanding in the way knowledge is shared between the following listed functions and Technical Services;

- RD&E (Research, Development & Engineering)
- Internally from TS L2
- Legislation and Classification
- PIP (Product Improvement Process)
- PM (Product Management)
- T&V (Testing and Validation)
- Customer contacts
- PLM (Product Lifecycle Management)

RD&E (including both T&V and PIP) are, based on the survey results, the main feedback channel, which goes hand in hand with it being the main technical function within the case company organization. RD&E is the organization responsible for development of new products as well as the said products improvement needs over its portfolio part of its lifecycle.

Concerning both Customer contacts as well as Legislation and Classification, they are both input that can be viewed as external input. While the input originating from the Legislation and Classification societies is communicated in an orderly manner, mainly towards the RD&E, the Customer contact input can vary as it depends on who within the case company the customer input initially reaches. Regarding the PLM and PM, they can be seen as the owners of the product during the entirety of the products or systems lifecycle, even when the product is taken out of RD&E's portfolio. One of the main differences between RD&E's operative targets, in comparison to PLM- and PM are that the RD&E organization are mainly technology driven while the PLM- and PM are business driven. As such, input from both sides are required for new development of systems and products but also occasionally for development occurring outside of set development processes.

Analyzing current ways of sharing knowledge, based on the survey results, the primary methods used to share knowledge between Technical Services, and internal / external input sources include, in order of frequency;

1. Meetings, with both internal and external people.
2. Generic e-mails, targeting the topic of knowledge development indirectly.
3. Face-to-face discussions.
4. Calls considered to include both phone calls and Microsoft Teams calls.
5. Specific e-mails, targeting the topic of knowledge development directly.
6. Web pages and internal forums.

As seen from the list above the manner of which input is potentially received varies, and thus the storage of said information might vary as well. The manner of which the case company stores information when it comes to physical documentation, pictures, minutes of meetings, etc. also varies from individual mailboxes to case company platforms and tools in use.

3.3 Key Findings from the AS – IS Analysis

After analyzing the Data set 1, the survey results points towards competence development being essential for Technical Services and that it unfortunately has some flaws in the way they are currently operating. Based on how the survey was designed, both strengths and weaknesses can be identified. Key strengths and weaknesses will be described in further detail below.

3.3.1 Strengths Identified

The AS – IS analysis indicate the following areas of strength:

- Information identification through good communication between colleagues in both Technical Service and RD&E.

- The possibility to Learn-by-doing and the low cost used for building up new knowledge.

The first identified strength is the collaboration and good communication within Technical Services and towards RD&E. From organizational context, even though the two organizations within the case company are different, RD&E is expected to maintain and provide input on new technology to Technical Services. One Team Managers comment that summarizes this strength;

"*Personal relations to R&D. We have multiple stakeholders and a vide portfolio of equipment being supported so generally it works best where there is a continuous dialogue, to manage expectations and highlight improvement needs.*"

Among the answers given it should be noted that there are many comments made regarding the execution of the communication and how it's not always ideal. While extremely important, the communication today often relies on personal connections and individual efforts to identify such new knowledge, from the Technical Services resource point of view. On this subject one Team Manger said the following;

"*A good way is usually IF someone takes the role of digging deeply into things, dissecting it and then thinking what this will mean for the case company in the future. However, this does require a whole lot of time and energy. Rarely is it possible for any of us to focus for longer times on one subject in a manner suggested above.*"

The second strength identified in the survey is the possibility to Learn-by-doing and the low cost & bureaucracy used for building up new knowledge. From the survey results Technical Services Team- and Technical Mangers made it clear that in order to build up new competence, classroom-lead trainings and online trainings are good but not fully sufficient. A strength and an option that Technical Services have is the option to participate in the field gaining valuable information and competence along the way.

Learning-by-doing is not only a nice benefit to Technical Services but also an important part in building up knowledge among its resources. As one Team Manager noted:

"*Seeing the field / participate in troubleshooting cases and active involvement in development /feedback discussions with RD&E will give best possible view of the complete setup and specific knowledge related to key competences.*"

Additionally, the benefit of low cost was seen as a benefit, with the side note of it being a result of the way Technical Services operate today.
As will be further discussed in the next subchapter, the possibility to participate in either trainings or customer installations have during recent years deteriorated. As of today, not as much financial resources are being spent on Technical Services resources traveling. This was quite simply stated by several of the respondents, using one of the Team Managers reply below as an example;

"*Lack of budget and cost restrictions (especially when trainings require travelling).*"

So, while the low cost used is an immediate benefit for the case company as a whole, the secondary effects of this is realized, at least among the survey respondents, and that it might be harmful long term, not only for Technical Services but also for the whole case company.

3.3.2　　Weaknesses Identified

The AS – IS analysis additionally reveals several challenges and concerns in the way competence development currently is implemented. Various challenges have been identified from both the identification of competence, concerning both development projects and non-development projects, as well as the way the identified needed competence is implemented. The main challenges are described in further detail below.

1.　Weaknesses with identifying needed knowledge not originating from development projects.
The consensus response to the survey questions related to identifying new knowledge required for the future is a reactive one. Most of the respondents feels that Technical Services are far too reactive in their approach towards new required competence. Some of the answers are not directly hinting towards this fact, while a minority of the answer feel that we are managing well when it comes to proactivity. Survey results also points towards the root cause to this problem is a disconnect between RD&E and the Technical Services deliverables, when it comes to support functions. Another underlying issue with the identification of new knowledge is also a lack of resources. Identifying or screening new designs of systems or products, as an example, takes time and effort from the different teams and their resources, something that is not always achievable. In relation to the core problem of the required knowledge identification one Team Manager stated;

"We are so far away from the new technologies that are emerging but have a responsibility to take care of them so we are always one step behind and cannot give input in an early stage."

2.   Weaknesses with identifying needed knowledge originating from development projects.

Just as the input not originating from development projects, the input which does originate from development projects (such as the DTM, NPI & Directive for Introduction of new Products) the approach to identifying required knowledge was highly reactive. The surprising aspect of the survey result also showed that the involvement rate quite deviated. Results from question number 26 shows that part of the teams are involved quite frequently, 45.5% of the time, while the other part (36.4%) replied that they never are involved in development projects. Further review of the replies indicates that the difference in replies is based on geographical location. The common trend highlights that Finnish based teams usually feel involved at quite a frequent rate while teams based in Italy seldom, if ever, are involved in development projects. One root cause behind this involvement issue can be sourced from one of the replies;

"To a large extent based on personal relations, lunch table discussions and other rather informal happenings."

One common aspect for all teams, regardless of location, was the feeling of always being involved too late, or in deviating stages, in the development projects. Survey results clearly point towards the desire to be involved as early in development processes as possible as this gives Technical Services the opportunity to both identify and implement any potential required knowledge. Unfortunately, based on the feedback received, this does not seem to always be the case.

"Happens that when being involved late in new product developments we are struggling to collect documentation/specification and understand who is dealing with what and who is in charge. Sometimes people who started the development in RD&E moved to another role before the product is on field."

3.   Weaknesses with implementing new knowledge.

The third and final main issue that can be identified is the problem of implementing the new knowledge once identified. The first aspect to understand is that the resources in Technical Services, due to their broad responsibility area, have a hard time to keep up with not only screening and identifying new required knowledge but also implementing said knowledge. This was further elaborated on in one of the survey responses, when asked what the main challenge with building up new knowledge is;

"*Diversity and being able to support old installations with obsolete automation systems and also having the core knowledge related to latest automation systems and functionality*."

Several other responses were also indicating the same issues faced, regardless of geographical location or expertise area;

"*We need more resources in order to give everyone time to focus on building expertise for new technologies. It can only be done in cooperation with R&D and the laboratory and one knowledge sharing session is not enough to make anyone an expert*."

From survey question number 19 we learn that building up new knowledge once identified is a process that can take, everything from weeks to years, with the most common answers stating that the duration of knowledge build-up in Technical Services takes 3 years, to over 5 years. Realizing this, while also considering that Technical Services resources daily work consists of several other time-consuming tasks, results in this being a weakness in the current ways of operation.

Additional weaknesses when it comes to building up new knowledge is also highlighted throughout questions 13-16, which is the lackluster approach to training. This was already slightly indicated in the statement above, regarding the fact that knowledge sharing session between RD&E and Technical Service simply isn't enough for Technical Service to be able to support the product or the system in question. Adding on to this problem of lackluster trainings is also the lackluster training opportunities. While one of the strengths identified was the potential to learn-by-doing (learning through practice), the opportunity to access such training opportunities is pointed out as a weakness in the way Technical Services operate today.

In conclusion, all three main issues identified by the AS – IS analysis are issues that need to be incorporated into the analysis, and which will be the key points that the TO – BE model will have to solve.

3.4 Summary

The foundation of the study originates form the hypothesis that the competence development in Technical Services currently is suffering from weaknesses. Stating that, there are also several good aspects with the process but that there are room for improvements. The data collected from the survey further confirms this initial hypothesis and while some good aspects with the current ways of working are brought up there are also glaring issues that potentially can be solved.

The next logical step in the study after collecting, analyzing and further reviewing the Data set 1, is to summarize the AS -IS analysis so that the study naturally can progress towards solving the weaknesses reviewed earlier. To also give the visualization of the analysis a sound theoretical foundation, input from both literature review and the theoretical part, further described in the next chapter, was put as a core value in order to combine both practical data retrieved form the survey with knowledge theory gained from literature. As the data so far collected is of a specific nature, targeting certain aspects of the competence directly, a conceptual overview of knowledge management be seen as a great asset to the study. This is done mainly to tie most of the questions asked, as well as the answers given into, what can be called, a bigger picture. A sound theoretical part of the AS – IS analysis visualization can also further aid in the creation of the TO – BE model if the same founding concept can be used. As the desired founding pillar for the visualization revolves around knowledge, and knowledge management, a description of the base function of knowledge management is required.

While there is debate as to whether knowledge itself is a cognitive state, a process, an object, the description of Knowledge Management as a process, based on understanding organization as a knowledge system dominates. This view examines the nature of individual knowledge and collective knowledge, and their interactions. While authors differ in the terminology used in describing the Knowledge Management process, the aggregate of their works can be described as a simple Knowledge Management value chain as depicted in Figure 7. (Shin, Holden, & Schmidt 2000, 340).
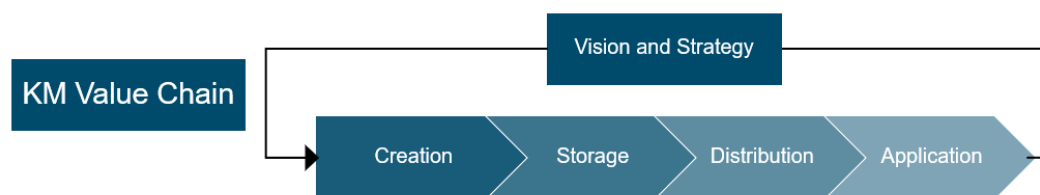

Figure 7. Knowledge management value chain.
(Shin, Holden & Schmidt 2000, 341)

By applying the knowledge management value chain as a foundation for the AS -IS analysis, the visualization of the analysis can be summarized as seen below in Figure 8. The key difference in comparison to the other initial visualization is that the value chain of knowledge management arranges identification and implementation of knowledge into two different streams.

