Peter Ågren

Technical Training Guidelines

Strategy, Organization and Immaterial Supply Chains in Technical
Training

Metropolia

As I graduated from the vocational school of HelTech as a carpenter in the spring of 2002, I vowed that I shall never study again. In 2013, as I graduated from Metropolia University of Applied Sciences as an engineer, I vowed that I shall never study again. As I received the notice of being accepted to the Industrial Management Master's Programme in Metropolia University of Applied Sciences, I thought to myself, here I am again. I wonder if I shall ever study again.

I would like to thank the Case Company for providing me with this opportunity to study and provide a solution proposal for an identified business challenge. The thesis would have not been possible without the help of all the persons involved in the work. This has been a noteworthy journey in times where nothing is predictable towards a broader business competence.

I would specifically like to thank the following persons,

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The fellow students of the Master's Degree Programme of Industrial Management 2019.
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Abstract

This thesis focuses on technical training guidelines which aim to improve the training offering in international fire suppression business.

The objective of the thesis is based on a business challenge. In the business of fire suppression, the engineers and technicians working on the firefighting equipment must be trained to the level in which they can work to fulfil the requirements laid by customers, authorities, and the company they work for. In fire suppression business there is no room for mistakes as the consequences may be dire.

The thesis follows the design research method which provides practical solutions to business challenges by using both quantitative and qualitative research methods. The method has four main steps: current state analysis, literature review, proposal building, and validation. In these steps, data is collected in steps 1, 3, and 4. The data is used to find the challenges within the current processes and to provide information on which the solution may be based on.

The study of this thesis revealed that in the case company, strategic plans for technical training were never created or at least the strategy was not implemented in the field. The study revealed that processes were developed, and some processes were used but not always to full extent. Based on these findings a proposal to establish a department strategy with strategic goals and reorganize the training function was created. Training model was created based on the findings and a proposal for an immaterial supply chain, which would expand over the enterprise and customers.

Keywords	Technical training, training strategy, training model, immaterial supply chains

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1 Introduction

Technical training is critical in businesses in which machines need to be commissioned to prove the correct operation of the machine and serviced regularly to maintain the functionality of the machine and to prolong the lifetime of the machine. This thesis addresses the criticality and the need of technical training and the matter of creating training programs for field engineers.

The thesis was carried out for the case company to support the service offering of the company. One part of the case company's service offering is technical training for field engineers working in commissioning and service operations. The thesis addresses the creation of guidelines for technical training, based on the analysis of the current state of the training offering, training process and the current state of the skills and competences of the field engineers.

1.1 Business Context

The case company is a manufacturer of fire suppression systems, consisting of pump units, valves, sprinklers, spray heads, operating panels and other components related to water-based fire suppression systems. The case company designs and manufactures the pump units and components, and the complete systems are either designed by the case company or by the case company's partners. The case company sells the products to the customer by the company's own sales departments or through a global distributor partner network.

The case company has two main business segments, Marine and Land.

Fire suppression systems are lifesaving equipment and therefore, the correct commissioning procedures and maintenance procedures must be adhered to and to cover this issue the case company began to train field engineers in a systematic way in 2013 at the case company's training facilities. Before 2013, training of field engineers was carried out by following a case-by-case approach and there were no training plans, official trainers or any resources allocated for training. All training courses and events during this time period were done on ad hoc basis.

The case company issued training certificates after the training to the trained field engineers as a proof of competence due to customer demand. Certificates were issued to everyone participating in the trainings, regardless of the outcome of the training, but no records were kept from those certificates in a systematic way. After establishing the training system all trainings have been uniformed to produce systematic training outcome and for the training participant to be certified, the training participant had to pass an

exam. The case company has kept a record of trained and certified persons so that the certificates may be re-issued to competent and experienced field engineers after certificate expiration, if pre-established criteria were met.

Certificates are needed to give prove for the customers, insurers, and authorities that the field engineer in question is competent to carry out a particular service or to commission the system.

The case company expanded the offering from selling fire suppression systems, spare parts, maintenance and commissioning services, training partner company designers, salespersons, and field engineers to offering end user training for system owners and users in 2015. A training campaign was launched in 2017, with the launch of a new pump unit, to familiarize the field engineers to a new pump unit control and operating system. With new products and systems, the need and criticality of technical training is substantial. The next section addresses the business challenge of the case company, the objective, and the outcome of the thesis.

1.2 Business Challenge, Objective and Outcome

The business challenge is that, after training the field engineers at the case company's training facility with the current training program, the field engineers still need support to carry out their work and to meet the expected standards.

It has been brought up by the case company's project and after sales departments, and by the customers, that the skill level of the trained and certified field engineers does not meet the expectations. This has led to complaints from the customers. In some cases, a second field engineer has been sent to finish the work, because the first field engineer onsite was unable to complete the work due to lack of skill and knowledge.

The company operates in a global market, where the actual workplace can reside anywhere on the planet and disruptions in commissioning or service operations can lead to high costs for the case company in the form of travel expenses and labor costs.

The Objective is to create guidelines to improve the training offering.

> This thesis work is carried out for the case company's training team and the results and findings are intended to be used in the company.

The Outcome of this thesis are guidelines to improve training offering.

> The guidelines to improve training offering are intended to be used by the company to achieve the company's strategic goals.

1.3 Thesis Outline

This thesis follows the research design approach in which the current process is analyzed after which topic related literature is visited. With the information gathered from those steps an initial proposal is created, which is then validated by the company. After the validation, the work is then reviewed and then the work is considered to be a final product.

The current state of the process is analyzed according to the methods of the case company and the methods of the research design. Methods used by the company are derived from Lean methods.

The literature which is to be visited in this thesis concerns the training methods, process development and supply chain management, with the main focus on literature regarding training.

The initial proposal is created from the information gathered during the literature review, current state analysis and from data collected in this stage.

Final training guidelines are created from the feedback received from the company and when it has been validated by the company management.

1.4 Key Concepts

The following key concepts and terms in this thesis.

- Commissioning

- Service

- Authority, Class Authority

- Approval, Approved System

- E-learning

Commissioning is done to all systems which are installed onsite. System commissioning is needed to provide proof of functionality of the system and to prove that the communication between case company's systems and Third-Party systems work. Commissioning in the case company includes system inspection, start-up, operational tests and possible troubleshooting. In addition to these basic operations in commissioning, modifications to the system according to customer, insurer or authority demand are made when needed.

Service in the case company refers to manual service work and maintenance done to the system on a regular time interval, for example annual service, bi-annual service and 5-year service. Breakdown service is included in the services provided by the company, but breakdown service is not considered to be a part of the concept service.

Authority and Class authority is a person working for company, which oversees that the installed systems are compliant with standards, rules and regulations. Authorities hold jurisdiction over the site and are responsible for approving the installed and commissioned systems. Without the approval of the Authority, the system is not commissioned. Authorities carry out regular inspections on vessels and other sites where systems have been installed to see that the systems are operational and according to standards.

Products and systems can be approved by an approving company, for example VdS. The approved system or product is tested for function and afterwards certified by the issuing approval company. Tests are either conducted, under approving company's supervision, according to national or other valid regulations or if none exist, then according to the issuing approval company's guidelines. The approved system or product can then be sold, installed, and used in places where approvals are needed.

E-learning is learning, teaching, information acquiring, information implementation, and understanding carried out via the internet.

In the next section the research methods and material are discussed.

2   Method and Material

In this study, the selected research approach is design research and the methods to collect data are both qualitative and quantitative.

2.1   Research Approach

There are two basic types of research approaches, fundamental research and applied research. Fundamental research is used for theoretical studies where the purpose is to gain more knowledge on a specific matter. Applied research is used in contexts where the result provides a solution or new knowledge to a business problem (Saunders et al. 2012). Therefore, applied research was selected for the study because the thesis addresses a practical business problem.

In applied research approach there are multiple sublabels, such as case study and action research, and for this study the approach of Design Research was selected because according to Kananen (2013: 20-21) the "design research produces functional and practical solutions" and the "design research is conducted in organizations in order to improve operations".

In the research both quantitative and qualitative data was collected due to the complexity of the business problem.

2.2   Research Design

In this study there were four steps in the research design. The first step was the analysis of the training processes, the second step was reviewing existing literature on the subject of the study, the third step was creating the first proposal for the outcome and the final step was the validation of the proposal. Data was collected in phases 1, 3 and 4. Data is discussed in more detail in section 2.3. An outcome emerged from all of the phases once the phases were completed. In the following figure the steps are illustrated.

"To develop a set of guidelines to improve the training offering"

Analysis of the Training Process	Literature on (Technical) Training	Proposal for Training Guidelines	Validation of Training Guidelines Proposal
DATA 1		DATA 2	DATA 3
Description of the current processes	Case relevant ideas from literature	Input from Data 2	Management Review
Interviews regarding the process and the current implementation		Input from Literature	Improving initial Solutions and Proposal
Checking the documentation and current metrics			
Summary of the Training Process Pros and Cons	Framework Concept	Initial Proposal for Training Guidelines	Final Training Guidelines

Figure 1 Research design.

As seen in figure 1, the current training process was analyzed as the first step of the design. The analysis consisted of three subphases: Description of the current process, Interviews regarding the process and the current implementation and Checking the documentation and current metrics. In the first subphase, the current training processes were described through the existing process documents of the case company. This part described how the process was designed to flow. In the second subphase, interviews regarding the processes and the current implementation were carried out with teams and individuals from different business units. The third and final subphase of the training process analysis was the checking of the documentation and current metrics. In this subphase the metrics used to follow the performance of the trainings were documented and all results of previous trainings were documented. As an outcome, a summary of the training process pros and cons was generated.

In the second phase existing literature on the subject was reviewed. The selection of the literature was based on the outcome of the first phase. As an outcome of this phase a framework concept was generated.

In the third phase an initial proposal for the training guidelines was made. The inputs for the proposal came from the literature reviewed in the previous phase and from the data collected from the interviews and workshops carried out in this phase. The outcome of this phase was the initial proposal for training guidelines.

In the final phase of the design the final proposal was validated. The proposal was reviewed by the management and the improvement ideas were implemented into the initial proposal, creating the final outcome of this study and thesis.

In the next section the methods of data collection and analysis of the data are presented.

2.3　Data Collection and Analysis

Data in this study was collected in three different phases. First data collection was done during the analysis of the current processes, the second data collection was done during the proposal for training guidelines phase and the last data collection was done during the validation phase of the training guidelines proposal. Each data collection phase contains five different elements; content, which informs the type of information gathered for the data collection, source, which informs where the data came from, informant, which informs the organizational position of the person or group handing the data, timing, which informs the time when the data was collected and the outcome, which informs what the data is used for. The table below illustrates the phases and the related elements.

Table 1 Data plan.

	Content	Source	Informant	Timing	Outcome
Data 1 Analysis of the Current Processes	- Description of current process - Pros of the current process - Cons of the current process	- Workshops - Interviews with BU´s - Questionnaires to customers - Existing documentation	- Sales Channels - Training Team - Key Partners - Business Units - Field Engineers	January 2020 March 2020	Summary of the Training Process Pros and Cons
Data 2 Improving Training Methods and Offering	- Input to the topic	- Interviews - Workshops	- Training Team - Business Units	March 2020 April 2021	Initial Proposal for Training Guidelines
Data 3 Feedback Validation of the Proposed Processes	- Improvement of Initial Solution and Proposal	- Interviews	- Business Unit Directors & Managers - Data 2 Informants	April 2021	Final Training Guidelines

As seen in table 1, the data in phase 1 is a set of data collections from the case company's documentation, interviews, and other sources. Informants who were interviewed to map the current training process were sales channels representatives and relevant business unit representatives. A workshop was carried out with the training team regarding the training processes. A questionnaire was sent to the field engineers and internal customers, who are called Key Partners, to receive feedback from the current training

process outcome. The outcome of the first data collection is a summary of the training process pros and cons. Processes analyzed in Data 1 are shown in Table 2.

Table 2 List of processes used in the current state analysis.

	Process	Description	Confidentiality level
1	Annual Training Planning Process	Produces an annual training calendar	Restricted
2	Training Content Planning & Production Process	Produces training courses and training modules	Restricted
3	Training Implementation Process	Produces a training event	Restricted
4	Training Request Process	Produces input for training content planning and production process	Restricted
5	Certification Process	Produces certified commissioning and service engineers	Restricted
6	Recertification Process	Produces recertifications of commissioning and service engineers	Restricted

Table 2 shows the names of the processes in the process field and what they produce in the description field. The level of confidentiality is shown in the last field. All of the processes related to commissioning and service training are listed as "Restricted" and therefore, cannot be fully disclosed in the thesis. The documents analyzed in Data 1 are listed in Table 3, which is shown below.

Table 3 List of documents used in the current state analysis.

	Document	Description	Confidentiality level
1	Training plan	Course specific training plan.	Restricted
2	Training register	Registry of trained persons	Restricted
3	Market feedback analysis	Feedback of the training event	General
4	Partner evaluation form	Tool for certification process	Restricted
5	Partner evaluation instructions	Instructions for evaluating partners	Restricted
6	Participant background information form	Tool for training implementation process	General
7	Welcome letter	E-mailed information note for training event participants	General
8	MkDenial	Tool for background checks	Restricted
9	Marketing & Training Roadmap	Roadmap to meet company strategy	Restricted
10	Information bulletin of HI-FOG certification process	Information bulletin for partners and business units	Restricted
11	SIPOC	Process summarization tool	Restricted
12	Scorecard	KPI calculation tool	Restricted

In Table 3 documents are listed in three fields, which are Document name, Description and Confidentiality level. The second field briefly describes the function and/or purpose of the document. The third field shows the level of confidentiality of the document. Most

of the documents are listed as "Restricted" and therefore, cannot be fully disclosed in this thesis. The documents which are listed as "General" can be disclosed in their normal formatting. If a document, which is listed as "General" is a form and it is filled, then the confidentiality level changes to "Restricted" and cannot be disclosed afterwards.

Data 2 was collected from a selected group of the same informants as in the first phase data collection. Methods used in the data collections were interviews and workshops with the informants to receive input from the stakeholders. The outcome of data 2 serves as an input for the initial proposal for training guidelines.

Business unit directors and selected informants from data 2 collection were interviewed for Data 3 to serve as an input for the improved training guidelines, which is the final outcome of this thesis.

Majority of the data analysis was carried out in the current state analysis stage, which is discussed in detail in the following section, The Current State Analysis.

3   Current State Analysis

In this section the current state analysis of the training process is discussed. The current state analysis consisted of five main steps: overview of the current state analysis stage, description of current training process, pros of the current training process, cons of the current training process and the key findings from the current state analysis. The main steps are discussed in more detail in the following section.

3.1   Overview of the Current State Analysis Stage

The training process was analyzed in steps which included reviewing existing process descriptions, carrying out a workshop and interviewing the stakeholders and other key affiliates. The analysis was done concurrently with the case company, as the case company was carrying out a business process maturity check for the training process. As there was an overlap on the analyses done for this thesis and for the company, some information from the analyses is not disclosed in this thesis due to the fact that it is company restricted information.

As a first step, the existing documentation was investigated to understand how the processes were planned to be executed and how many processes were involved in the actual training process. This step included the analysis of the documents related to the processes. For this thesis it was paramount to understand the executed processes and their relationship with the training outcome.

The second step was to continue the investigation of the existing documentation to find out what measurements were carried out and followed. This step was done to reveal what actually was measured and what was the impact to the process and were there any other impacts.

In the third step, the informants were interviewed individually, and the interviews were carried out as informal sessions. The interviews included predetermined discussion openers, which were not considered as strict questions which needed to be answered formally. The purpose of the interviews was to retract information on the current processes and how they work from the perspective of the stakeholders and how well the outcome of the current training system serves the business units. The interviews were audibly recorded with the consent of the interviewed persons. The interviews were listened to for a number of times to draw out the key themes. The interviews were not transcribed fully, and the partial transcriptions were not published. The first interview was carried out as a pilot interview to find out if the discussion openers were relevant to map

the process and to receive information on the current state of the process and the process outcome. The following interviews were carried out on the basis of the pilot interview.

The fourth step included sending questionnaires to selected field engineers in the partner chain and to the case company's own field engineers to receive information on the actual impact of the training courses to the field engineers. The selection criterion was agreed with the case company and the criterion was that the individuals had to have participated in the training courses within 1 year. This criterion was agreed on with the case company to limit the amount of field engineers to whom the questionnaire was to be sent and to ensure that the recipients still had clear memories of the training courses.

In the fifth step, a workshop was carried out to map the actual process and to investigate if the planned and described processes had any differences to the actual practices. The workshop was carried out with the training team.

In the next section the training processes are discussed in detail.

3.2   Description of the Current Training Process

The training processes are described in the following subsections in more detail. All described processes were listed in the SIPOC of the Marketing & Training Department of the case company with the exception of two subprocesses, certification process and recertification process. SIPOC stands for Supplier, Input, Process, Output, Customer and it is process summarization tool used by the case company. The processes are described in their logical order.

3.2.1   Annual Training Planning Process

The annual training planning process was the first process, which was investigated. The investigation revealed that the annual training planning process produces a training calendar for each calendar year, which is then posted on the case company's intra page and sent to the business units and to partner companies through the case company's sales channel.

During the analysis of the process, it was found that the Annual Training Planning Process does not have any description or any defined process steps. The process only has

a name, an output and an input. The process does not have a process owner and the process is not tied to any strategies or goals. In the following text the process is described in detail and the process, in all its simplicity, is depicted in the figure below.

Figure 2 Annual training planning process.

The following description is based on the interviews and actual workflow as the process is not formally defined in the company. The training calendar is created by the training team at the end of the calendar year. The input for the process comes from the business units and through Engineering department when it comes to new product launches and their corresponding courses. The input received from the business units are, the number of expected participants for the year, new recruits, demand from partners, etc. The training calendar is then created by the training team with the input from the aforementioned parties and from the knowledge and experience from the previous years. The number of attendees per course and topic has an effect on the calendar. During the creation of the training calendar, the people who were put on hold or placed in the training queue from last year's training courses have priority when planning the first training events of the coming year. The process uses a First In, First Out principle to sort out the participants when it comes to situations where double booking may happen or when there are more applicants than seats on the training courses. In the next subsection the Training Request Process is addressed, which is closely tied to the Annual Training Planning Process.

3.2.2 Training Request Process

The training request process was the second process which was investigated during the current state analysis. The process produces input to the first process, the Annual Training Planning Process, and to the third process, the Training Content Planning and Production Process, depending on the type of the received training request. In the following text the process steps are described and in the figure below the process is depicted.
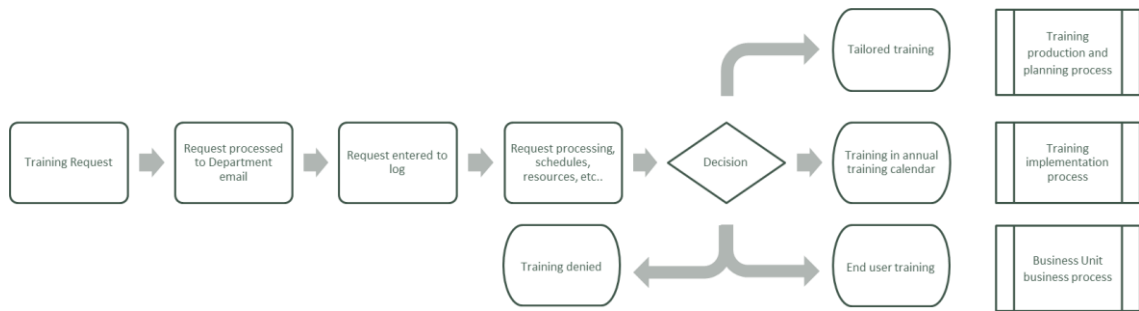
Figure 3 Training request process.

As seen in the figure 3, the process begins with the input of a training request. The request can be of any format to include all types of requests as an input for the process. Then the request is processed through the training team's workflow and a decision of carrying out the training event is made. Depending on the decision, yes or no, the process has four flow paths from the decision. The first path is that the training request is approved, and the customer is informed and guided to the training event which is in the annual training calendar. The second path is that the training request is approved, but the training request is so specific that the training events in the training calendar are not suitable for the need or there are scheduling challenges. Then a tailored training event or course is suggested to the customer and then the request is processed in the Training Content Planning and Production Process. The third path is that the training request is for the end users of the case company's products and then the request is transferred to the business unit in question. The fourth and the final path is that the training request is denied. In this case the customer is informed about the matters leading to the denial of the training request.

When the process was analyzed, it was seen that the process was handled well and the persons involved in the process within the training team were up to speed on the process, but it was also discovered that the customers did not always know how and where to send the training requests. In some cases, the business units handled the requests on their own, because they were not aware of any other training offerings but the annual training calendar. In some cases, the customers did not know from where to find the annual training calendar, which was causing annoyance in the customer base. In the next subsection the training content planning and production process is discussed, which is tied to the training request process and the training implementation process.

3.2.3   Training Content Planning and Production Process

The training content planning and production process was the third process, which was analyzed during the current state analysis. The process produces training courses and modules for basic training courses which are in the training calendar and for the tailored training events, which are created from the training requests. The following text describes the process steps in detail and the process is depicted in Figure 4, below.
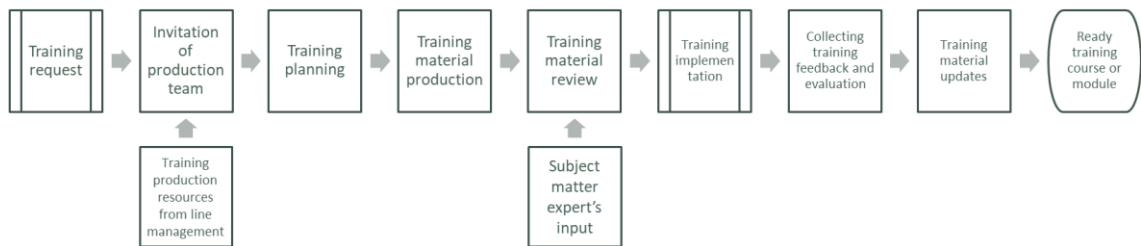
Figure 4 Training content planning and production process.

The process starts with the Training Request Process as an input, which means that all new training courses and modules are planned and created when there is a formal request for a training course or a training module. The next step in the process is for the process owner to invite a production team to begin the creation of a training course or a training module. The production team resources are delivered by the line management of the case company's departments. Then the training course or module is planned, and the training material is produced. After the production, the training material is reviewed by the subject matter experts and after the review, the training course or training module is implemented. The implementation happens in the process called Training Implementation Process, which is described in subsection 3.2.4. Training Implementation Process. After the training event is carried out, feedback is gathered from the participants and the training event is evaluated. Based on the feedback and the evaluation of the training, training materials are updated, and the training course or training module is considered as a ready training course or module and the process ends.

The analysis of the process revealed that the step where the production team is invited by the process owner is not known outside of the training team. The line management was not aware that they should allocate resources to the training planning and production process. What was done with new product launches was that the Engineering department created all technical documentation, which was then used as source material by

the training team's technical training specialist who was responsible for the production of the training material. The analysis revealed that in the training material review step of the process, in which the subject matter experts give their feedback and input to the training material, was not known by the department heads or team leaders. What was done instead was that the training material owner, the technical training specialist, used informal ways to receive feedback from the subject matter experts. The analysis also revealed that after the implemented training event the feedback, which was gathered from the participants gave information on the satisfaction level of the participants in regard to the course, which was not the intention of the feedback. The same feedback form was used in this process and in the Training Implementation Process. This had a straight effect to the training material update step. Training material update step was intended to solve the shortcomings of the training materials, such as presentations, handouts, etc. In the analysis it was seen that due to resourcing challenges the training material updates were falling behind on every training course and training module. The analysis also revealed overlaps and inconsistencies related to the use and gathering of the feedback, which is discussed in subsection 3.2.7. Metrics. The following subsection addresses the training implementation process.