The first stream in chronological order is the identification of the new required competence while the second stream includes the implementation of said competence. This also suits the practicality of the analysis as competence cannot logically be implemented before it has been identified.
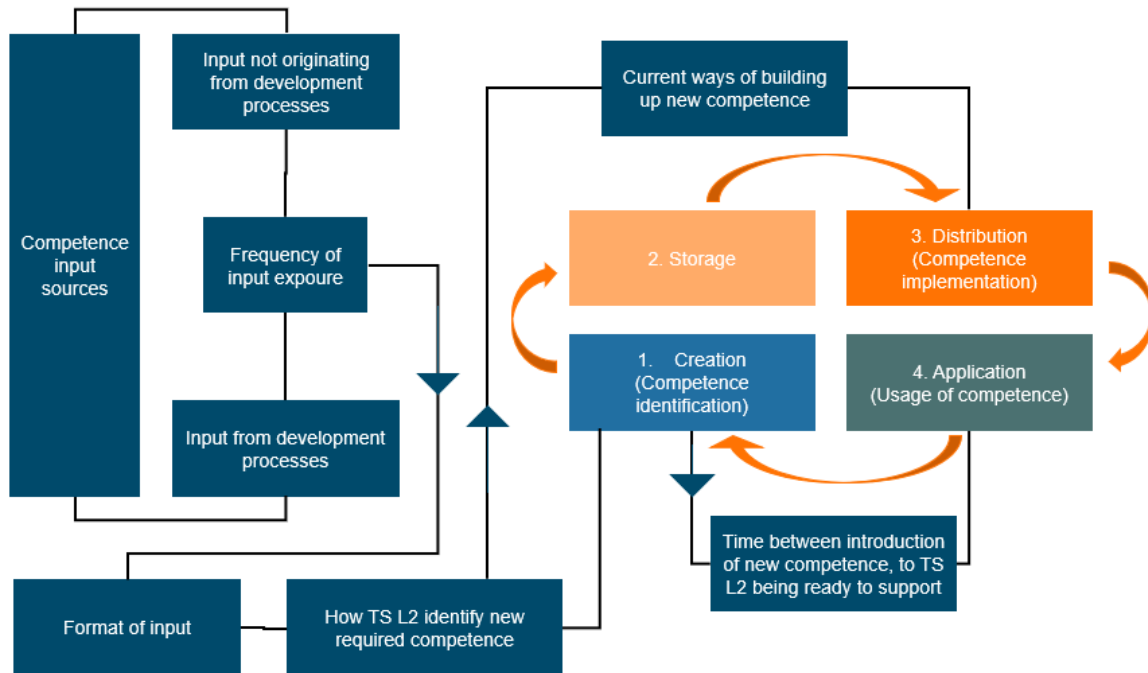

Figure 8. Final visualization of the AS – IS analysis. (Own Figure)

By incorporating the visualization of the AS – IS analysis, and the strengths and benefits earlier derived from the survey data, the finalized AS – IS can be created. To summarize, the AS – IS depicts the current state of how Technical Services operate when it comes to new competence development. The analysis suggests that the current practices are in need of improvements. Addressing these issues will be further elaborated upon in upcoming chapters.

The final version of the AS – IS analysis depicting both key results from the survey, the visualized analysis seen in Figure 8 along with concerns and red flags can be found in Appendix 4.

4 Competence Management – Theoretical Review

This chapter will discuss the findings from available literature in order to find the best practise of managing competence, when it comes to required, but not yet obtained, competence. To fully understand competence management, it is also crucial to understand the basics of knowledge management, as well as knowledge itself.

The content reviewed in this chapter will then later be used to create the Conceptual Framework for the study. The purpose of the conceptual framework is to create a sound theoretical foundation for the study. Along with the data collected, it will help form the final TO - BE Model and the study's final improvement suggestions.

4.1 Competence

Before reviewing the term competence and what it defines, this subchapter will start off with evaluating why competence in an organization such as Technical Services is needed in the first place. As previously stated, Technical Services deal with product support and in order to do so, and prevail, a large amount of both system- and product type competence is required. In other words, the basic preferred skills of Technical Service resources consist of basic mechanical know-how, combined with general product knowledge if narrowed down to a basic level. So how come Technical Services need the competence they have and why is it important for the company in the first place? From the company's point of view, both in terms of internal support, as well as external customer support, it comes down to knowledge economy and how well it can be of benefit for the company.

The transformation from a more standardized and old-fashioned economy to a new, knowledge-based economy, is driven largely by the recognition that knowledge rather than financial capital, land or labour is the major source of continued economic growth. While every economy relies on knowledge to some extent as its base, (i.e. agricultural- & industrial economies), in the "knowledge economy" knowledge itself is for sale and ideas are the main output or product of the economic institutions. Major identifiable characteristics of the knowledge economy in terms of knowledge centricity are increasing returns, network effect, transparency, customer loyalty, innovation and products as experiences. Knowledge centricity is typically demonstrated in the increasing dependence of services and non-physical as well as physical goods on knowledge for their production and distribution. It is further noted that knowledge-based offerings have increasing returns. Once the first unit is produced at a significant cost, additional units can be produced at a near zero incremental cost (i.e. piece of software). Network effects are evidenced in the positive correlation between the market size and the value and the value of the knowledge offering (Handzic 2004, 6).

From this it can be concluded that the competence, referred to in the form of knowledge, can have a positive impact on a modern company in several aspects. If implemented more specifically for Technical Services, the system- and product knowledge possessed by the resources can be i.e. sold to external customers in need of competence services and knowledge support. Additionally, the competence possessed from already existing products can be used for the development and refinement of newer products, thus also benefitting internal business processes. While it also can be in common belief that the competence in the company can be an additional revenue stream, it can be harder to describe on paper compared to other business types such as i.e. product- and component sales. While it's also not the main purpose of this study to review the company's economical gains from the competence it possesses, it should still be considered, since a major part of Technical Services scope of work consists of product knowledge, which can be directly connected to a knowledge-based economy.

As concluded by Nonaka; Despite its growing size, attention and importance, little academic research has succeeded in empirically identifying the relationship between shareholders' value and intangible assets. In recent years the growing trend to invest in intangible assets has been one of the most impressive characteristics of the economy. However, intangible investments are a double-edged sword. On one hand, it can be a source of competitive advantage in the knowledge society; on the other hand, low-profit intangible investment can destroy firm value when its performance is not adequately measured. In fact, some firms are losing because they invest too much in unprofitable R&D projects and branding activities. Business managers should try to measure the profitability of both tangibles and intangibles effectively. How? My suggestion is to recognize intangible investments as assets for internal use, not for financial reporting objectives. First, recognize them as assets in the organization. Second, amortize them for their service life, which varies among industries. Firms can choose the service life by themselves because it's not for financial reporting, but for strategic use inside the firm. Third, measure the profitability of the intangible investments based on the calculated intangible assets amount. This method may seem too simple, but it's better than no measurement. (Ichijo and Nonaka 2007, 192).

This recognizes that an issue with competence and knowledge management is the difficult task of branding them as a profit for the company. It's also clear that it is a good investment if managed correctly, which is to be kept in mind. As Nakano also clearly states the intangible assets can also be damaging to the company if managed poorly. This is why, from a business point of view, Technical Services require competence for both internal and external profitability (both in terms of revenue and competence), they also need the right set of competence and some way to measure them, in order to stay competitive in the market and sustainable within the organization.

To further create a logical foundation to base the theory on the logical starting point would be to investigate what competence is at its core and what kind of different types of competence there is, since the concept of competence as such can be quite broad. Starting off with competence on a basic level, competence is defined as; "the quality or state of having sufficient knowledge" or alternatively defined through the legal definition of;

"possession of sufficient knowledge or skill" (Competence. *Merriam-Webster's collegiate dictionary*).

This indicating that competence and knowledge, while at face value, are similar but that competence specifically indicates a higher level of knowledge. Formulated differently competence can be seen as knowledge put into action, resembling a possession of both theoretical and practical knowledge.

Nonaka and Takeuchi (1995) defined knowledge to be a function of an individual's perspective, intention or stance, which is about their beliefs and commitment. They also present that knowledge is always about reaching some end, which means that knowledge is about action and it is always context specific.

Since it is yet to be determined if different types of competences require different approaches to development, this subchapter will continue by reviewing the distinct types of competence, when it comes to knowledge and knowledge management. One recognized way to treat different kinds of competences is according to the tacit- and explicit knowledge model by Nonaka and Takeuchi; Tacit knowledge cannot be communicated through manuals or theories, in comparison to explicit knowledge which in turn is more objective. Instead, it is best communicated through experience. This can be achieved by harvesting knowledge from the company's employees and knowledge they gained through experience, knowledge linked to their mental schemas, for instance, attitudes and beliefs. According to the authors, the knowledge of experience tends to be tacit and subjective, as opposed to the objectivity of explicit knowledge. Due to its experiential nature, the sharing of tacit knowledge between individuals is like an analogue process requiring a simultaneous processing of information. Explicit knowledge, on the other hand, is created sequentially, and oriented towards a context-free theory.

"We can know more than we can tell"
-    Takeuchi and Nonaka 1995, 60

Based on this information, the knowledge within Technical Services can be split into two different forms of knowledge;

Tacit Knowledge	Explicit Knowledge
Knowledge of experience (body)	Knowledge of rationality (mind)
Simultaneous knowledge (here and now)	Sequential knowledge (there and then)
Analog knowledge (practise)	Digital knowledge (theory)

Table 5. The two types of knowledge. (The Knowledge Creating Company 1995, 1-2).