3.2.4   Training Implementation Process

The fourth process, which was analyzed was the training implementation process, which produces training events. The process produces training events, and the depiction of the process is illustrated in figure 5 and the process is described in the text following the depiction.
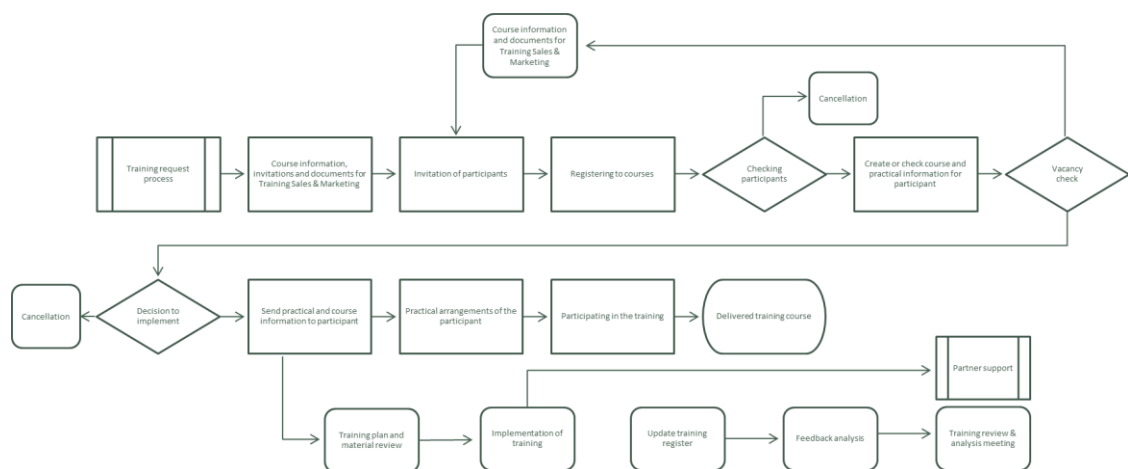

Figure 5 Training implementation process.

As seen in the process depiction, the input for the Training Implementation Process is the Training Request Process. After the input arrives to the process flow, the training team sends out information related to the training course in question to Training Sales & Marketing, who in turn sends invitations to the participants. After receiving the invitations, the participants register to the courses via email. The emails are sent to the training team's joint email account. The registrations are checked by the training team and the training team checks whether or not the registered individuals are acceptable for the course. If the registered persons are not accepted for training, they are informed about the matter. For the persons who were accepted to attend the course, a course is either created or a suitable course is checked from the training calendar and the registered persons, participants, are informed about the matter. After the correspondence with the participant, vacancy is checked from the training register, which has the information of all the courses of the annual training calendar and all the tailored trainings and the participants of the courses. The information regarding the vacancy is then passed on to the Training Sales & Marketing with the information of the courses. This is done to fill in the remaining seats if there are any left on the course. Training Sales & Marketing sends this information to the possible training course participants, which have not yet registered to the courses. After the vacancy check a decision to implement is made by the training team. If there are not enough participants or there are resource challenges the course is cancelled, and the participants are informed. If the decision is made to implement the course, then practical information regarding hotels, travel, schedules and so forth is sent to the participants. At this stage, the process description is split in two flows. The first flow describes the process from the participant's perspective, which is the main perspective, and the second flow describes the process from the trainers and training team's perspective, which is the organizational perspective.

From the perspective of the participant, the process continues to the step where the participants make their own practical arrangements, such as booking the flights and hotels. After this the participant participates in the training event and the process ends to the final step, which is called "delivered training course".

In the organizational process flow, the first step after the separation is the training plan and material review step, in which the materials and plans are checked that they are up to date and suitable for the participants' needs. This step is done in both cases, in training courses which are in the annual training calendar and in tailored training courses. The next step is the implementation of the training. After this step the organizational process

flow is split in two different flows. First process flow is a continuation of the organizational process flow and the second is a process flow which ends in Partner Support Process. In the organizational process flow the next step after the training implementation the training register is updated, which holds the information of all the trained individuals. Then the feedback forms from the implemented training course are analyzed and in the final step, which is called the training review and analysis meeting, the training event is analyzed and updated to the training course or training modules are made according to the analysis.

The analysis of the Training Implementation Process revealed two breaking points and two steps which were not followed and many general inconsistencies.

The first breaking point in the process was the second step, where the course information, invitations and other related documents were to be delivered for the Training Sales & Marketing. In the case company's organization, there is no entity called Training Sales & Marketing and as per company and corporation rules, technical training which is provided to the business units is free of charge. Therefore, this step could not be followed. The second breaking point in the Training Implementation Process was the process output called Partner Support Process. The analysis revealed that the process does not exist. There were no records or descriptions found from this process or any other processes with a similar name or expected process content. The first step which was not followed in the process, according to the current state analysis, was the step in which the course information and documentation was delivered to the Training Sales & Marketing after the vacancy check in the process flow. The reason why the step was not followed was the same as for the first process breaking point, the Training Sales & Marketing does not exist in the organization. The secondary reason for not following the process flow was that the communication regarding vacant seats was either done by the training team with the business units or by the training coordinator and the partner company, which meant that a need for a third-party involvement was not needed. The second and final step, which was not followed in the process flow was the training review & analysis meeting. The reason why the process was not followed in this step was twofold. Firstly, the step was not known and secondly there were not enough resources to analyze the training events. The feedback gathered from the training events were not extensive enough to provide sufficient data for analysis on their own and together with re-

source challenges this caused more reasons for not following the final step of the process. More details about the feedback challenges can be found in subsection 3.2.7. Metrics. The next subsection discusses the certification subprocess.

3.2.5 Certification Process

The certification process was the first subprocess which was analyzed in the current state analysis. The certification process produces certified field engineers. The process is illustrated in figure 6 and a detailed description of the process is on the following text after the illustration.
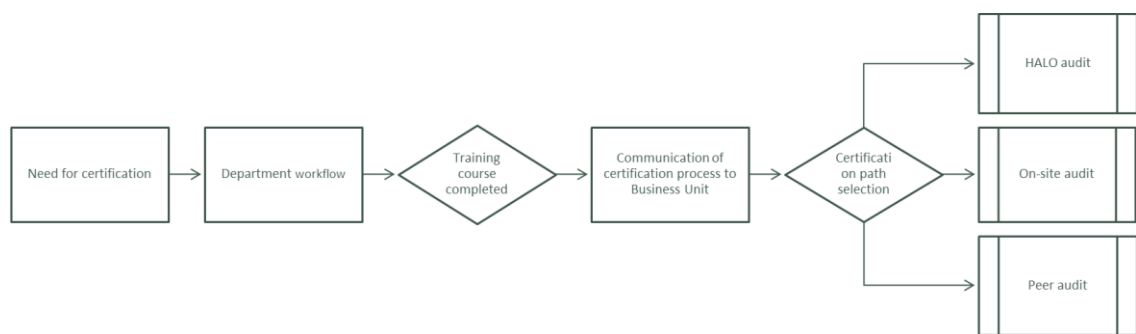
Figure 6 Certification process

The process begins with an input called "Need for certification". The input is described as any type of communication regarding a field engineer's certification from any source. When the need or request for certification is received the request is put through the Marketing & Training Department's workflow, where the person who is requesting to be certified is checked by the corresponding business unit and the Marketing & Training Department. Then the training register is checked and if the person has completed the corresponding training course, the upcoming certification and the certification process is communicated to the business unit. If the person has not completed the training course, which is relevant to the case, the matter is discussed with the person and then the communication either ends or a training request is made. After communicating the certification decision to the business unit, the business unit and the certificate applicant decides from three certification path options.

The first option is HALO audit. In this option the applicant travels to the case company's head office, where the training facilities are and carries out the commissioning and service tasks to the system in the training facility. The second option is on-site audit, where

either a technical trainer or a certified senior field engineer travels to a site where the applicant carries out either a commissioning or a service to a system. The last option for certification audit is peer review. An experienced and certified field engineer supervises three commissioning jobs or service jobs or any kind of combination of the two jobs and evaluates if the applicant can be certified for the system. The certification audit can be judged as passed or as failed.

The current state analysis revealed that there are weak points in this process. Those weak points include the step where the certification process is communicated to the business units and all certification audit paths. These weak spots in the process are external process steps, which are not in the control of the Marketing & Training Department or the training team. The process breaks in the certification path selection. The reasons for this break are communication and process ownership challenges and resource challenges. For the communication and process ownership part, the challenge was that the certification process is not well known outside of the Marketing & Training Department. The process goes through department boundaries and the process owners in the other departments are not defined, which leads to the situation that the process is not known in the other departments or in other business units.

Other challenge identifies as a resource challenge. Because the process is not well defined and process owners are missing, the cost structure is not clear inside the case company and the costs are distributed case by case. Also, the process has resource challenges when it comes to persons who are allowed to audit field engineers and are able and willing to travel. At the moment of the current state analysis the case company had one person to carry out audits. In the next subsection the recertification process is discussed. The recertification process was created to ease the process of renewing certificates for field engineers who have been working on a regular basis after the initial certification. Earlier, the practice was that to be recertified, the field engineer needed to attend the course again, but it was seen in the early stages that this was not efficient nor necessary.

3.2.6   Recertification Process

The recertification process was the second subprocess and the last process, which was analyzed during the current state analysis. The recertification process produces certified

field engineers. The process is described in detail after the illustration of the process in figure 7.
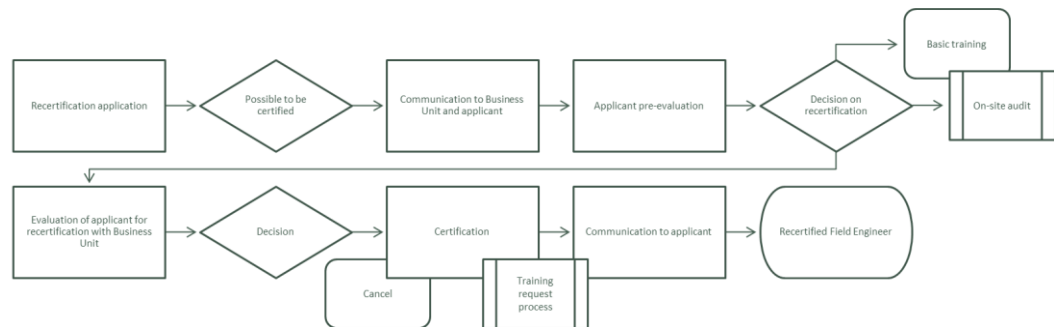
Figure 7 Recertification Process.

The recertification process starts with the recertification application, which can come from the field engineer or from the business unit or from the partner company. In the next step the training team checks if the applicant can be certified. If the applicant passes the checks, then the business unit and the applicant are informed that recertification is being processed. The applicant is the pre-evaluated by checking the work history and completed training courses. Then a decision is made to either call the applicant to participate in the training courses or to audit the applicant. The audit can be carried out in two different ways. The first way is to carry out an on-site audit, where the applicant shows his or her skills to the trainer or to some other person who is allowed to audit field engineers. The second way is to evaluate the applicant's skills based on the work the applicant has done between the last certification and the ongoing recertification. After either of the audit steps the training team and the relevant business unit makes the decision to either recertify the applicant or to call the applicant to participate to a training course.

The current state analysis revealed two breaking point in the process and three challenging steps. The first breaking point is that for recertification the partner companies and the business units do not know where or who to contact. The process is not commonly available information, and it is not communicated as well as it is expected. The second breaking point is the on-site audit process. This is, in reality, never done due to challenges in financial and workforce resources. The same challenges exist here, which exist in the certification process, discussed in subsection 3.2.5. The first identified challenge in the process was that if the applicant is denied recertification and the applicant is called for a training course, the case company does not have enough resources to train the applicant. The second identified problem, which is related to the first problem

was that there is no legal requirement for the field engineers to be certified, other than in very few rare cases, and this leads to the situation where the applicant does not want to invest time and resources in training and recertification. The third and last challenge which was identified in the analysis was that the evaluation of the applicant based on the work the applicant has done in the past does not show the actual skill level of the applicant and in some cases finding any documentation of the work, which the applicant has carried out is very difficult or impossible due to the lack of documentation. The next subsection of the description of the current training process addresses metrics involved in the processes.

3.2.7   Metrics

During the current state analysis, the metrics involved in the training process were analyzed and investigated. The only measurement which was recorded from all of the training processes and subprocesses was the training event trans actual market feedback analysis. The process summarization tool SIPOC had defined metrics for all four main processes: the annual training planning process, the training content planning and production process, training implementation process and the training request process. From the annual training planning process, the number of participants, MFA for the plan, link between the training department metrics and technical support and quality department, cost of training and the number of events, days and participant attendance should have been recorded in the plan, but no records were found in the analysis. Measurements related to the training content planning and production process from which no data was found was that the training content readiness should have exceeded 80 % before the training course took place. The readiness level of 80 % was defined as "Trainer named, subject matter experts named, content reviewed by the training team and the subject matter experts". As for the training implementation process the data, excluding the trans actual market feedback analysis, no data was available in recorded form. The metrics were defined as number of events, participants, and training days from the annual plan as a quantifiable measure of delivery and as quantifiable measure of cost, the metric was defined as "in planned budget". The trans actual market feedback analysis served as quantified measure of quality. For the training request process, the metrics were defined as on time delivery of the background information form for the input metric. Training request output measurement for quantified measure of delivery was defined as on time delivery of responsiveness, referring to answering requests and inquiries. On time was not defined in the process. The input metric for training implementation process was not

defined and for training content production and planning process, the input metric was on time delivery of technical information from engineering. In the following text, the training implementation process' metrics are discussed in more detail.

The trans actual market feedback analysis, MFA hereafter, is given to all training participants at the end of the course. The MFA consists of three different fields, which have questions with numerical evaluation answers and fields for written answer for questions. The three fields are described as satisfaction of pre-arrangements and other practicalities during and before the course, personal performance and satisfaction during the course and the last field concerns satisfaction with the course content.

The current state analysis revealed that the measured and followed value from the MFA was the average of the numerical answers given in the MFA, which the participants gave after the course. After further analysis, it was discovered that the metrics only showed the satisfaction of the participant regarding the attended training course. The metrics were followed on a monthly and yearly basis and due to the case company's quality program, the value from the measurement dictated the quality level of the training team in the organization. The quality level system is based on Lean. By these measures the training team was excelling in their work but the actual impact of the training courses was never measured according to the analysis. In the next subsection the interviews conducted to provide stakeholder insight and perspective on the training processes and the training outcome is discussed.

3.2.8   Interviews

The interviews were done for a selected group of six stakeholders operating in different business units. The business units were marine, land after sales and land sales channels. The interviews were carried out in an informal way, where the interviewer leads a conversation. The key themes drawn from the interviews are addressed in this subsection.

The training processes are mostly unknown to the interviewed persons and this is because the processes in the case company are generated, maintained and developed inside the department and the processes are not communicated outside of the department in a formal way. For some of the interviewees the training process is a synonym

for the annual training calendar, which in reality is a product of the annual training plan-
ning process, which is a part of the whole training process. In the following table a sum-
mary of the interview results and themes are presented.

Table 4 Interview summary.

Informant	Status level	Pros	Neutrals	Cons
1	Manager	• Ready training concepts and courses • Easy to contact • Responsiveness • Training team's activity • Training facility for basic training • Employees are willing and eager for training and believe that it helps	• Training calendar directs recruitment • Before training courses, the new recruits go to the field to see the environment	• Training resources • Certification process • Difficult to get tailored trainings • Solutions for resource problems • Training facility inadequate for real life training
2	Manager	• Training provides good basic skills • Easy to contact • Responsiveness • Training facility provides good environment to learn the operation of the pump units	• Training provides basic skills and therefore new recruits need guidance in the field	• Training resources • Certification process • Training facilities are not suitable for system level training • Training facility is used as passage • Training calendar is not public • Training register is not public • Training team's inactivity and inflexibility due to indifference towards business units and the business
3	Manager	• There is a demand for training and current courses are good, but focus is on pump units • Training facility is good	• After the training there is a lot of questions regarding documents	• Training process is not public • Training is not customer specific or tailored • Training resources • No steering • No field training, except for new product launches but cost structure is not known • Cross-department resources not mapped • No training paths

				• Certification process • Immaterial supply chain
4	Manager	• Responsiveness • Pump unit training is good for older systems	• Training department is only one part of training	• Training resources • Number of courses • New product training level • System level training, PLC and bus missing • No 3rd party interfaces • Strategical connection and cooperation between business units is missing • Limited troubleshooting training • Communication related to training and certification processes • Rules, codes, standards and regulations not trained
5	Manager	• Training is in the annual business plan • Responsiveness • Basic level of training is good	• Trainings seats are delivered FIFO	• Training resources • No steering • Checking the skill level after training is difficult • Certification process • Field training missing • E-support missing • Not in company strategy • No detailed mapping of training needs • Immaterial supply chain
6	Senior Salaried	• E-learning support • Training facilities • Basic service and commissioning course content • Positive feedback from customers • Language and culture barriers are considered • New product commissioning assistance		• Materials, documents and training processes • Training resources • No field training or at customer premises • Inflexibility towards partners • Service training only on base level • Too slow to react to fast changes

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		• Training team's flexibility and service-oriented mindset • Certification is not self-evident after training		• Quality control missing after training • Communication related to tailored trainings • Market value of training is not identified, • Training is not identified in the immaterial supply chain or in the company strategy

As seen in table 4, a reoccurring theme in the interviews was that the training resources are scarce according to all interviewed persons. This lack in resources affect multiple areas in the business across the organization down to the partner companies and their customers. According to the persons interviewed the training resources are seen as number of people giving training and the annual training calendar. Due to low training resources, recruitments have been postponed according to interviewed persons, even though the same persons say that the long-term goal in training a new recruit is as far as one year from recruitment. Also, the low number of trainers has led in numerous occasions to the situation where the case company has not been able to provide training to everyone who have desired it or in fact needed it. The lack of training resources has created an environment where the training department is not fast enough to react to partner company needs. This has led to situations where technical support has been needed to solve basic problems related to commissioning and troubleshooting. For the most part, the lack of training resources is an identified problem throughout the organization in the operational level.

The second reoccurring theme drawn from the interviews was the certification of the trained persons, the costs related to the certification process and the complexity of the certification process. As the certification process, explained in subsection 3.2.5 Certification Process, dictates the trained person should be directed in to one of the three paths leading to certification but all of the paths create some form of costs to the participants company and according to the interviewed people this creates a major problem due to the fact that certification is not mandatory from a legal perspective. Therefore, it is seen that the case company is the only entity demanding the certificate, without any legal or regulatory requirement. The voice of the partner companies is that the certification pro-

cess is too complex and costly and that having this certification system hinders the business. At the same time, the certification is seen as a business opportunity by the persons working in sales related positions. According to them, the business opportunity lies within the exclusive service, which the case company and the partner chain can provide. The exclusivity is that only companies which are in the partner chain can have a certificate on service and commissioning of the equipment and that creates added value for the customers, and this is not seen as a marketing value in the case company. Within the case company, as in the partner companies, the training process usually ends before the certification due to the complexity of the certification process. This leads to a situation where the case company and the partner companies have multiple persons who have attended the training but have not yet been certified working in the field independently, which is not ideal for any party. As the idea of the certification is to ensure that the field engineers and technicians has the needed skills and knowledge and the latest information, it is realized that without a functioning certification process it is nigh impossible to determine the skill level of the field engineers currently working in the field. According to the interviews, the issues in the certification process are strongly linked with the inadequate training resources.

The interviews revealed a third reoccurrence, an interesting contradiction regarding the training facilities. The training facilities were seen as good when giving basic level training for new recruits and the part of the facilities where pump operation, commissioning and service training was given was seen as good. On the other hand, many of the interviewees stated that the training facility does not provide enough variability when it comes to system-level training and that the system-level training equipment is outdated. A major negative aspect of the training facility was that it is stationary and therefore the training is stationary, which translates to high costs for the partner companies, because the partner company has to send a participant, or multiple participants, to attend the training. Even though the training itself is free of charge for the partners, costs are generated form the travel expenses and lost revenues, while the service engineer is travelling and not able to conduct business. In addition to the training facilities and the mobility issue, the lack of onsite training was seen as problematic and a huge shortcoming. According to the interviews, the presence of the case company on partner sites would be beneficiary for all parties, including the end-users. This would be seen as quality assurance and as a sign of seriousness. As a side note related to training facilities in the interviews it was noted that the training facilities were used as a passage to other facilities, which causes

interruptions to the training sessions and on the other hand the training events create problems for the persons who need to use the training facility as a passage.

Strategy, business unit plans and immaterial supply chains we revealed to be the fourth reoccurrence in the interviews. As company strategy is linked to the business unit plans and all information flows back and forth in the immaterial supply chain within the case company and in the partner chain it was seen as a paramount challenge that the company strategy nor the business unit plans were not communicated between the business units and the training department and that training was not recognized in the immaterial supply chain. The detachment from the aforementioned matters came out in the interviews as a notion that the training department does not have a plan whom the department is training, when and why. This was called by the interviewees as the absence of steering. One matter was also pointed out, which was that the training department takes training needs into consideration but the dictates what is the training content, basically disregarding the training needs of the customers.

The interviews revealed lots of information related to the current training model and its pitfalls. A major problem in the current training model and training offering was the absence or deficiency in troubleshooting of the pump units and systems. This is seen as a deficiency in the training as it does not suite the business needs. In addition, the training model did not include any training related to rules and regulations. The understanding of rules, codes and standards is critical to the field engineers and the fact that they were not included in the training plans has led to situations where field engineers have needed to rely on third party information on the matter, which does not give a professional image of the case company or the training plans and models. The non-publicity of the training register and the reservation situation of the calendar courses not being public is seen as an issue, because the stakeholders have to first contact the training coordinator to get information on these matters and that takes time, which is seen as an unnecessary step. The interview revealed, in addition to mostly negative matters, some positive matters as well, including the current service and commissioning course content as discussed earlier. Firstly, the training department is easy to contact, and the responsiveness is seen as quick and good. Secondly, the training department is seen as flexible and service oriented considering the resources available, but on the other hand the training department was seen as inflexible and indifferent towards the business due to low training resources. Thirdly, the fact that the training department is providing commissioning as-

sistance to partner companies for their first new product commission was seen as a positive matter, even though the costs are considered problematic. Fourth issue was that it seemed that the training department has not taken any steps to map out possible resources from cross-department sources, which in turn had a self-feeding effect to the negative experience regarding flexibility of the training department. Fifth issue was the absence of any long-term training paths, which the customers could take, and the stakeholders could use in sales and in skill follow-ups. The sixth issue was related to communication from the training department to the business units. The communication problem was linked to majority of the issues listed in this subsection. A summary of the pros and cons found from the interviews are discussed in their corresponding subsections later in this study. In the next subsection of the current state analysis the results and the content of the questionnaire is discussed.