4.2 Knowledge Management

Organizations need to manage knowledge carefully since it is a crucial resource for value creation and serves as a source of competitive advantage for the organizations (Grant 1996, 121). Hence, knowledge management capabilities, processes to develop and use knowledge within the organization, are essential for sustained competitiveness (Gold, Malhortra & Segars 2001, 211). According to Gold et al. (2001), the organizational capabilities essential for effective knowledge management include knowledge infrastructure (consisting of technology, structure, and culture) along with knowledge processes for acquisition, conversion, and application of knowledge. Gold et al. (2001) considers knowledge management as a process through which organizations generate value from their knowledge-based assets. Knowledge management is a systematic process involving all activities affecting knowledge: identifying, capturing, creating, organizing, storing, representing, distributing, reusing, and enabling the adoption of tacit knowledge and explicit knowledge (Probst 2000, 15-20). This is shown in even further detail in Shin, Holden & Schmidt's Knowledge management value chain (Shin, Holden, Schmidt 2001, 341) as mentioned already earlier in the prior chapter, see Figure 7. Figure 7 represents the four main categories of the Knowledge management value chain; Knowledge Creation, Knowledge Storage, Knowledge Distribution and Knowledge Application. In addition to the content in Figure 7, there are also a list of the terms or definitions from other authors below these four main sections, which have been using different terms for the same section. For the purpose of this study the in-depth content is not specifically mentioned as the conceptual idea of the Knowledge Management value chain is the core theoretical input desired. Above this knowledge management value chain, there is Vision and Strategy, which are used to steer and control knowledge management to that kind of direction, where it will be supporting for the main business. It is essential that knowledge management system is intricately included with corporate strategy, structure and processes.

4.2.1   Identification

To further elaborate on the four main pillars of Knowledge Management, this, along with the other following subchapters, will review the purpose and the key concepts of the value chain. Starting off in logical order with the Creation of Knowledge, or Identification of required Competence as specified specifically for this study. The Identification section of the value chain can be defined as the section where the creation of knowledge is made. The key for this section is to identify the source of the knowledge. The creation of the knowledge can be consciousness, constructed, created, captured or acquired. Knowledge is created through interactions between individuals at various levels in the organization (Nonaka 1995, 67).

Placing the available information on Identification into context for the study in specific, we can realize the risk of non-contextual Identification.

One of the defining characteristics of first-generation documentation efforts was that people were not thinking about documents in context.

In many instances, companies contributed thousands and thousands of PowerPoint decks, process reports, and project summaries to repositories. For many users, however, these documents lacked the context that would make them valuable. Additionally, little attention was paid to the relationship among documents, so knowledge seekers had no idea how a particular document fit into a larger body of experience. (Ichijo 2006, 35). Being aware of this fact is also crucial for this study as it highlights the importance of context and type of knowledge input that will be desired for new required competence.

4.2.2 Storage

Before further reviewing the importance of storage and its benefits, the scope of the study will have to be again mentioned. It is not in the scope of the study to alter or rework current storage systems of the case company. That being said, the case company do have multiple storage systems in place used for accessing different types of knowledge and data. Seen for the sake of i.e. Implementation the concept of Storage will have to be further defined by Data sets 1 & 2 for Technical Services to know from where the knowledge can be accesses if needed. Current knowledge Storage is web-based storage where the majority of explicit knowledge can be stored and accessed. Due to the nature of tacit knowledge the storage of such knowledge is harder to define and will thus be harder to identify and implement. This difference will be reviewed in more detail in the following subchapter.

The main importance of Storage is if the existing knowledge is not stored in any organization storage, it will remain in the heads of the individuals and it will also be lost once the individuals leave the firm. This is called outflow of the knowledge. Also, if the knowledge only remains in the individual, the full value of their knowledge may not be realized, because it is not available to others. (Levitt & March 1988, 335-337).

4.2.3 Implementation

As referred to as Knowledge Distribution in the Knowledge Management value chain, Competence Implementation refers to a distribution of stored knowledge. For this study the Implementation of Competence can be viewed as the Implementation of either Tacit or Explicit Knowledge.

Knowledge distribution happens either by sharing, which refers to knowledge sharing between the individuals or by transferring, which refers to knowledge transfer between larger entities within organizations (Ipe 2003, 337).

As stated by Ichijo and Nonaka (Ichijo and Nonaka 2007, 158-161); Most work is no longer manual, but knowledge and teamwork oriented. Teams are the fundamental learning units in modern organizations, and there is increasing recognition that collective work in teams is the most efficient way of developing knowledge.

Therefore, it is vital to understand the difference in obstacles to overcoming social dilemmas in knowledge teams from those in manual teams. One of the main differences is that new knowledge is seen as the feedstock of competitive advantage in knowledge teams. As the SECI (Socialization, Externalization, Combination & Internalization) model in Figure 9 clearly illustrates how organizational learning proceeds by integrating more and more tacit and explicit knowledge to become collective explicit knowledge.
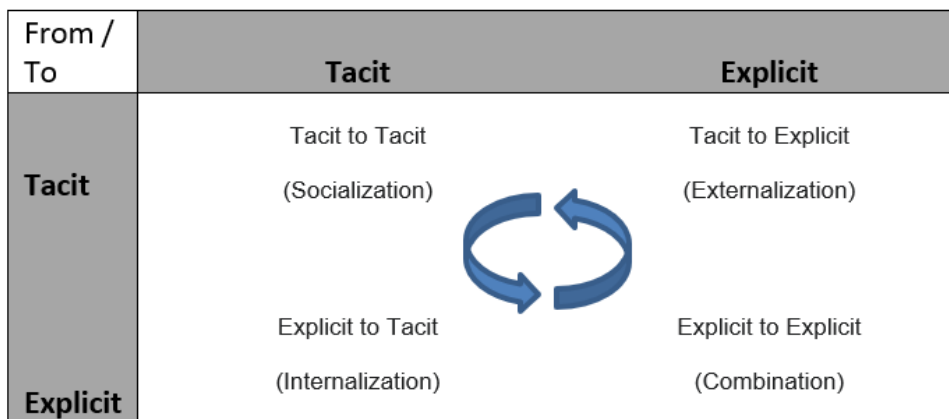
From / To	Tacit	Explicit
Tacit	Tacit to Tacit (Socialization)	Tacit to Explicit (Externalization)
Explicit	Explicit to Tacit (Internalization)	Explicit to Explicit (Combination)

Figure 9. SECI model of knowledge dimensions (Nonaka & Takeuchi 1995, 89).

Tacit to Tacit (Socialization) – Socialization typically occurs in a traditional apprenticeship, where apprentices learn the tacit knowledge needed in their craft through hands-on experience, rather than from written manuals or textbooks.

Tacit to Explicit (Externalization) – When tacit knowledge is made explicit, knowledge is "crystallized", thus allowing it to be shared by others, and it becomes the basis of new knowledge. Concept creation in new product development is an example of this conversion process.

Explicit to Explicit (Combination) – Explicit knowledge is collected from inside or outside the organisation and then combined, edited or processed to form new knowledge.

Explicit to Tacit (Internalization) – Learning by doing. Internalization is also a process of continuous individual and collective reflection and the ability to see connections and recognize patterns and the capacity to make sense between fields, ideas, and concepts.

4.2.4   Application

In the Knowledge Management value chain, the final logical step of the chain features the Application (usage) of the gained Knowledge. Once again, the scope of the study needs to be reviewed. Even though the scope does not specifically focus on how the competence is applied once Identified and Implemented the Application of knowledge still needs to be featured as a part of the value chain cycle to not risk missing any key pillars of the value chain.
Knowledge Application, the final phase in the knowledge management cycle makes the stage where the knowledge previously created and shared is put into use. The individuals that apply the knowledge need to understand the content of the knowledge, validate the relevance of the knowledge, and utilize the knowledge in their context (Saarela 2016, 36)

4.3 Organizational Learning

The ability to learn continuously, leverage and utilize knowledge for innovation, and acquiring new knowledge allows organizations to achieve sustained organizational success and maintain their competitiveness (Liedtka 1999, 6). This ability also makes organizational learning a critical strategic asset foe achieving long-term organizational success.

At the very basis, knowledge sharing in an organization is to make knowledge available to others within the organization. Knowledge sharing means the sharing of knowledge between individuals, so-called 1-to-1 interactions. It has been defined that knowledge sharing between individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed and used by other individuals. This competitive advantage in organizations results from individuals with diverse knowledge collaborating synergistically toward common outcomes. As Ipe has defined; the sharing of individual knowledge is imperative to the creation, dissemination and management of knowledge at all the other levels within an organization (Ipe 2003, 340-342).
Ipe has created a knowledge sharing model, which describes sharing between individuals in organizations. The model is presented in Figure 10.
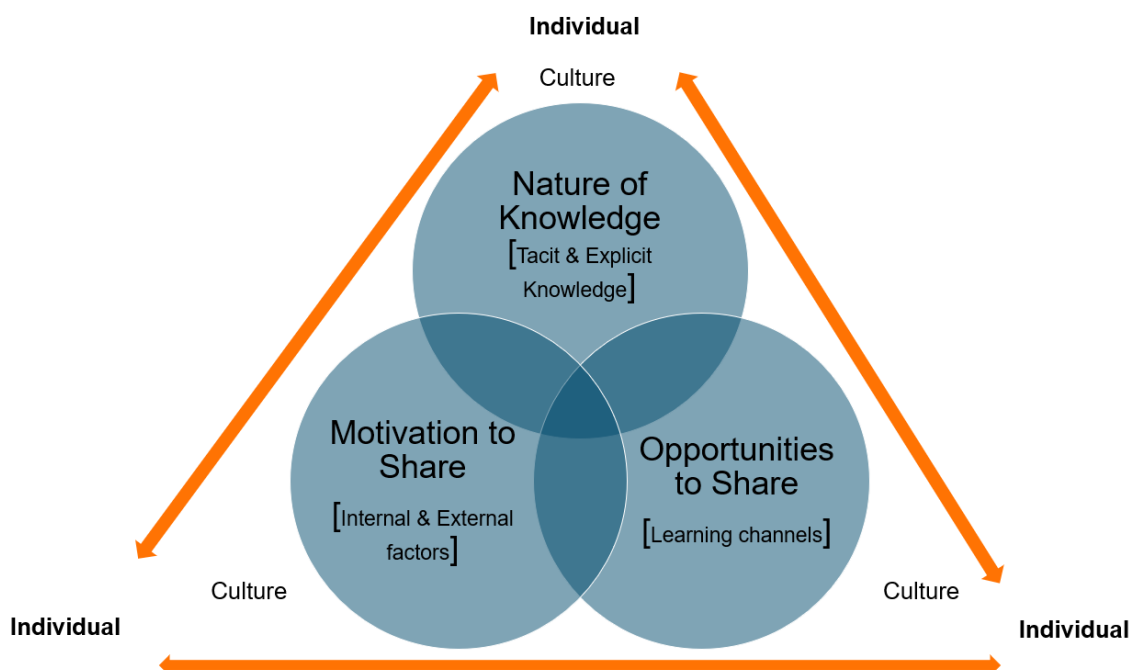
Figure 10. Knowledge sharing model. (Ipe 2003, 352)

In this model, there are four major factors that influence knowledge sharing:
- Nature of knowledge
- Motivation to share
- Opportunities to share
- Culture of the work environment

Nature of knowledge is something that already has been partially reviewed in sub-chapter 4.1. The nature of knowledge is described as containing both tacit and explicit types of knowledge. In addition to this, the nature of knowledge also includes how the knowledge content is stored and thus also accessed. The scope of this was reviewed in sub-chapter 4.2.2. To complete the view on the case company nature of knowledge the input gained from Data sets 1 & 2 will be used as this will give the study further detailed input.