3.2.9   Questionnaire

A questionnaire was sent to selected field engineers to analyze the outcome of the training courses and certification. The questionnaire consisted of four questions regarding the provided training in general and an open field for improvement ideas and suggestions. In addition to the general training questions, the questionnaire had 11 training course outcome related questions and a field for open comments regarding the impact and the outcome of the training courses. The questionnaire was sent to 12 individual field engineers, who were located in four different business units or partner companies. The field engineers were selected by pre-established criteria, which was that the field engineers needed to have recent memories of the training course content and based on this, a 12-month limit of a finalized training course was put in as a limit.

The questionnaire was answered by 9 out of 12 field engineers. It was expected that not all of them are going to deliver an answer. The questions were the same for all informants but not all informants have participated in all of the courses and because of this difference between the informants, they were instructed to leave those field empty which did not concern them. This had to be considered when interpreting the numerical results. The field for open comments is addresses later. The questionnaire results can be seen in table 5, which is illustrated below.

Table 5 Questionnaire results.

Statement	Poor			OK			Excellent
Rating Score	1	2	3	4	5	6	7
General Training Questions							
Commissioning & Service training offering satisfaction			1		3	4	1
Commissioning & Service training facilities satisfaction				1	1	4	3
Commissioning & Service training human resources					1	8	
Commissioning & Service training hand out materials					3	5	
Improvement suggestions & comments?	Hand out materials are good and important. Suggested to have shorter courses for KAU and MAU units, maybe as well for Electrical stand-by pump and WTU.						
Training Course Outcome Questions							
Theoretical information provided by the training				1	2	3	3
Practical information provided by the training					2	4	3
Hands on skills provided by the training			1		1	3	3
Commissioning confidence after training			1	2	2	3	1
Service confidence after training			1	1	2	4	1
Component overhaul and service confidence after training		1		2	2	1	3
Support need after training (1 = none, 7 = very much)		1	3	2	2	1	
Advanced/In-depth training needs (1 = none, 7 = very much)		1	1	1	4	2	
Pump Unit Type 1 Commissioning & Service Course rating		1		1	2	3	1
Pump Unit Type 2 Commissioning & Service Course rating				1	2	4	1

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Pump Unit Type 3 Commissioning & Service Course rating					3	2

Table 5 shows the numerical results related to the questionnaire questions in a score range from 1 to 7. In this text the results are discussed in detail. In the part of the general training questions the results show that the score is above average for all questions. The average for the first question related to training offering satisfaction is 5.45. One of the informants gave a score of 3 as the other informants scored the offering satisfaction between 5 and 6, with a one 7. For the next question, satisfaction towards training facilities, the average was 6.00. In this scoring there were two informants who scored the question as 4 and 5 as the other informants scored it evenly to 6 and 7. The third question which concerned the human resources in training was scored 5.89 as an average. All informants scored the question as a 6 with the exception of one 5. The last general training question, related to the training hand out material, was scored 5.67 as an average, with an evenly distribution between 5 and 6. The comments related to general training improvement suggestions were that the handout materials are good and important, implying that they are critical for the field engineers. The other comment was a suggestion to improve the training offering by increasing the offering by two or three courses related to specific pump units and pump unit accessories. The averages of the results can be seen in table 6 below.

Table 6 Result averages of the general training questions.

General Training Question Result Averages	
Commissioning & Service training offering satisfaction	5.45
Commissioning & Service training facilities satisfaction	6.00
Commissioning & Service training human resources	5.89
Commissioning & Service training hand out materials	5.67

The averages give a contradictory result when compared to the findings from the interviews. Satisfaction of the training offering is well above average, even though in the interviews it was said that the training offering is limited and does not suit business needs. The satisfaction towards the training facility is closer to excellent than average, as in the interviews, the training facility was seen as outdated and limited when it comes to more than basic training. The contradiction could be explained by the different perspective the two different groups of informants have over the matter. A high average score regarding the human resources reflects the trainers and not the amount or number of trainers in

the company, which in turn explains the contradiction between the questionnaire results and the interview findings. The handout materials, which are given to all participants during the training, as it is laid in the training plans, received a high average score as well. Even though the average scores are all above average this means that there is room for improvement. Following the average scores of the general training questions the training course outcome question results are addressed.

The training course outcome questions were modelled to get feedback from the course content and training models from the perspective of the field engineers, because the field engineers have a firsthand experience of what information, skills and knowledge is needed on the field. As for the theoretical information provided by the training course the scores were quite evenly distributed between 5 and 7, with the exception of one informant scoring the theoretical part as 4. As an average the theoretical question received a 5.89 score. The second question, practical information provided by the training, received an average score of 6.11, with an even distribution from 5 to 7. The third question was answered only by 8 informants instead of 9 and this creates a bias to the result, and it has to be considered when looking at the score. The average score was 5.88, with the distribution leaning towards 6 and 7. One informant scored the practical information as 3, which is alarming due to the fact that the service and commissioning courses are designed to be practical over theoretical and most of the training is hands on. The fourth question, commissioning confidence after training, received a 5.11 as an average score with a spread distribution over 3 and 7. The spread can be in part explained by the fact that the informants have been working in the business for different periods of times. Some informants are fairly new and other are well experienced. But this does not remove the fact that this spread has to be considered carefully. The fifth question, service confidence after training, received a similar spread as the previous question. Only the average score was slightly better, 5.33. The spreading of the scores on both main topics of the training ties in with the interview findings, which were that the courses provide only basic level of training and that is not enough for the business needs. The sixth question related to component overhaul and service received an average score of 5.22 with a spread of 2 to 7. This part of training is embedded in the majority of the normal service and commissioning courses, which the case company offers and the high spread of scores entails that the training targets have not been achieved or that there is discrepancy in the delivery of the course content. The seventh question, where the score rating has been changed from poor - excellent to none - very much, support needs after training received an average score of 3.89 with a wide spreading over the scores. Regardless of the high

spreading, the results show that support is needed after the training. As for the eight question, advanced training needs, the result is in correlation with the support need issue. An average of 4.56 was received with a similar spreading of the scores as with the previous question. The last three questions were related to specific pump unit service and commissioning training courses, the pump unit type 1, the pump unit type 2 and the pump unit type 3. The fact that not all informants have participated in all of the courses has to be considered when looking at the results. The courses are listed from the latest product to the oldest product, which the case company has to offer. The courses were created in the same order, which means that the pump unit type 3 and pump unit type 2 courses have been carried out more times than the pump unit type 1course. For the pump unit type 1commissioning and service course, the course received an average score of 5.13, which is above the average but not much. The distribution of scores is mainly between 5 and 6, with three individual scores on 2, 4 and 7. For the pump unit type 2 training, the average score was 5.63 with a distribution concentrated on 5 and 6. For both the pump unit type 1and for the pump unit type 2 course ratings, scores were received from 8 informants. The pump unit type 3 course was scored by 5 informants and the average score was 6.4 with a narrow distribution over 6 and 7. In the following table, table 7, the averages are presented.

Table 7 Result averages of the training course outcome questions.

Training Course Outcome Question Result Averages	
Theoretical information provided by the training	5.89
Practical information provided by the training	6.11
Hands on skills provided by the training	5.88
Commissioning confidence after training	5.11
Service confidence after training	5.33
Component overhaul and service confidence after training	5.22
Support need after training (1 = none, 7 = very much)	3.89
Advanced/In-depth training needs (1 = none, 7 = very much)	4.56
Pump Unit Type 1 Commissioning & Service Course rating	5.13
Pump Unit Type 2 Commissioning & Service Course rating	5.63
Pump Unit Type 3 Commissioning & Service Course rating	6.40

As shown in the table above, the average scores do not give much information related to the discussed matters, but the informative findings are in the individual responses of the informants. In the following text the open comments are addressed.

The questionnaire had a section for open comments, regarding the training in general. All comments were considered in the analysis. From 9 informants who answered the questionnaire, 7 informants gave open comments. The comments covered a few main themes. The first matter, which was commented was that the training offers good basic skills for commissioning and service, but the length of the course is too short to cover more ground, which many informants wanted. For example, one of the informants wanted the training to focus more on the components and back-up systems and another informant wanted the rules and guidelines when it comes to the installation of the case company's sprinklers and spray heads. One reoccurring theme on the comments was that the training on using the pump unit type 1 parametrization software should be longer and more detailed. There were comments regarding the certification process, as seen in the quote below.

> I would like the test to be more in depth so the knowledge of the student could be understood, tasks from troubleshooting to safety situations couple be included. This would help to show areas where further onsite training could be focused.
>
> I would also like to see on the job training completed after the course. It's hard for to have students shadow us in the "country" on annual services as they are very short and don't offer a lot of hands on applications. It would be good for the students to go shadow a 5-year service for example. (Informant 8)

In addition to the previous comments a point was made in one of the comments, which was that the partner companies are not always up to date on the latest information regarding the documents and manuals and this is seen as a matter, which has negative effects on the business. Final comment was about having a review on the trained field engineers to see that their knowledge and skills are up to date. In the following subsection the workshop carried out for the current state analysis is discussed.

3.2.10 The workshop

For the current state analysis of the training process, a workshop was carried out with the training team. The workshop was carried out concurrently with the case company as it was a part of the case company's ongoing business process maturity check. The workshop addresses the training processes of the marketing and training department and all processes, which were not related to training were left out from the workshop's agenda.

The workshop focused on the process summarization tool SIPOC and the processes identified in it. SIPOC stands for Supplier, Input, Process, Output and Customer. The

summarization tool compiles the processes to a logical order where the process supplier is first identified and then the input from the suppliers to the process. The process output and the customers are identified also. One process might have a single or multiple suppliers, inputs, outputs, or customers. The tool is used to identify measures for the input and for the output as quantified and qualified measures of delivery and quality. In the workshop the current SIPOC was investigated for all four training processes, the annual training planning process, training request process, training content and planning process and the training implementation process. The investigation revealed that the suppliers and input were incorrect in all of the processes and the measures, which were laid in the SIPOC were wrong due to poor understanding of the tool and the terminology used in the tool. The workshop did not reveal any additional information, which was not already addresses in the previous subsections related to the individual training processes and metrics. The workshop continued as the case company's business process maturity check and the results cannot be addressed in this thesis. In the next section the pros of the training process are summarized and discussed.

3.3 Pros of the Current Training Process

In this section the strengths of the training process are summarized. In the current state analysis, it was found that the training processes had many strengths and good qualities. The key strengths were the content of the training courses, level of expertise, responsiveness and the training facilities in which the training courses took place. The training process held good qualities according to the field engineers, mostly on the delivery of theoretical and practical information, hands on skills and pump unit type 2 and pump unit type 3 courses. The basic level training was held at a high rate by the field engineers. In the next section the cons of the training process are summarized and discussed.

3.4 Cons of the Current Training Process

In this section the weaknesses of the training process are summarized. During the current state analysis multiple weaknesses were found from the processes and one finding was that the case company does not have a top-level process for training, but all the processes were described as separate processes with links to each other, which made the following of the process quite difficult. Also, the current performance indicators of the processes are not measuring vital information, which could be used to develop the offering and models of training. From the interviews and field engineer answers it can be said

that the negative aspects of the training process are that the training does not provide enough detailed information or skills and that the training resources are insufficient to meet business needs, such as field training, follow-ups, material updates, certification, which has a negative cascading effect on the cooperation between the business units and the training department and for the business in general. Commissioning and service confidence is not on a high enough level and this is seen on the interview findings as well. Training is not being planned ahead, except for the annual training calendar, which means that the customer needs and business plans are not considered by the department. Communication of the certification and training processes is not on a satisfactory level and that the training register and the vacancy situation of the training courses are not open to all is an issue. All in all, the current training process does not deliver the desired outcome. In the next section the key findings from the current state analysis are discussed.

3.5   Key Findings from the Current State Analysis (Data Collection 1)

In this section, the key findings to which the study is going to focus on are discussed and the reasoning behind the focus.

To understand how the training is carried out in the case company, the training process was analyzed along with related documents. Even though the topic of the study is not to improve processes, it is paramount to understand the process flow behind the actions and to better understand the issues brought out by the interviews and the questionnaires. This study is focused on three topics found from the current state analysis, which are:

1. Field training

2. Strategy

3. Immaterial supply chain

As can be seen from the previous subsections, the absence of field training, along with other challenges, has been noted on several occasions as a major issue in the training model, along with other challenges, which is causing indirect losses to the case company. The second topic in which the study is going to focus on is the company strategy and the alignment of in-department and cross-departmental business plans. Strategy is an umbrella, which covers many of the weaknesses and issues brought up by the analysis. The final topic to be studied is the internal and external immaterial supply chain. As said earlier in the study, that the training has not been identified in the company supply

chain, in relation to strategy, and that the processes are complex and heavy to handle due to communication problems and that information is hard to get and some information may be lost in the processes due to access restrictions. The main focus in the literature review is on the first topic. The other two topics are studied to support the organizational functions to deliver better training.

4   About Technical Training, Strategy and Immaterial Supply Chains

This section discusses the existing knowledge on technical training and the related topics of strategy in technical training and immaterial supply chains in technical training. As it has been established on section 3, the current state analysis, the main topics to be studied for the conceptual framework and ultimately the proposed solution to the business problem are in the mentioned topics. In this section the topic of technical training is discussed in the first section, starting from the definition of technical training and progressing to training models. The second topic, business strategy in technical training, is discussed in the following section, which then leads us to the final topic, the immaterial supply chains in technical training. From these studies a conceptual framework is developed, which is then discussed on the final section of this section.

4.1   Technical Training

To first understand what the term technical training means in this context, literature had to be reviewed. Technical training according to Combs & Davis (2010: 26) is a type of training which extends over boundaries of technical functional training; which is defined to be content specific training to any function or profession or to any discipline, business training; which aims to teaching skills on how to work in a company effectively and personal effectiveness training; a form of training with a purpose of creating better personal management skills. Therefore, technical training within the context of this section is considered as training on any technology overlapping with technical functional training, business training and personal effectiveness training. The three different training types are shown below in figure 8.

Figure 8 Technical Training Definition

As seen in figure 8, the overlap of technical training is more prominent in technical functional training than it is in personal effectiveness training.

Technical functional training refers to training, which is related to an employee's profession, function or discipline and not so to technology. This training is needed for the person to be able to do his or her job. Technical training is mostly comprised of technical functional training as figure 8 illustrates. In the reviewed literature the goal was to separate all other forms of training from technical training and from technical functional training as the difference between the two are in the details, more than they are in anything else. The simplest explanation of the differences was that pure technical training is changing with technology at all times, as technical functional training is more consistent and stable over time. For example, an engineer may have to keep up with fast changes in the technological field, but an HR specialist may not need to refresh labor laws as often. In the given example the engineer is representing technical training and the HR specialist is presenting technical functional training.

According to the sources, business training is in modern days important for technicians, engineers and whomever works with technology and are in contact with internal or external customers. With business training, separate parts of the company or enterprise can be connected, as an example an engineering department can communicate with other department in an efficient way when a common language and code of conduct is first established. Business skills are important to the customers as well. According to Combs & Davis (2010: 23) the ability to translate technical concepts into common-sense or to business language is highly valued. This builds trust between the company and the customer due to the feeling that both parties understand one another, and a technical solution can thus be created. Unfortunately, the same source indicates that the value of business training and personal effectiveness training is usually underestimated, when in reality business training provides ways to present technical concepts and the impact of those concepts to the company in a business-oriented language while at the same time educate the technical expert on how the business functions holistically. The problem according to Combs & Davis (2010) is that technically oriented persons, such as technicians and engineers tend to gravitate away from business trainings, if they are not embedded in the technical training itself to which they naturally tend to gravitate to and this is partly due to the argument that technical experts tend to learn new concepts in a certain way, which is by data, information, and hard facts. The embedded business training should be tangibly presenting the fact that business processes and the technology, which is being trained are deeply connected to one another.

According to Combs & Davis (2010: 17) the need for personal effectiveness training has been on the rise and the need is more and more apparent. What the source defines as personal effectiveness skills are decision making skills, skills on how the receive or give feedback, negotiation skills, problem solving skills only to name a few. When giving personal effectiveness training the differentiation of the training should be done by skill, not by group or audience. This way the training can be broken to pieces by topic to better suit the recipients and it has a better chance of surviving organizational changes. To continue on the matter, the demand for technical experts to be well versed in behavioral sciences and business concepts is there but the demand is not realistic.

The literature points out that product development and related documents from product development are not in themselves to be considered as technical training. The technical experts should own the whole life cycle of the product including documentation of the product but leave the production of the training material for the training experts, but in order for that to be possible, the training experts should be involved in the product development process early on. The early participation to the development process ensures that the delivery process can begin in time to make critical decisions on what to prioritize, how to deliver the training and possibly create funding requests if necessary.

In the following subsection the differentiators of training types are covered.

4.1.1   Differentiators

In this subsection the differentiators between technical training and other training types are discussed. Differentiators are factors, which separate technical training from other types of training, for example soft skills training. Combs & Davis (2010) introduced the differentiators using a U.S military originating system called ADDIE (Analysis, Design, Development, Implementation and Evaluation). The system categorizes differentiators in a systematic way.

The first step of the system, analysis, is used to analyze a business problem or an opportunity to see if training is needed in the first place. The factors for technical training in the analysis are focus, trigger, expected plan and methods. The focus on technical training is on turning ideas and concepts into tangible or intangible forms. The trigger for the need of technical training comes in the form of new product development and launch, which are initiated by responsible business units, such as engineering department. The

expected plan is analyzed at the beginning of the year in most cases but as it is in business, the plan changes as the market and business change or new technology comes available. This sets up a problematic scenario in many cases, as managers and leaders want the training materials to be ready and available before the actual new product launch, where the designers want to use all the time available for testing and possibly improving the product. This leads to a situation where the technical training experts are unable to receive concrete information on the product due to it being still developed. The methods on how to deliver the training should be analyzed also. The delivery may be formal or informal but ideally both. Modern training methods, such as e-learning should be carefully analyzed for the audience, bearing in mind that not all information is best delivered by e-learning. Modern methods may have a negative impact because it does not create opportunities for integrating teams, business units or different parts of an extended enterprise. With e-learning it should always be considered if hands-on learning is more suitable.

The second step in ADDIE is design. This step is to create or establish the objectives of a given training. This is done by validating what content is available and how much, what is the audience size and what sort of information is needed for the audience, contextualization of the training and subject matter involvement. Regarding the available content on new products and systems the argument by Combs & Davies (2010) is that the persons who actually know how the new product or system should work, are the persons who designed it. Therefore, it is imperative that technical training experts cooperate closely with the technical experts responsible of the design of the new products or systems from early as possible. For designing the audience size, in technical training the audience size is seldomly large but usually quite small. With the audience size technical training experts has to have an understanding what the members of the audience know, so that in unison with the audience size and the content can be tailored for the audience. This does not mean that the design should only be made for hard experts of the matter. The training has to be scalable to an extent, so that the training can be further developed for larger audiences. With the audience size and information delivery restrictions, context must be considered. This means that the information changes from generic form to a specific form, according to the audience. Subject matter experts are used in the design of technical training to proof that the content is real and accurate. The whole design should not be left in the hands of the subject matter experts, but the design should be done in cooperation with the technical training experts due to the fact that they tend to forget that the audience does not necessarily have the same level of knowledge and

expertise. In other types of trainings or in trainings where the trained topic is stable or in use over the field, subject matter experts are usually not needed. It should be remembered in the design step that a company does not need to reinvent the wheel. If something is readily available in the common market, it should not be created inhouse because it carries no extra value. As a final note on the design step; The cooperation of the subject matter experts and the technical training experts should not rely on goodwill, but on clear and solid processes.

The third step in ADDIE is the development step, which is there to allow for the development of the training materials. This step comprises of information delivery system changes and training cycles and material standardization and participant certification differentiators. The challenge of short cycles is present in technical training due to the ever developing and changing technology, but it also gives leverage to standardization and certification as the development of such trainings is revolutionary in nature as opposed to soft skills training, which is more evolutionary, meaning that technical training changes less frequently than soft skills training by training style. Standardizing methods and processes and with the expectation that a progression in skills can be seen on the participants of the technical trainings, a certification system can be produced to track the skill levels of any trained employee. But the certification system cannot work without a solid evaluation system. In addition to the internal certification, a combined certificate may be handed, if the company is able to produce validated and accredited industry related certificates.

In the ADDIE system, the fourth step is called implementation and the differentiators lay in learning of new concepts, timing of the release and voluntary instructor profile. Learning and unlearning of new and old concepts in technical training is easier than in human behavior or personal effectiveness skills due to the fact that technical concepts does not have anything personal in them. The lack of personal stakes makes a huge difference especially in unlearning old concepts. The second differentiator in implementation is the release timing, which differentiates from other types of training by not being always aligned with a company calendar, as business or HR training, but with a release of a new product or system or other initiatives or product cycles. Sometimes technical training is aligned with major corporate wide business process changes or initiatives. The last differentiator are voluntary instructors. In technical training the ideal voluntary instructor is a person with a solid background in the subject and with a keen enthusiasm towards training with the ability to teach. Voluntary instructors in technical training come from

inside the company, from expert positions and from different parts of the company organization, not so much from the managerial or higher positions. When contextualizing the training, it is a best practice to use company internal voluntary instructors due to their expertise on the subject and business field, but the voluntary instructors need to be trained for the job, which includes presentation skills, teaching methods, learning theory and so on. The training has to be built so that it roots out all non-applicable applicants because a bad teacher cannot do well even with good training material.

In the final step, evaluation, of the ADDIE system the differentiators are causality, measurability of the training impact, the consequences of delivered false information and the escalation of bad experiences. The main idea in the evaluation step is to determine that were the set goals met and was a business problem or opportunity addressed. Technical training is easier to measure due to it having higher level of causality than other types of trainings. ROI, rate of interest, can be calculated from the measurements done from the technical trainings, which gives more tangible result in the impact of the training. Measuring ROI of technical training is time consuming, and it is not easy, but it gives more leverage to win the stakeholders on the side of technical training. Finally, the consequence of delivered false information separates technical training from other types of training due to the fact that when false information is delivered, it may cause serious accidents, even death. And because of the severity, escalations happen rapidly, and complaints may go all the way up to high management and across the company in relatively short time. As with all training, but especially in technical training, the material should be tested and reviewed before any presentations or training events.

In addition to the aforementioned differentiators, there are many differentiators which does not fit in to any specific step but have an overarching attribute. First one is cost, which in technical training may be high due to laboratories, instruments, fast refresh cycles etc. Second one is expertise and the misconception that anyone can do anything. Even though the idea bears fruit and has truth in it, not everyone can be a trainer due to personal attributers, interests, education etc. As not everyone can be a brain surgeon. And this bridges us to the last overarching differentiator, trust. The participants, stakeholders, have to have trust on the training organization and it does not come for free or on its own. Trust has to be built and earned and the way to do it is by using the best possible people available in technical training.

As seen in this subsection, the differences in technical training when compared to other types of trainings are substantial and therefore, technical training has to be inspected and studied from its own perspective.