Motivation to share. As motivation affects most of our activities, it also influences knowledge sharing. Without strong motivation, people do not tend to share their knowledge. Motivational factors influencing knowledge sharing, can be divided into internal and external factors. According to Ipe; Internal factors include the perceived power attached to the knowledge and the reciprocity that results from sharing External factors include a relationship with the recipient and rewards for sharing (Ipe 2003, 345).

Opportunities to share. Organizations can have different ways of sharing knowledge. These are normally split into formal and informal opportunities for sharing. Formal opportunities include training programs, work teams and technology-based systems that facilitate the sharing of knowledge. Informal opportunities are personal relationships and social networks that facilitate learning and sharing of knowledge. Formal opportunities create a context in which knowledge is shared and provide the tools to do so. These purposive learning channels can connect many individuals and they allow speedy dissemination of shared knowledge

(Ipe 2003, 349). These formal opportunities are of course important for knowledge sharing, but it has been indicated in the research that most of knowledge are shared in the informal settings. These informal opportunities are also called relational learning channels. These channels are based on face-to-face communication, which requires and builds trust. The trust between the individuals is critical for the sharing of knowledge. By these informal opportunities, individuals can interact and develop their respect and friendship towards each other's, thus influences positively to their behaviour related to knowledge sharing (Jones & Jordan 1998, 159).

Culture of the work environment. The culture of the work environment is developed by group as they grapple with and develop solutions to everyday problems. Culture of work environment is reflected in the visions, values, norms and practices of the organization; thus, it orients the mindset and action of the individuals and create sense to involvement and contribution (Ipe 2003, 350). The culture of the work environment influences knowledge sharing by shaping assumptions about which knowledge is important, attitude towards it, controlling relationships between different level of knowledge e.g. organizational, group and individual, creating a context for social interactions and determining the norms for knowledge distribution in the organization. In the organization, there are subcultures e.g. national, which can be characterized by a distinct set of values, norms and practices (Ipe 2003, 351).

In this study the concept of Organizational learning features all the above-mentioned factors of the Knowledge sharing model. The nature of knowledge, motivation to share, opportunity to share and the culture of the work environment are all crucial to the organizational learning and for sharing knowledge within the case company. The end goal for the Knowledge sharing model factors are to optimize the case company environment for knowledge sharing. Following subchapters will further elaborate on specific environmental and individual factors that might influence the organizational learning and affect the knowledge sharing in the company.

4.3.1 Environmental Factors

One of the main recognized factors under the organizational context is the organizational culture and climate towards knowledge sharing. Learning orientation, trust and reciprocity and openness of an organization's culture are important enablers of knowledge sharing. Cooperative organizational climate, as opposed to competitive one, has also been identified to be supportive of knowledge sharing. Another important factor in organizational context is the knowledge sharing orientation of the management. Management support and encouragement has a direct effect on the perception and behavior of the employees towards knowledge sharing. In some cases, management encouragement can be through explicit rewards and incentives which have been found to have a positive impact in knowledge sharing behavior. The last factor discussed under organizational context is the organizational structure of the organization.

Organizations can be structured in such a way that they can foster the knowledge sharing capability among the employees. (Sheng and Raymond 2010, 116) They also suggest that functional structures tend to hinder knowledge sharing while open and decentralized structure significantly enhances knowledge sharing among the employees.

Another influencing environmental factor, according to Harder (2008), is how rewards and management styles influence the motivation to share knowledge.

- First, Harder indicates that individual motivation mediates the relationship between contextual variables and knowledge sharing behavior. This implies that motivation is, in fact, an important factor in understanding and explaining knowledge sharing performance in organizations.
- Secondly, findings indicate that tangible rewards may have a negative influence on employees' autonomous motivation to share knowledge and, ultimately, on their knowledge sharing behavior.
- Lastly, this study suggests that management style is a significant predictor of individuals' motivation to share knowledge. In fact, an autonomy supportive management style is the most important contextual variable predicting autonomous motivation for knowledge sharing in this sample. These findings are important considering the relatively under emphasized role of management styles in the knowledge management literature. In other words, it seems that the interpersonal approach adopted by managers merits more attention than it has previously received. (Harder 2008, 23-24).

4.3.2   Individual Factors

According to Sheng and Raymond (2010) there are two main factors influencing organizational learning from the individual point of view. First, the personality of the individual has an impact in the knowledge sharing process. Secondly, the motivation of the individual also plays a role in the knowledge sharing within the organization. Furthermore, competence itself may also affect how we perceive- and are perceived by others. If the individuals possess the right kind of knowledge, it might create a notion of power around the possessed knowledge or competence. This might lead to hoarding of said knowledge and they can use the knowledge for their own benefit. Therefore, power politics of knowledge sharing in an organization is an important aspect as well. It has been recognized by Davenport, Eccels & Prusak, where the primary reason for companies not to succeed in knowledge management is lack of the management of the politics of information (Davenport, Eccels & Prusak 1992, 53). As knowledge is dependent on context, it is natural that culture and power dynamics affect the way knowledge is perceived and used. One of the individual factors influencing the motivation to share knowledge is also the relationship between the sender and the recipient (Ipe 2003, 346,437). The relationship features three essential components: trust, power and status of the recipient. From these three, trust is more important because it facilitates learning and decisions to share knowledge.

Especially in the knowledge communities which are used to collect, develop and promulgate knowledge, if one percept's that others are not contributing equally or alternatively might exploit their cooperative efforts, these can create barriers for trust and reluctance toward knowledge sharing (Ipe 2003, 347).

As stated by Ichijo; People share knowledge and go out of their way for others with whom they share common ground. They are helpful when the culture rewards being recognized as knowledgeable by others, not when the culture reinforces a ''knowledge is power'' or knowledge-hoarding attitude. (Ichijo 2006, 36)

Regarding both of Sheng & Raymond's factors influencing organizational learning on the individual level, Lindgren, Stenmark & Ljungberg concludes that there is a relation between the personality, motivation and competence. If the individual isn't motivated then the creation of competence will not happen, or not as easily. Interest is more important than formal competence, hence, in the knowledge-based organization business rely more on identifying individuals with the ability to learn as they go along than on finding employees matching predefined and formalized competence descriptions. Personal interest profiles should be included in the organization's competence descriptions (Lindgren, Stenmark & Ljungberg 2003, 26). It is indicated that interest is more important than formal competence. This way of understanding the interest / competence-relation stresses the need for continuous competence development as a result of the ever-changing environment. It is the intrinsic motivation that comes from personal interests that sets the limits for the organization's future and it is therefore crucial for people to be motivated and 'hungry'. To actively nurture and develop the interests thus becomes more important than to archive records of past achievements. The view of interest as something that goes beyond competence belongs to the knowledge-based organization, where tomorrow's tasks are more difficult to foresee and people's interests, the motivation, and their commitment become the main assets (Stenmark et al. 2003, 26). Hence, in the knowledge-based organization business rely more on identifying individuals with the ability to learn as they go along, than on finding employees matching pre-defined and formalized competence descriptions.

To further enhance the motivation to learn among individuals Ipe suggests that companies should have an incentive system to encourage individuals to share their knowledge (Ipe 2003, 348). The incentive system should have tangible and intangible rewards. Tangible rewards are monetary and intangible rewards are enhancing and recognition of individuals. Studies have also shown that the rewarding system will have positive effects in knowledge creation (Dyer & Nobeoka 2000, 355), sustenance of knowledge and organisations success in knowledge management initiatives (Ipe 2003, 348). Only tangible rewards are not enough by themselves to motivate individuals to share their knowledge, however. The ones who participate in knowledge sharing, do it because of the intrinsic reward from the work itself and motivation in a sense of involvement and contribution and can even sometimes perceive formal rewards as demeaning (Ipe 2003, 348).

4.4 Conceptual Framework of the Thesis

The theoretical review in this chapter focused on exploring and reviewing existing knowledge on competence management and factors affecting the learning within an organization. As suggested by several researchers, knowledge and knowledge sharing within an organization is a difficult subject for many organizations as it is highly influenced by the organizations own behaviour towards knowledge and knowledge sharing. Therefore, when selecting and proposing the best practises for the case company competence management, the case company need to identify and address competence management- and knowledge sharing practises relevant in their context. Based on this a conceptual framework for the study in question can be visually illustrated as seen in Figure 11 below.
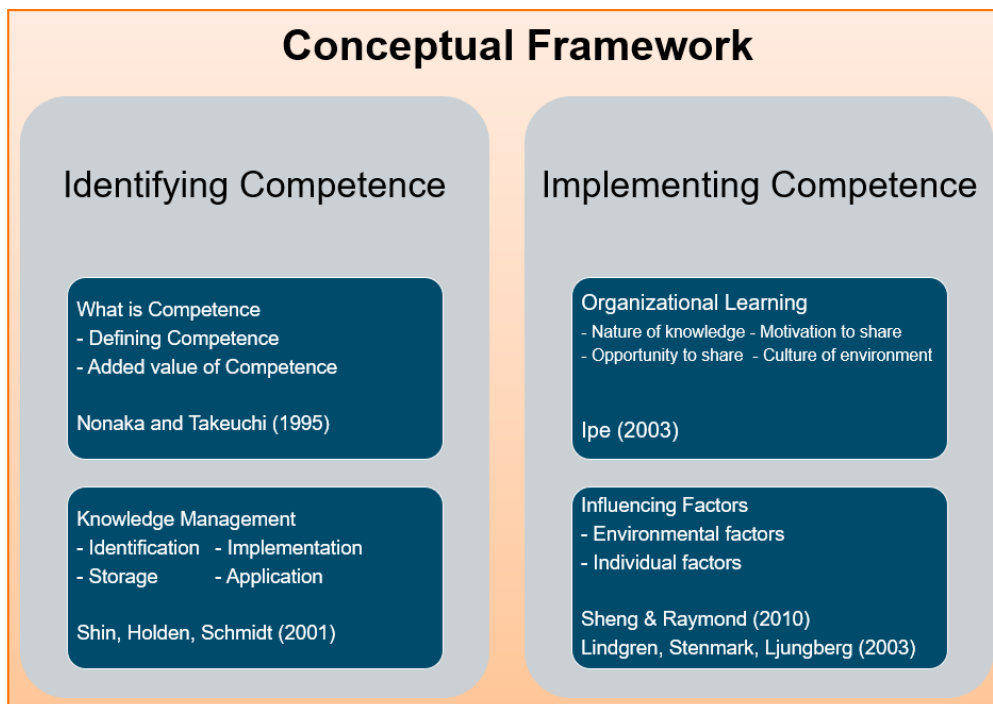

Figure 11. Conceptual framework. (Own Figure)

As Figure 11 presents, in order to understand competence and competence management, it is essential to understand what competence is and what it brings to the case company, which is explained by Nonaka and Takeuchi (1995).