4.1.2 Funding and Budgeting Technical Training

Funding is an imperative part of technical training and as the literature suggests, obtaining funding for technical training is not a problem of mathematics or economics but of attitudes. As the stakeholders often see technical training as an expense instead of an investment, the following text addresses what the existing literature considers about funding technical training functions. Also, the literature argues that technical training funding is not a seasonal event but an ongoing event, unlike budgeting is, which is done annually or periodically. First, to receive funding, there must be a business reason to have a technical training organization. Strategic reasons are also addressed in section 4.4 Strategy, which crosses over with this topic. First, the business value needs to be explained to the business executives. According to Combs & Davies (2010), there is a problem when calculating, which of the expenses fall into technical training budget and which does not. For example, if the whole engineering department has to be trained to use a new design program, that should not fall into the technical training budget. Technical training should only pay for the expenses directly created by their own actions, which are in the training programs, technical training roadmap, etc. The literature does argue that there is a grey area, where cost shifts or cost center reallocations are made. One of these grey areas concern the expenses of the voluntary instructors and travel expenses. Therefore, the total cost of technical training is complex to determine and that leads to the fact that funding and budgeting may get complicated. Regardless of the complexity it is compellingly argued in the literature that funding technical training is reasoned by positive effects on the bottom-line. Bottom-line is affected by revenues, productivity and customer satisfaction and from the loyalty, which comes from satisfaction and technical training positively affects all of those. When applying for funding, the literature points out that the programs or initiatives to which funding is requested, leans on one these factors and is aligned with company and department strategy and in particular the strategic objectives and the technical training managers should be able to show the connection between them. A worrying notion in the literature was, that in crisis scenarios technical training is more aligned with business objectives than in normal times, which should not be the case. Technical training should always be aligned with business objectives and technical training organization should have a strategy and a roadmap to

show this alignment, which in turn helps funding requests. But, according to the literature, just the notion that technical training has a positive effect on the bottom-line is not enough, when requesting funds. Especially when all the arguments are more or less intangible in financial terms. So, another solution has to be created in order to receive funding and that is to point out in financial terms, why technical training is a critical investment and to use the documentation from meetings with stakeholders, executives and the steering committee meeting minutes as leverage. The idea of the steering committee is explained in section 4.4 Strategy. As said in the beginning of this part of the section, that obtaining funding for technical training is a problem of attitudes, the technical training manager needs to convince the company that technical training in its current and future forms are necessary for the company to achieve its goals. It should be noted that, even compelling as it may be, the same metrics, which are widely used in other types of training should not be used in technical training as a driver when requesting funding due to differentiators explained earlier in the study. Examples in the literature included the number of courses delivered in a year and how many participants were in those courses, because those metrics does not reflect the factors, which affect the bottom-line.

Technical training differentiates form other types of training due to the fact that in technical training machines or other capital investments are needed. This fact creates a probable need for further funding due to the cost of the investment and the future maintenance of the investment. All this added with the normal labor costs etc. may add up to a multi-million-dollar budget and when budgets are high, responsibility and accountability comes into play as training managers have the authority in approving expenses of technical training. Policies play a huge role in accountability and for that reason policies should be available for everyone to see with ease of access. As there might be limitations in the training sessions audience size and if expenses are made before the training session has been approved for execution and later on the session is cancelled, the policies should explain who is accountable for the expenses. If the policies are not available for the stakeholders, for example, the situation might escalate rapidly when invoices or cancellation fees have been received.

When funding and budgeting training, it is a balancing act between the scope of the training and the time spent on training. The problems lay in the intangible factors, which according to Combs & Davies (2010) are seldomly calculated as costs. These are mistakes made by employees due to low quality training, employees leaving the company

due to low quality training or the lack of training and rewarding systems related to training. A study showed (Combs & Davies, 2010: 166) that employees are 3.8 times more likely to quit their job if they are not trained for the job. The idea is that technical training standards are high enough for the outcome of the training to outweigh the costs and that the trained employees can get the job done. Otherwise, technical training will have a negative effect on revenue, productivity and customer satisfaction. In order to turn the balance of a funding decision more factors can be considered. The factors are savings in labor costs, reduced downtime, safety and product return and warranty claim reductions. The broader the scope on the training the more time training consumes but from all aforementioned factors cost savings can be generated and with the factors mentioned earlier in the text, a strong argument can be made to support technical training funding.

The literature argues that technical training can be offered onsite or offsite and that there is a breakeven point, which determines whether it is more cost efficient to arrange the training onsite or offsite. But the literature also points out that it is case and business dependent, whether the question should be even asked. These cases are equipment critical for hands-on learning. The learning experience, which a person can receive from hands-on learning session is according to sources (Combs & Davies, 2010), phenomenal, even it may create more expenses than originally planned. Therefore, it is recommended to analyze cost and benefits from the training programs, that should they be fully or partially offered onsite or offsite. Key factors in the analysis, as it has been mentioned several times in the literature, are company goals; revenue, productivity, and customer satisfaction, which leads us to return of investment (ROI). Technical training compared to some types of training has roughly 400 % higher ROI, as stated earlier in the literature study, and the fact can be used as a grounding for funding application. ROI can be used basically in two ways, first being that an estimate is calculated that how much the training event creates ROI or the second being, how much ROI was created from the past courses or training programs. Literature states that there are ways to calculate or evaluate training benefits and one method is Phillip's ROI methodology, which has five steps. The steps can be formulated into five questions, which are:

- Was the training event liked?

- Was the content learned?

- Are the participants able to do the job?

- Did the training event make a difference in the business?

- Return of Investment?

Calculating ROI is time consuming in normal circumstances and determining ROI for technical training is complicated due to the intangible properties of technical training, such as assumptions of causality. But when the assumption of causality is directed on skill rather than other tangible outcomes it makes more sense, because the skill can be linked to productivity, quality, and other tangible factors. The literature points out that calculating ROI can be more difficult than it already has been stated, if the training organization creates curriculums on a supply-based model rather than a demand-based model, which is more probable to be in alignment with business strategy and objectives. The literature points out that calculating ROI is not the only answer, when seeking justification for funding, but it is smart to limit the metrics to a few, which are directly linked to business objectives instead of trying to measure everything. When choosing what to measure, the literature suggests choosing metrics, which can be incorporated to business metrics and use balanced scorecards, for example. Also, using testimonials as evidence for the value of technical training towards stakeholders is recommended. It is mentioned that regardless of which approach the technical training organization chooses, it takes at least one financial cycle to collect enough data to support any decisions.

4.1.3 Technical Training Skills and Roles

The notion that anyone can train is a widespread belief according to Combs & Davies (2010), but as the literature points out, not just anyone can do technical training. It takes skill, knowledge and training in the four key areas: technical functional training, business training, project management and managing relationships. Depending on where on the technical training function the individual resides and what that individual's role is, it takes a different combination of skills to be proficient. In training design, the individual needs to have expertise on adult learning theories, instructional design, process and methods and other related subjects. Training delivery experts on the other hand, needs to know more about delivery media and delivery options, culture, sensitivity awareness, learning styles and so forth. But, as the literature shows, all technical training professionals needs a deep understanding on the business they are involved in. Processes, finance, opera-

tions and products and services all comes in to play when dealing with different stake-holders, while planning a training solution for a business opportunity. Regardless, one underlaying skill or a trait for technical training professionals is the skill to understand technology and to learn technical information, especially the technology and information, which comes from the company. Technical training professionals need to have an interest towards technology and be willing to learn new things. If the technical training expert does not have these traits, it can be difficult to provide accurate quality training on time. Detail orientated and analytical mindset are also favorable traits.

Project management is a part of technical training function. The same tenets, which are used in project management are essential in technical training organization. The value for the organization comes from the systemic approach of project management. For the project manager, basic project management skills are needed to explain to the executives why a training solution is a good business case, even though technical training is not a project, but the service it provides comes in the form of projects, which are courses, curriculums, programs and so forth. Project manager is also helpful for the organization in managing or assisting in managing the stakeholders, taking care of budgets, and dealing with possible vendors. One of the project managers jobs include to keep the training team up to date with the company processes.

One skill, which is universal in technical training organization, is related to managing relationships to create stakeholder engagement. This requires good relationship skills, ability to listen and to be sensitive and to have tolerance towards conflict. As Combs & Davies (2010: 196) argue.

> Good relationship skills enable technical training professionals to build trust with stakeholders, collaborate effectively on advisory teams, and partner as needed. Professionals must recognize when an issue has arisen and take the time to resolve it.

The idea is that not all technical training professionals need have all of these skills in technical training organization, but all of these skills are represented in the technical training organization through individuals. The individuals create the organization and according to the literature, there are different jobs or titles for the technical training professionals. An example of such organization is presented below in figure 9.
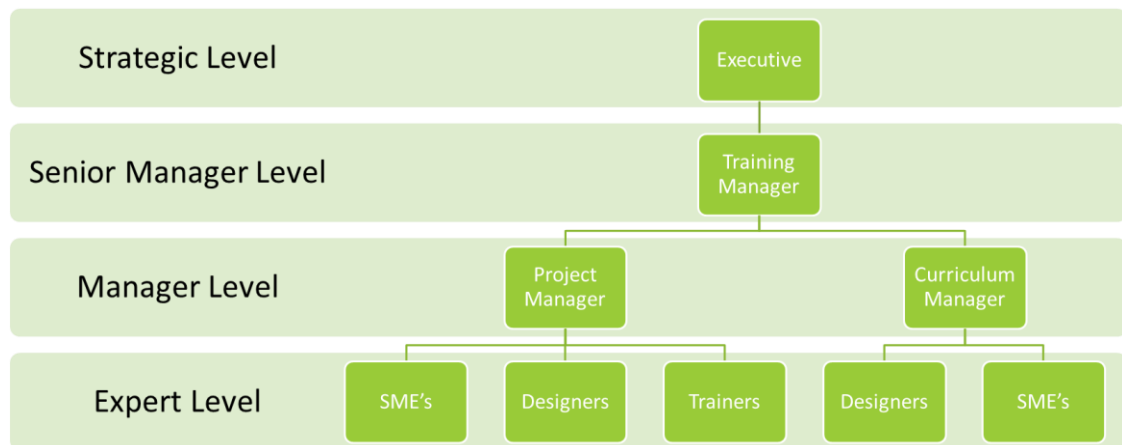
Figure 9 Technical training organization example.

As seen in figure 9, there are executives, who lead the organization and it is the executive's responsibility to drive the training strategy and align it with the company's strategy. The training manager's responsibilities are in communicating with executives and to manage the overall operation of the technical training organization. Project managers are responsible for the products, which are training programs and courses. They basically lead the development of the projects by planning and organizing resources, such as subject matter experts (SMEs). Curriculum managers are leading the development of training curriculums and prioritize training delivery according to demand and need. They also communicate with the SMEs to align schedules. Curriculum managers are not deeply involved in the course development, but still work with the designers. The SME's role is to provide content for the trainers, designers and for the project manager or curriculum manager. SME's do not work for technical training organization but are closely tied to the function by built relationships. SME's also give critique over course content and training programs. Designers create training content and the training courses. Their role is critical for the function as SME's expertise lay heavily on things and not people. There can be many designers with different backgrounds working for the organization due to the differences in creating hands-on course, classroom courses and e-learning courses. Trainers are either hired technical trainers for the job or voluntary instructors from other business units. Voluntary instructors are usually experts in their own field and have to be trained to work as trainers. The fact that trainers have to be real experts is a reoccurring theme on the literature. On the other hand, the literature also argues that technical trainers and technical professionals in general need skill development. For technical training expert, skill development may come in the form of participating on man-

ufacturing operations or other operations, shadowing, job rotation, coaching, development plans and so forth. The focus in skill development should be on the skill gaps of the individual and of the team. Then, there may be in addition to the shown organizational chart an administrative expert on the team, whose job is to support other functions and to carry out other administrative actions. The role of a stakeholder manager, which is further discussed in section 4.2 Stakeholder perspective, is not in the chart because stakeholder management may fall into everyone on the team or for the person or persons with the needed skills to do the job.