Knowledge Management includes the main pillars of the Value Chain, which were identification, storage, implementation and application, based on the literature by Shin, Holden and Schmidt (2001).

The model of Organizational Learning was based on the theories of Ipe (2003) and it also featured four main areas which were the nature of knowledge, the motivation to share, the opportunities to share and the culture of the working environment.

In the model of factors influencing competence implementation in the organization, which is based on theories Sheng & Raymond (2010) and Lindgren, Stenmark & Ljungberg (2003) there are several environmental- and individual factors that affect the implementation of competence within an organization.

In the following chapter the conceptual framework along with the inputs gained from Data sets 1 and 2 will be put into use to establish the TO – BE model, which can be seen as a most optimal best practise for how Technical Services should identify and implement new required competence.

5 TO-BE Model

This chapter summarizes the results of the AS – IS analysis and the Conceptual Framework, including the interview data from Data set 1 and 2 to fill potential gaps and open questions. The TO - BE model was constructed in such a way that the writer made an initial proposal which was over time adjusted and improved upon through input by core members involved in the study from the case company.

5.1 Improvement Proposal Draft

The initial proposal was made based on the AS – IS analysis, seen visualized in Figure 8, and the Conceptual Framework, illustrated in Figure 11. In the following subchapters, the steps taken towards the final TO – BE Model will be reviewed section by section. At the end of this chapter there is a summary providing an overview of the final TO – BE Model. This proposal is divided so that all four of the Knowledge Management Value Chains separate areas are split, with the focus being on the Identification and Implementation of Competence.

5.1.1   Competence Identification

Here the focus is to propose a good foundation for the case company knowledge management, as this should be a sound platform to incorporate both Competence Identification and Implementation into.

To improve knowledge management for the case company when it comes to both identifying and implementing new required competence it is important to understand the value of knowledge, realizing that it is one of the main intangible resource available to the Technical Services. Concerning this, Technical Services should have a strong focus on how they convert tacit competence into explicit competence. As earlier mentioned, tacit competence is knowledge that an individual possesses, for example knowledge received through experience and abilities. Explicit competence is knowledge, which can be recorded and be transferred to others. Understanding the difference between these two types and the manner of how they can be transferred between each other will be highly valuable for the case company. See Figure 9 for more information on tacit and explicit knowledge.

In the case company, competence was created through several different streams. Due to the vast amount input channels, the input gained from Data set 2 indicate a need for a divide on how Technical Services can identify their incoming knowledge. These two main streams could be categorized as;

o   Input from sources not related to development processes.
o   Input from development processes.

For input not originating from process development the input range is still wide, containing sources from many parts of the case company as well as from external sources. The key part for Technical Services is to identify these different roles and to mainly communicate any potential need for new input to the different input sources as well as performing screenings of potential new input when possible. The main way of getting to the desired TO – BE Model, from the AS – IS analysis, is using data from Data set 1 and 2. An example of this would be question number 9 from the survey data from Data set 1, with questions 10-12 used to further specify in which direction Technical Services should strive to go in order to improve competence identification.

9: *"Identifying new knowledge: Using your own words, how would you describe the current ways of identifying new competence needs that will be required for the future?"*

The initial question tackles the topic directly. The idea with the initiating question is that it first makes it clear for the respondent that this concerns an open-ended question. The respondent's own opinion, written with his or her own words is what is at the core of the question. Secondly, the question itself focuses on current ways of working, something that will be directly implemented into the AS – IS analysis. The question is then wrapped up by further elaborating that the competence requested is one that isn't needed now but will be in the near, or far, future. The following questions are then design for giving input on which direction the respondent would like to take the identification of new knowledge (10 & 12), as well as the incorrect way to approach the identification of new knowledge (11).

10: *"Identifying new knowledge: Regarding question number 9, describe what has been working best with the current ways of identifying new competence that will be needed for the future?"*

11: *"Identifying new knowledge: Regarding question number 9, describe what has been the biggest challenge with the current ways of identifying new competence that will be needed for the future?"*

12: *"How would you like to change the current ways of identifying new competence that will be needed for the future?"*

The data gained indicates that the link between Technical Services and input sources are not fully established and that most of the communication is occurring through personal connections, if occurring at all. This is not ideal as personal connections are hard to standardize and are not reliable as they vary on the personalities themselves and not on the function they represent, nor the knowledge they may possess. Due to the variety of input options for input not originating from development projects the standardization of input will be a challenge in the case company, not only because the input may originate from different functions within the case company but also because the format of input may vary from written to spoken, explicit to tacit, or vice versa.

As one of the main benefits seen by respondents in the survey, as well as based on feedback

from interviews, targeting RD&E as a main target of input was the logical way to try an mitigate the vast quantity of input. As input as such also varies throughout the case company, Technical Services also need to consider at which stage the information is relevant to them. As mentioned by Nonaka, the key is to identify the source of the knowledge. Knowledge is created through interactions between individuals at various levels in the organization (Nonaka 1995, 67).

Then to put the input of new knowledge into a form of logical relevance, as described by Ichijo, placing the available information on identification into context for the study in specific, we can realize the risk of non-contextual Identification. Many users lacked the context that would make knowledge valuable. Attention must be paid to the relationship among documents, so knowledge seekers have an idea how a document fit into a larger body of experience (Ichijo 2006, 35).

The outcome of this review gives the study following key improvement proposals for the input sources not related to development processes;

o   Communication between RD&E and Technical Services to be improved and maintained. Communication indicating; a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior (Communication. *Merriam-Webster's collegiate dictionary*). "Communication" is by design left open for interpretation as this ideally is to be agreed upon by respective parties. Although not specified by either survey nor interviews, the recommendation for "Communication" would be a scheduled and re-occurring format in which both parties can attend any incoming subjects concerning the gain of new competence.

o   Technical Services need to make RD&E aware of their required deliverables when it comes to competence identification.

o   Proactive approach by screening design changes through optimal tools.

Regarding the second and last main input type, input from development processes, the origin of input deviates far less than in comparison to input gained from sources not related to development processes. Input from development processes also affect Technical Services less frequently as the scope of development projects usually are on a larger scale than minor design changes. In these scenarios the main difference is that the input is standardized in a far better way by the case company's own implementation process. Unfortunately, results from Data sets 1 and 2 indicate that this is not always working in practice, and that Technical Services might still be left out of the developing process, resulting in a loss of input and a delay in new competence implementation.

As part of the literature review as well as the scheduled interviews it is indicated how Technical Services should be involved in new development projects in order to ensure product or system support (Develop-to-Market process description, Internal documentation). Input on new required competence, when derived from development processes, is in the hands of the respective Product Managers who are always to be involved in the development projects. Data set 2 points towards this working well when executed properly. However, as this involvement is in the hands of the Product Manager alone there is a risk that this not

always is done according to Technical Service's own desire and that they sometimes are involved far too late in the development process, if involved at all. In these scenarios it is essential that Technical Services must be able access new development information as soon as possible. There must also be time reserved for Technical Services resources to participate in development projects, so that they are able to both identify and implement any potential new competences. To avoid being left out of development projects it is important for the case company to minimize the power politics aspect of knowledge. This can be done by selecting an appropriate politics model, which matches the culture of the organization, selecting appropriate solutions for knowledge distribution. For further information about knowledge politics, see Davenport et al. (1992).

The outcome for input from development processes gives the study following key factors;

o   Communication between Product Managers and Technical Services to be improved and maintained. Communication indicating; a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior (Communication. *Merriam-Webster's collegiate dictionary*). "Communication" is by design left open for interpretation as this ideally is to be agreed upon by respective parties. Although not specified by either survey nor interviews, the recommendation for "Communication" would be a scheduled and re-occurring format in which both parties can attend any incoming subjects concerning the gain of new competence.

o   Technical Services need to make respective Product Managers aware of their required deliverables when it comes to competence identification.

o   Technical Services Line Managers and individual resources to familiarize themselves with how the Develop-to-Market process operates prior to process involvement, in order to improve the understanding of what is expected in terms of competence development.

5.1.2   Competence Implementation

Moving from the identification of new required competence to the implementation of new required competence, in logical order. The implementation of competence also utilizes a combination of the AS – IS analysis, the Conceptual Framework and the data from Data set 1 and 2 to establish a finalized version of the TO – BE Model. Data gathered through Data set 1 is once again attempting to further specify in which direction Technical Services should strive to go in order to improve competence implementation, in the same way as the identification of competence.

13: *"Building up new knowledge: How would you describe the current ways of building up new competence that will be required for the future?"*

The respondent's own opinion, written with his or her own words is what is at the core of the question.

Secondly, the question itself focuses on current ways of working, something that will be

directly implemented into the AS – IS analysis. The following questions are then designed for giving input on which direction the respondent would like to take the identification of new knowledge (14 & 16), as well as the incorrect way to approach the identification of new knowledge (15).

14: *"Building up new knowledge: Referring to question 13, what is the best aspect of the current ways, when building up new competence that will be required for the future?"*

15: *"Building up new knowledge: Referring to question 13, what is the main challenge with the current ways of building up new competence that will be required for the future?"*

16: *"How would you like to change the current ways of building up new competence that will be required for the future?"*

The results indicate that both time and budget is a big restriction when it comes to implementing new competence. Due to the amount of exposure to new competence along with the current time constraints, it might be necessary to dedicate certain resources specifically to new competence to make sure that there is enough time for the implementation. When it comes to the TO – BE Model, it needs to ensure that there first of all are enough resources in order to implement new competence. Secondly, a training budget also needs to be ensured as resources attending trainings and travelling to field installations for learning purposes will require some expenses to be made on behalf of the case company. It would then be on the Line Manager or the dedicated resource to review the current resource- and training budget requirements based on the information gained from the Competence Identification. If new required competence is identified, then the logical next step is to review if the Identified Competence can be Implemented or not. If the Liner Manager considers this as not being possible due to time or budget constraints, then the TO – BE Model needs to enable the Line Manager to solve the issue.

As further described by Ipe, four main factors should be accounted for when talking about knowledge sharing, these four being Nature of knowledge, Motivation to share, Opportunities to share and Culture of the work environment, more information on this can be seen from Figure 10. Knowledge sharing model. (Ipe 2003, 352).

As far as the Nature of knowledge is concerned it already has been taken into consideration when the concerned competence is identified. The above mentioned enabling of Line Managers to review the availability of their team's time and budget constraints aims to give the individual resources Opportunities to share by ensuring that they are capable of doing so. What still needs to be considered is the Motivation to share the Culture of the work environment and the External and Individual factors affecting this relationship.

What can be derived from the literature review is that it is necessary to establish incentives & reward system to activate people to implement new competence. The incentive & reward system must include intangible and tangible incentives. Without any form of incentives, the case company might risk the implementation of new competence being viewed as having a negative impact. Both data sets already indicate that time and workload restrictions limit the ability to implement new competence among resources in Technical Services. Without any additional incentives the implementation of new competence will end up giving the individual resources tasked with the implementation an additional workload with no benefit. An example of intangible can be recognition and praises from the management whereas tangible incentives can be monetary. It is also essential to create personal goals for the individuals through performance appraisal or similar. It should also be noted that tangible rewards are not enough by themselves to motivate individuals to share their knowledge. The ones who participate in implementation and sharing of new competence, tend to do it because of the intrinsic reward from the work itself and motivation in a sense of involvement and contribution according to Ipe (2003).

To get from where the case company is today, illustrated by the AS – IS analysis, the case company need to further validate the Motivation among the individual resources and the Culture of the work environment. As Sheng and Raymond (2010) suggests; functional structures tend to hinder knowledge sharing while open and decentralized structure significantly enhances knowledge sharing among the employees indicating that a fixed process for implementation might be counterproductive.

For the case company to get a better view of their current situation Lindgren, Stenmark & Ljungberg (2003) recommends reviewing personal interest profiles in the case company's competence descriptions. Specifically, for this case company the most natural approach to this would be to, aside from the current mapping of competence, to additionally map the interest for new competence. This approach will give the case company sound data on the potential to gain new required competence. Lindgren, Stenmark & Ljungberg concludes that if the individual isn't motivated then the creation of competence will not happen, or not as easily. Interest is more important than formal competence, hence, the case company will also have to identify individual resources with the desire to learn.

"*To actively nurture and develop the interests thus becomes more important than to archive records of past achievements.*"
(Lindgren, Stenmark & Ljungberg 2003, 26).

The key results of Implementing new required competence can be defined in short as;

o   Technical Services Line Managers to evaluate the need for a dedicated resource for identifying and / or implementing new required competence.

o   Technical Services Line Managers to report a training budget on a yearly basis. To ensure that Technical Service teams have a sufficient budget to spend on training for new competence, an estimated budget for yearly spending is required.

o In combination with competence mapping, additional mapping of interest for new competence, in the already mapped areas, should be implemented. This is done to get a better picture of the capability of implementing new competence. The suggestion would be to review this interest during the yearly Development Discussions.

o Implementation of intangible rewards. An example of intangible can be recognition and praises from the management. Currently the case company do have tangible rewards in place for merit increases but the intangible rewards should also be considered as part of motivation for implementing new competence.

5.2 Overview of Improvement Proposal

The proposal for the improvement of competence development in Technical Services is constructed by the collection of data trough surveying Technical Services Line Managers, conducting interviews among concerned parties, the AS – IS analysis and best practices from theoretical literature reviews. Based on these it was possible to build a TO – BE Model incorporating required steps to get the current way of working from the AS – IS analysis to the desired situation. Based on the TO – BE model a matrix compiling recommended actions could be generated as well. A simplification of the TO – BE Model can be seen below in Figure 12. In Figure 12 the different color schemes represent the respective KM value chains the Improvement Proposals aim to improve, whether it concerns Competence Identification or Implementation. The complete TO – BE Model can be found in Appendix 5, and the Proactive Competence Development Matrix compiling the key improvement proposals can be seen in Appendix 6.

As the AS – IS analysis indicated there is a need for an improved approach to identifying and implementing new competence within Technical Services. Currently there is no structured way of identifying or anticipating new competence which also results in Technical Services not being ready to build up new competence in time. The need of proper identification and implementation is also essential for Technical Services as their main asset is the knowledge and the competence they possess. Here, the theoretical section of this study provides guidance from a theoretical point of view and in this TO – BE Model the needs from the AS – IS analysis along with the data collection and the best practices from theory have been merged.
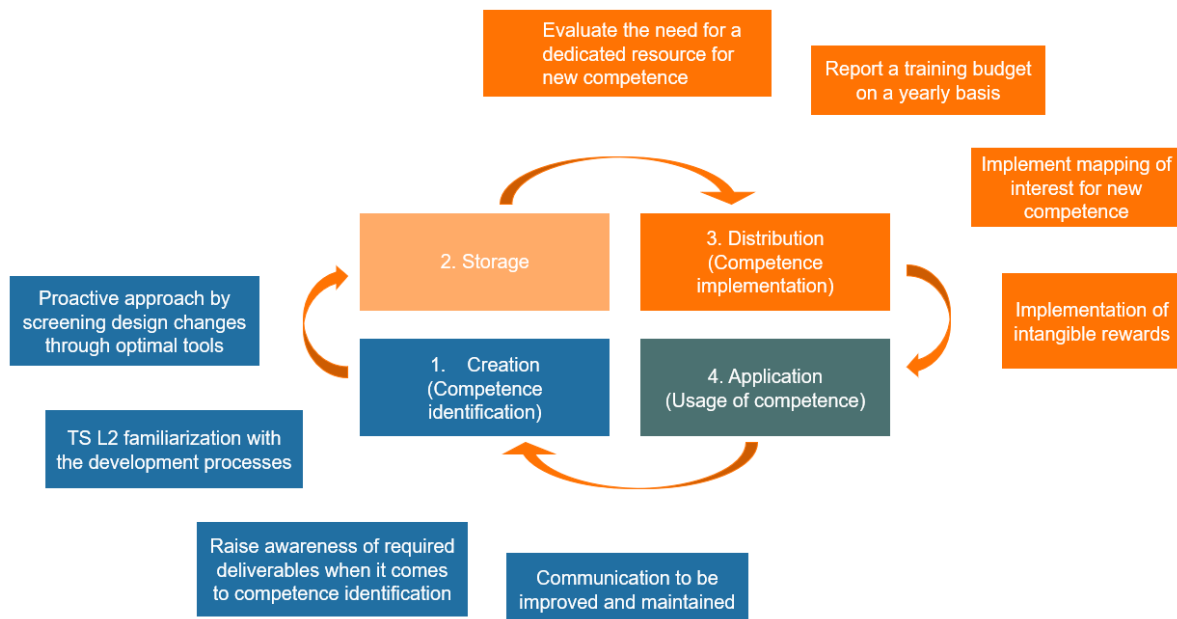
Figure 12. Visual simplification of the TO – BE Model. (Own Figure)

5.2.1   Managerial Implications

In order to implement these above recommended improvements, it is necessary that the proposal is agreed upon and accepted at the correct level of management. Without this the improvement proposals might not receive the appropriate support. The discussion for this implementation of recommendations will be held at the upper management level of Technical Service.

To do this properly, it is necessary to have a plan for the implementation. Together with this plan it is necessary to prioritize all tasks so that the focus can be aimed appropriately (Saarela 2016, 57). The idea with the plan and the prioritization is that it will allow management to adapt the proposed changes in a structured manner. Prioritized actions concerning the Proactive Competence Development in Technical Services include:

o   Establishing concerned parties among individual resources.
o   Resources and a good attitude for change management.
o   Process instructions and usage of tools.
o   Line Manager impact on resource and budget reviews.
o   Mapping of interest for development and reward systems.

As part of the improvement planning, the implementation of the proposals will have to be agreed upon by Technical Services management. A suggestion for the improvement scheduling is visualized below in Figure 13.
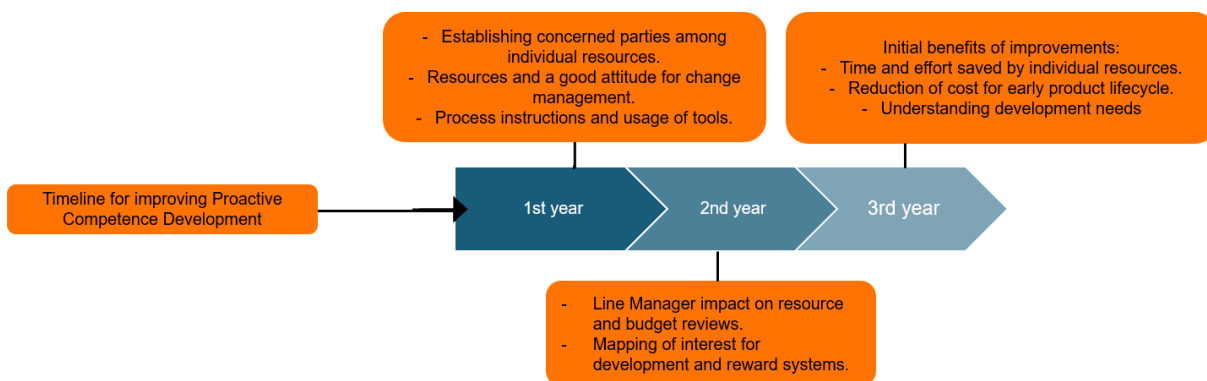
Figure 13. Timeline for the improvement suggestions (Saarela 2016, 58).

As Figure 13 illustrates, the proposed timeline for the iplementing the improvement proposals could be set to 2-3 years. Initially the basic foundation for the proactive competence development should be in place before launching the more detailed functions of the proposals such as the mapping of interest and the Line Manager's evaluating roles. The target with utilizing this plan is to achive some recordable results within three years of it being implemented.

5.2.2 Benefits

By implementing the improvement proposals, the case company would be gaining following benefits.

o   Increased efficiency of Technical Service technical support.
o   Reduction in cost, early on in a product or a systems lifecycle.
o   Providing Technical Services Line Managers with a trigger for change is required.
o   Increased level of adopting new technologies and solutions.
o   Higher job satisfaction of employees.

As proactive competence development would aid in how Technical Services resources commit their time to different tasks the technical support would ultimately increase as a result of improved efficiency in identifying new competence. By improving the communication and understanding of how to gain new required competence input, the individual resource would have to spend less time screening for potential input. A potential reduction in cost for products or installations could also be expected in their early lifecycle as the approach to gain competence would be more efficient in comparison to today. If Technical Services increase their competence at an earlier stage in the products or systems development, then issues seen early in the products or systems lifecycle can be mitigated trough increased know-how. An earlier developed competence level will also aid Technical Services resources in their efforts to both validate the product or system and troubleshoot unforeseen issues developed over the time of initial operation.

Apart from covering potential gaps in time and resource availability, the resource and budget review enables concerned Line Managers with a trigger for change if required. While the trigger for change initially must be evaluated, the implementation of the additional resource review aims to give the Technical Service Line Manager leverage if the review is based on a sound case. The additional resource (for either identification- or implementation of competence) will not only ensure that new competence is established but it will also free up time for other Technical Service resources across the whole Support Team.

By interest mapping and reward system implementation an increase in job satisfaction can also be expected. By only reviewing what the individual knows at a certain point in time the value gained can be directly link to intellectual capital for the case company. By also reviewing what the individual resource is motivated by and what is in his or her interest, based on the different areas of work, the case company can also review their possibility to increase their intellectual capital for the future.

"*There is a positive and statistically significant correlation between intellectual capital investment and increased shareholder value*"
(Ichijo & Nonaka 2007, 189).

6 Discussion and Conclusions

This section reviews and summarizes the study. First, it provides a summary of the study. Secondly, it evaluates the study by comparing the end results to the original objective set at the start of the study. Finally, the chapter evaluates the study and reviews the reliability and validity of the research and its outcomes.

6.1 Summary

The original scope of this study was to create a proposal on how to improve the competence of Technical Services, when it comes to new introductions of products or systems. Instead of just being aware of new incoming technology the target is to be prepared for the required support of said technology. The approach for managing this original problem was to initially define the objective and the scope for the study and after that explore literature that can best aid the study. After that data was collected in order to generate a AS – IS analysis, to find the current state of competence management in the case company. After the AS – IS analysis ad been established further data was collected to create the final proposal of how to improve the competence of new products or systems within Technical Services.

The case company in this study is a provider of both products and complete solutions for both the marine and energy markets. It has its global headquarter in Finland with regional headquarters located worldwide in 70 different countries. This study focuses strictly on the Technical Services organization within the case company, specifically Technical Services. Technical Services is one of the most important technical knowledge centres within the company, supporting technically internal and external stakeholders during the whole life cycle of the products, solutions and services delivered or serviced by the company. Technical Services offer specialized technical services like component investigations, calculations, measurements services both for internal and external customers.

At the start of the study the focus was on the objective and scope of the work itself, after defined, the focus shifted towards the theory of competence, knowledge management and organizational learning to better understand the concept and to give further insight into applicable theories for the study. The AS – IS analysis was conducted through a collection of data, including both a survey and conducted interviews. Based on the received data it was possible to merge the results of the data collected with the theory to create a proposal for proactive competence development for Technical Services.

6.1.1   Reliability and Validity

As described in chapter 2.5, the reliability and validity of the study was ensured by commonly used practices of qualitative data analysis, combined with multiple source confirmation. This means that data was both collected by multiple sources and confirmed by multiple sources before being considered definitive. Additionally, data was collected from trusted sources with relevant input into how Technical Services operate within the case company.
Validity, dealing with the question of how research findings match reality and how congruent the findings are with reality can be best supported by the usage of multiple sources. Reliability, referring to the extent to which research findings can be replicated can also be referred to usage of multiple sources. However, the replication of the study can be arguably based on the writer of the thesis. The writer also recognizes that qualitative data analysis can be up to the data reviewer's own interpretation when interpreting, indexing and charting the data. In conclusion, different methods of data collection were used. The methods included a survey, interviews and a literature review on competence, knowledge management and organizational learning.

6.1.2   Outcome vs Objective

The original scope of this study was to create a proposal on how to improve the competence of Technical Services, when it comes to new introductions of products or systems. The study provides improvement proposals in the area of competence development, in order to increase readiness to support internal and external clients in Technical Services. By being increasingly proactive in its competence development, Technical Services would be more efficient in the way they operate, reduce potential cost spent early on in a product- or a systems lifecycle and provide an increased level of adopting new technologies and solutions with a higher job satisfaction of their employees. This improvement proposal was based on the best practices from theory, identified through the literature review, and the issues identified through the AS – IS analysis.

Hence, it could be considered that the outcome of the study would meet the objectives of the thesis once implemented. The theoretical improvement proposal offered by the study and the implementation of said improvements will have to be further discussed internally in the case company.

If said improvement proposals are taken into use, further study into the impact of these could be considered to fully understand the implications the proposals have had, and the achievability of the benefits mentioned in chapter 5.2.2. This would then naturally have to follow the suggested timeline for the improvement suggestions shown in Figure 13. Relying on the reliability of the study, it would be advised to execute such an additional validation through a similar research design as this study utilizes, see Figure 1.

7   References

Adams, J. Khan, H. & Reaside, R. 2014. *Research Methods for Business and Social Science Students*. New Delhi, SAGE Publications.

Communication. (n.d.) In *Merriam-Webster's collegiate dictionary*. https://www.merriam-webster.com/dictionary/communication (retrieved: 02.11.2021)

Competence. (n.d.) In *Merriam-Webster's collegiate dictionary*. https://www.merriam-webster.com/dictionary/competence (retrieved: 01.10.2021)

Davenport, T. Eccles, R. & Prusak, L. (1992). *Information politics*. Sloan Management Review Fall 1992, Vol.34(1), p.53.

Develop-to-Market process description (Internal documentation), [Online]https://wartsila.sharepoint.com/sites/process/Ship%20Power%20Processes/DeveloModuleToMarket/Pages/Default.aspx (retrieved: 25.03.2021)

Dyer, J. & Nobeoka, K. (2000). *Creating and managing a high-performance knowledge-sharing network: Toyota case*. Strategic Management Journal March 2000, Vol.21(3), pp.345-367.

Ekinci, Y. 2015. *Designing Research Questionnaires for Business and Management Students*. London, SAGE Publications.

Gold, A. H. Malhortra, A. & Segars, A. H. (2001). Knowledge Management: An Organizational Capabilities Perspective. *Journal of Management Information Systems.* Vol. 18(1), 185–214.

Grant RM. (1996) Toward a Knowledge-Based Theory of the Firm. *Strategic Management Journal.* Vol. 17(2), 109–122.

Handzic, M. (2004). *Knowledge Management: Through the Technology Glass,* Danvers, MA, USA: World Scientific Publishing Co. Pte. Ltd.

Harder, M (2008). *How od rewards and management styles influence the motivation to share knowledge*. Frederiksberg: SMG Working Paper No.6/2008. Copenhagen Business School.

Ichijo, K. Nonaka, I. (2007). *Knowledge creation and management – New challenges for managers,* Oxford, New York; Oxford University Press, Inc.

Internal Documentation. (revised 2019). *DBAA118672.*

Ipe, M. (2003). *Knowledge Sharing in Organizations: A Conceptual Framework. Human Resource Development Review* 12/01/2003, Vol.2(4), pp.337-359.

Jones, P. & Jordan, J. (1998). *Knowledge orientations and team effectiveness*. International Journal of Technology Management 1998, Vol.16(1-3), pp.152-161.

Lacey, A. & Luff, D. 2007. *Qualitative Data Analysis; The NIHR Research Design Service for the East Midlands.* University of Nottingham, Nottingham.

Levitt, B., & J. March (1988) *Organizational learning. Annual Review of Sociology*. Vol. 14. pp.319-338.

Liedtka, J. (1999). *Linking Competitive Advantage with Communities of Practice*. Journal of Management Inquiry. Vol. 8(1), 5-16.

Lindgren, R. Stenmark, D. & Ljungberg, J. (2003). *Rethinking competence systems for knowledge-based organizations* Eur J Inf Syst 12, 18–29. https://doi.org/10.1057/palgrave.ejis.3000442 (retrieved: 01.10.2021)

Merriam, S. & Tisdell, E. 2016. *Qualitative research. A guide to design and implementation.* San Francisco, CA, John Wiley & Sons Inc.

New Product Introduction process description (Internal documentation), [Online] https://wartsila.sharepoint.com/sites/compass-Finland/English/Paikallistoiminta/Ship_Power/Vaasa_Delivery_Center/New%20Product%20Introduction (retrieved: 27.03.2021)

Probst, G. Raub, S. & Romhardt, K. (2000). *Managing Knowledge: Building Blocks for Success*. Dublin: John Wiley & Sons.

Saarela, J. 2016. *Improving Knowledge Management in Consulting Service Business.* Helsinki: Metropolia University of Applied Sciences. Master's Thesis.

Sheng, W. & Raymond, A. (2010). *Knowledge Sharing - A Review and Directions for Future Research*. Human Resource Management Review. Vol. 20, 115–131.

Shin, M. Holden, T. & Schmidt, A. 2000. *From knowledge theory to management practice: towards an integrated approach*. Information Processing and Management, Vol.37(2), pp.335-355.

Takeuchi, H. Nonaka, I. (1995). *The Knowledge Creating Company,* Oxford, New York; Oxford University Press, Inc.

Vestergren, R. 2002. *Directive for Introduction of new Engine Products* (Internal documentation).

Walle, Alf H. 2015. *Qualitative Research in Business: A Practical Overview*. Newcastle upon Tyne, Cambridge Scholars Publisher.

7.1 List of figures

7.2 List of tables

7.3   Appendices

Appendix 1. Survey layout and results.

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Appendix 2. Survey Raw data.

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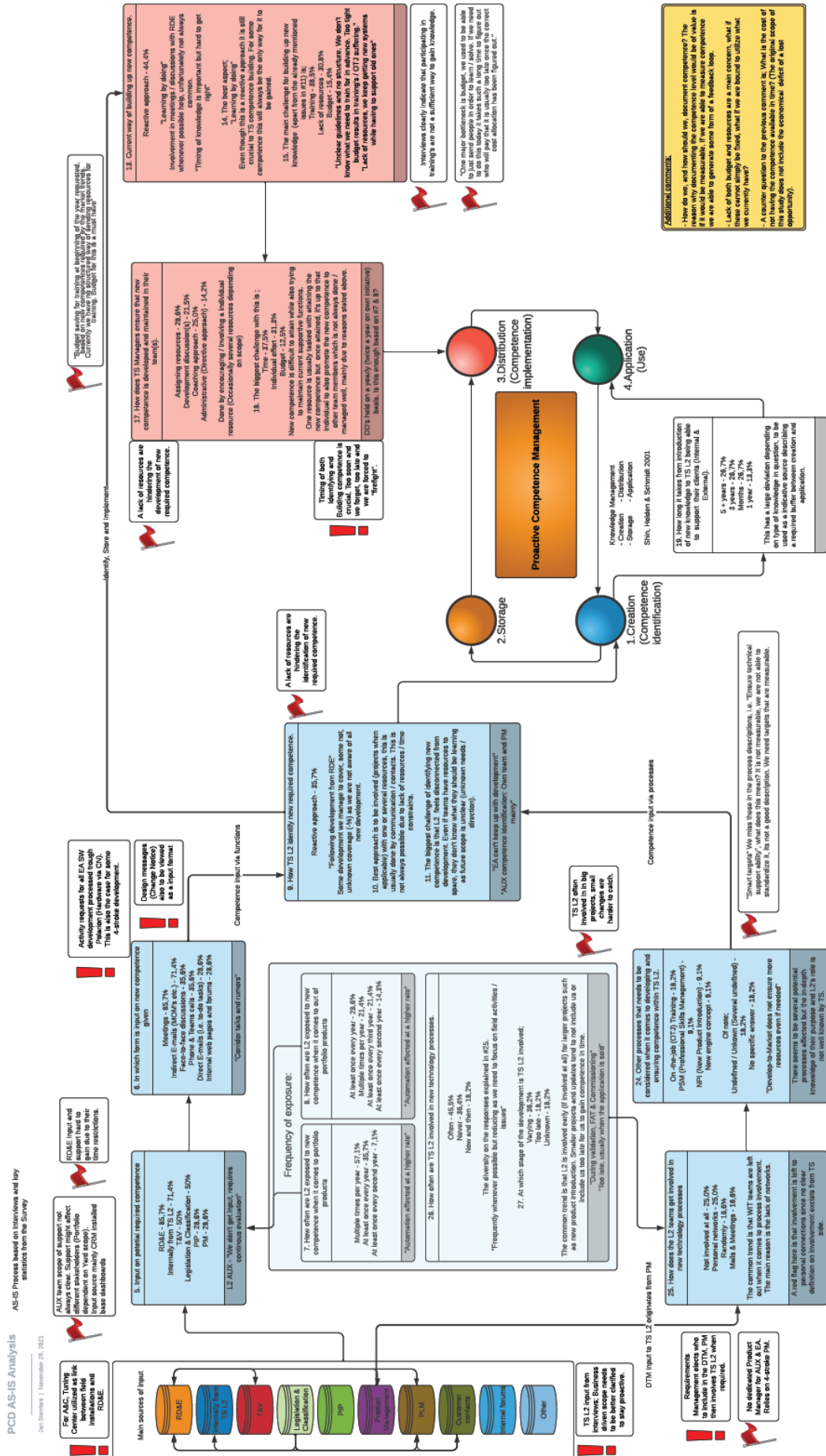Appendix 3. Survey and Interview results compilation.

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Appendix 4. AS – IS Analysis.

PCD AS-IS Analysis

Jan Sterling | November 29, 2021

Proactive Competence Management

1. Creation (Competence identification)
2. Storage
3. Distribution (Competence implementation)
4. Application (Use)

Knowledge Management
- Creation
- Storage
- Distribution
- Application

Shin, Holden & Schmidt 2001

AS-IS Process based on interviews and key statistics from the Survey

Main sources of input

RDAE | NPI / New TS L2 | TAV | Legislation & Classification | PIP | Product Management | PLM | Customer contacts | Internal forums | Other

A lack of resources are hindering the identification of new required competence.

A lack of resources are hindering the development of new required competence.

Timing of both identifying and building new competence is crucial. Too soon and we forget, too late and we are forced to "firefight".

Interviews clearly indicate that participating in training is not a sufficient way to gain knowledge.

Appendix 5. TO – BE Model.

"We need a model on how TS L2 anticipates new knowledge, being ready to build competence."
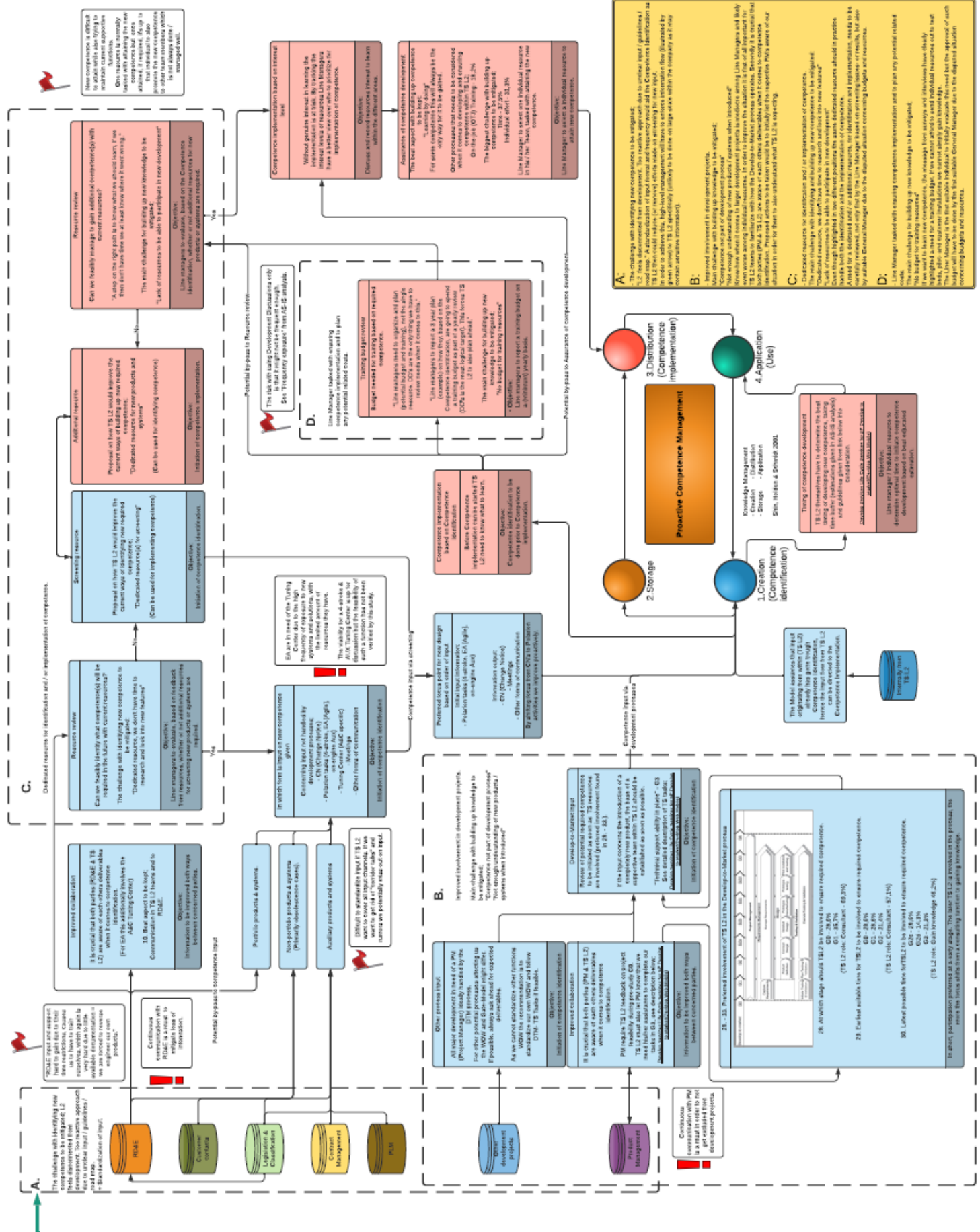
Appendix 6. Proactive Competence Development Matrix.

Proactive Competence Development TO - BE Matrix
Jan Sienten | November 14, 2021

*Communication:
Noun, "the imparting or exchanging of information by speaking, writing, or using some other medium". "Communication" is by design left open for interpretation as this ideally is to be agreed upon by respective parties.

Although not specified by either survey nor interviews, the recommendation for "Communication" would be a scheduled and re-occurring format in which both parties can attend any incoming subjects concerning the gain of new competence.

Recommended Actions based on the TO-BE Model	A. Improvement of competence input format from sources not related to development processes	B. Improvement of competence input format from development processes	C. Additional resource review	D. Training Budget review
TS L2 4-stroke	Recommended actions: - Communication* between TS L2 & RDE to be improved and maintained. - It is crucial that RD&E Engines Platform are aware of TS L2 4-stroke required deliverables when it comes to competence identification. - Proactive approach to design changes through accessing Polarion design activity.	Recommended actions: - Communication* between TS L2 & PM to be improved and maintained. - TS L2 Line Managers & Individual TS L2 resources to familiarize with how the Develop-to-Market process operates prior to involvement. This is done to improve the understanding of what is expected of them in terms of competence development. - It is crucial that both parties (PM & TS L2) are aware of each others deliverables when it comes to competence identification. Proposed actions to be taken to make respective PM's aware of our situation in order for them to also understand what TS L2 is expecting.	Recommended actions: - TS L2 Line Managers to evaluate the need for a screening and / or dedicated resource for implementing new competence. - TS L2 Line Managers to adapt suggested workflow. Competence Identification to be done and evaluated before Competence Implementation. - TS L2 Line Manager to review the need for a dedicated and / or additional resource, for identification and implementation. To be approved by first suitable TS L2 General Manager. Even though highlighted in two different positions, the same dedicated resource could in practice handle both the identification and the implementation of competence. - TS L2 Line Managers and / or individual resources to determine the best timing of developing new competence, taking potential time buffers into consideration. - TS L2 Line Manager to select one individual TS L2 resource in his / her Team, tasked with attaining new competence.	Recommended actions: - TS L2 Line Managers to report a training budget on a yearly basis. - The TS L2 Liner Manager, as the first suitable individual should estimate the required budget for incoming required training's within the team, to be approved by first suitable TS L2 General Manager.
TS L2 Engine Automation	Recommended actions: - Communication* between TS L2 & AC to be improved and maintained. - It is crucial that Automation & Control are aware of TS L2 EA deliverables when it comes to competence identification. - Proactive approach to design changes through accessing Polarion design activity.			
TS L2 Auxiliary Systems	Recommended actions: - Communication* between TS L2 & CM to be improved and maintained. - It is crucial that Contract Management are aware of TS L2 Aux deliverables when it comes to competence identification. - Proactive approach to design changes through accessing Polarion design activity.			

Research Development & Engineering Including A&C and Tuning Center for TS Engine Automation	Recommended actions:
	- Communication* between TS L2 & RDE/AC to be improved and maintained.
	- Ideal responsible functions within RD&E:
	  - 4-Stroke: Engines Platform (Technical Management & Design Management),
	  - Engine Automation: Automation & Control (Automation System (Asset & Life-cycle) & Customer Delivery),
	  - Auxiliary Systems: Ancillary Systems.
	- Above mentioned functions have to be aware of TS L2's responsibility to screen and potentially implement competence if seen as needed. This means that a minimum of 1 TS L2 resource have to be included in any relevant development in order to evaluate potential needs.
	- RD&E to standardize new development input format and frequency to aid the Competence identification.			

Product Management		Recommended actions: - Communication* between TS L2 & PM to be improved and maintained. - Product Managers have to be made aware of TS L2's responsibility to screen and potentially implement competence if seen as needed. This means that a minimum of 1 TS L2 resource have to be involved in new development projects in order to evaluate potential needs. - PM to standardize new development input format and frequency to aid the Competence identification.		
Contract Management + Product Management & Sales Support *TS L2 Aux Systems have no direct equivalent function representing in-house RDE, hence input from CM & PMSS is required*	Recommended actions: - Communication* between TS L2 Aux & Contract Management (CM) Catalyst Systems (CS) Fuel Gas Supply Systems (FGSS) Portfolio Management (PortM) to be improved and maintained. - Above mentioned functions needs to provide TS L2 Auxiliary Systems with information on what we deliver & develop - Above mentioned functions to standardize delivery input format and frequency to aid the Competence Identification.			