The literature pointed out another type of organization, which is introduced later in 4.3 Organizational perspective, de-centralized organization. When a company operates internationally and has an extended enterprise, where partner companies are spread across the globe, the literature makes a strong argument to have either local training professional on the roster or to have an expatriate on the location. The key is that the trainer, whether local or expatriate, is mature for the job because the training manager's role is not going to be as direct as in a centralized organization.

4.1.4 Training delivery

Training delivery starts with preparation. In the preparation, according to Combs & Davies (2010) the training solutions are pilot tested with the voluntary instructors and other instructors or trainers. Piloting differs from the validation of the training course content, which is done with subject matter experts. Piloting is done when the content and the structure of the course is decided to be in an adequate level for delivery and the purpose of piloting is to test that the course delivers a smooth, efficient, and accurate transfer of information from the technical trainers to the participants. After the piloting, all trainers should be ready to deliver the course for the stakeholders and customers to an extent, meaning that the delivery matures over time and the outcome of the training begins to be more consistent with experience. The pilot course should have the voluntary instructors as the audience with a selected group of actual customer participants or stakeholders, depending on the company. The audience is a vital part of the piloting because based on their notes and feedback the course content or flow may be rearranged or changed. The literature makes a strong argument for not taking any shortcuts when piloting a course, due to the fact that anything left untested will be delivered to the customers as it is and the possible issues are not addressed, which leads to unwanted outcome. All parts of the training course whether it is hands-on, scheduling, transitions, tools,

equipment or such, should be carried out during the piloting for the aforementioned reasons. As discussed, the subject matter experts, who become voluntary instructors, should be trained to act as trainers or instructors. A "train the trainer" session or sessions are held to prepare the voluntary instructors for the new job. The sessions should include all aspects of training, which are vital for good performance. Technical expertise is a must, and the voluntary instructors should be exposed to the training material beforehand and as students of the course. Instructional methods should be trained, for the voluntary instructors to be able to deliver the information in the best way possible. Instructional technology, such as online components of the training should be introduced and trained. If the training session includes a hands-on component, the instructors should master the technology so that they are able to troubleshoot any issues, which may arise during the training. The purpose of a "train the trainer" sessions or sessions is to fully prepare the voluntary instructors so that they are able to deliver training courses independently. Combs & Davies (2010) state that after the "train the trainer" session the voluntary instructors should have a real course to deliver for actual customers very soon. The reason is that the information, which they received from the "train the trainer" sessions are fresh and the motivation to use new information and skill is high.

Training can be delivered in many different environments with many different ways. Combs & Davies (2010) mention that classroom, e-learning and blended training are predominant ways to deliver technical training. In addition, hands-on training, simulation, social networking tools, vendor training and mandatory training are related to technical training as ways of delivering training. The literature states that traditional classroom training is most effective when the training involves physical skills to achieve training goals or when face-to-face interaction is needed. It was also mentioned that interaction in training sessions increases the likelihood of participants supporting one another on the job. But traditional classroom training has a negative aspect to it, which is the limited interaction with the instructor or with other participants after the training course. This may lead to problems in the skills related to problem solving and troubleshooting. E-learning on the other hand is more efficient in delivering technical concepts and procedures than traditional classroom training. The availability of the training is not tied to schedules or locations. Subject matter experts may operate as mentors instead of classic instructors and give support to specific issues when needed. In the blended training model, both ways of delivery are used to create the most efficient learning environment for the participants. Combs & Davies (2010: 271) gives an example where the participant is first given an online pre-work before attending the classroom training and after the classroom

training, practices the skills on his or her own pace and afterwards books an online meeting for follow-up. And in the background a discussion thread is ongoing from the beginning to the end. The advantages are that the participant is served in a way, which benefits the participant and allows the participant to get more information and support outside of the classroom restrictions. Blended training can also be used to introduce a learning portal or information portal to the participants in a classroom face-to-face. Then the participants can use the portal on the job when needed. This way the person on the job does not have to rely on memory but instead the person may collect the needed information from the portal for that particular job or issue. Technical training most often has a hands-on component in it to ensure that technical skills are developed. The hands-on component may have equipment, tools, procedures, or any kind of technology in it, which facilitates the opportunity to practice in real life situations, which in turn allows the participants to apply the learned information, knowledge, and skill. Hands-on component also gives immediate feedback for the participant on his or her performance and it may make the training session more exciting and create a better learning experience. If hands-on training is too dangerous, then simulations may be used. Simulations are used, when the environment or the task itself if too risky to the participant or to the group or generally risky or dangerous, or when the tasks are complex in nature and making a mistake creates scheduling, resource, or facility problems. Combining hands-on and simulation may create an effective learning experience in some fields. Social networking tools are informal learning and training tools, which do not substitute formal training with trainers and instructors but may be helpful for the learners. Social networks are usually self-organized between the learners and experts so the information flows from expert to learner and from learner to learner. The social network allows learners to have more access to the experts and breaks barriers between company departments and allow for "just-in-time" learning. In some cases, it is justified to use a vendor to deliver training. The cases are according to Combs & Davies (2010); when the vendor controls the technology, when certificates are needed, etc. Vendor training may be carried out onsite, offsite and the content may be generic or specific depending on the case. When designing a portfolio of services and products, vendors should be considered in the process. Portfolios are discussed in section 4.4. As most of the mandatory and compliance training is usually governed by human resources, HR, technical training organization does not have a lot to do with mandatory and compliance training unless it is specific for a technical job or a task. These trainings may include safety training or method training. The literature argues that if there is no penalty for missing the mandatory and compliance trainings, the can-

cellations and no-shows are high. Therefore, a penalty system must take place, for example, if a technician does not have the mandatory training certificates in place it may lead to termination of employment or cancellation of a planned business trip. The reason is that the differentiator in missing the mandatory or compliance part of technical training is that the consequence may be severe injury or death, when in non-technical training the consequences may not be as dire.

After the training has been delivered the outcome of the training needs to be evaluated. The evaluation is done for two reasons, first reason being that the stakeholders want to know how well their investment paid off in terms of increased performance of the workforce. The second reason is that the technical training organization needs to know the same as the stakeholders, in order for the organization to understand how well the training transfers to the actual job. The feedback on technical training outcome is quite immediate. Either the trained person could perform on the job or not. There usually is no midground in the feedback, when it comes to the actual outcome, but the business impact is not as easy to evaluate according to the literature. Combs & Davies (2010) point out that transfer of training to the job is more efficient when the training environment is similar to the actual working environment and hands-on components in the training reinforces the learning experience. They also point out that managers have a big role on how technical training is seen within the workforce, which has an effect on how self-efficient the workforce can grow with the help of technical training. If the managers are not onboard or have a negative attitude towards technical training, they might influence the training organizations performance indicators through evaluation. As said, the evaluation is done on the transfer of knowledge and skill to the job the trained persons are carrying out, which in turn means that the design of the training has a huge influence on the outcome. Therefore, factors which affect the learning transfer should be considered when designing or redesigning training. The content and the whole setup of the course has to be directly tied to the actual job. Combs & Davies (2010: 282) point out the following.

> A training design that includes the opportunity to practice, receive immediate feedback, problem solve, and make corrections (typically part of technical demonstration and hands-on exercises and simulations) facilitate training transfer.

It is noted in the literature that there may be barriers in the training transfer, for example, the equipment the person is trained for does not yet exist in the market, or that the technology which should be used is not available in the field, which again points back to the

design of the training and the content relevance. This leads to another problem, which is that new acquired skills deteriorate fast and therefore, the skills should be put into use as quickly as possible.

Training programs and instructors should be evaluated also. Training programs have the same reasons for evaluation as technical training in general, to resolve if the outcome was positive in the eyes of the stakeholders and the training organization. Instructors should be evaluated so that they can evolve as professionals. The literature points out that forms used for feedback at the end of the course, whether they are online or paper, are a quick and an economical way to gather information but there is the danger of bias. The training participants may rate the instructor on paper different than what they inform their manager or supervisor. The outcome of the training is more interesting for executives. The problem lays in how to measure the outcome. A passed test does not reflect in actuality the transfer of training. One way of measuring the business impact, according to the literature, is to measure a baseline of an operation, which the training should impact, and then measuring the same indicator after the training. This takes time and expertise to measure and calculate but it may provide crucial information on technical trainings business impact. Combs & Davies (2010) suggests that a technical training organization selects a training, which is strategically important and identifies a performance measure, which is attributed to skill, takes a baseline measure from that operation, and measures the performance for a selected period of time and finally analyzes the result with the help of statistics and process experts.

In the following subsection the literature on stakeholder perspective of technical training is discussed.

4.2   Stakeholder perspective

In this subsection the literature on the existing knowledge on the stakeholder perspective is discussed. As the vast literature on customer care, customer-oriented service business and customer relationship management argues that in any business, the needs of the customers are paramount to understand in order to be competitive, Combs & Davis (2010) argues that when training customers, the need of analysis should never be overlooked and the assumption that one size fits all should never be made. The reason for this is that existing literature shows that in different organizations, in different business

fields, same approaches does not work due to the differences in operation and overall field. When considering customer service, the literature reviewed suggests that customer service should always be seen from the customers perspective and end-to-end, instead of singular contact points to receive full information and feedback on the customers experience. A noteworthy argument by Combs & Davies (2010) was that technical training organizations have an opportunity to define to the stakeholders what technical training is in the company. This opportunity, if taken, has the potential to align understanding and to make technical training more efficient for the businesses. When the training is efficient, the employee's skills can be built to reflect market needs. Also, when technical training happens outside of the company premises, for example at a customer site, the business impact is greater through impression of higher quality. The fact is that as training directly impacts the bottom line through increased revenue and customer loyalty amongst others. In the next subsection different stakeholder identification and stakeholder roles are discussed.

4.2.1   Different stakeholders and identification

This subsection discusses and identifies different stakeholders and their roles. Stakeholders can be company internal or company external. Company external stakeholders are considered as stakeholders in the extended enterprise, such as partners and customers.

As stated earlier, the need for analyzing stakeholder needs is paramount, which means that the technical training organization should engage stakeholders early on and create long-term relationships with the stakeholders to better understand their needs. The benefit for the company is that technical trainers are then able, with the help of stakeholders, place focus on the real business problems, which are identified by the stakeholders. This results in higher quality of training and the trainings are more relevant to the stakeholders. First, from the internal and external stakeholders, managers and team leaders have an insight on what are the skill gaps within the workforce and are therefore, able to provide crucial input for the technical training experts. Second, the technological leaders should be onboarded tightly on to the technical training organization to provide information on what is coming and where to prioritize when it comes to technology. Taking technology leaders such as engineering department directors onboard provides benefits

for both parties, because technical leaders are reliant on the technical training organizations support with the new product launches and related processes. Also, technical leaders have a lot of leverage when it comes to funding technical training.

One of the internal stakeholders are identified as the subject matter experts. The role of the subject matter experts is to naturally provide information and content in cooperation with the technical training experts but also from time-to-time work as an instructor or part-time trainer. According to the source, it has to be clear for the technical training experts that the subject matter experts have other priorities than training and training is not their primary job and because of these reasons the process has to be easy and not time consuming for the subject matter experts. Instead of heavily relying on subject matter experts to participate in the training functions, the voluntary instructors can be utilized. Basically, the voluntary instructors are subject matter experts who have volunteered to work as trainers from time to time or according to a schedule and who have been properly trained to deliver technical training, but the defining idea is that they are experts of the matter, with several years of experience before they start to train others. It has to be noted that voluntary instructors need recognition from their work as the job demands a lot of additional work and learning from their part. Employees are naturally one of the company internal stakeholders as they are most often the audience of the training event and as such have high expectations on the training delivery with a high variance on the delivery method as Combs and Davies argues.

> Employees' preferences vary on how training is delivered, although all employees want easy access to training. Some prefer onsite local courses or e-learning, whereas others prefer to travel to get away from job demands when training. Location, length, delivery methods, "hands on" components, and instructor play into employees' decisions to enroll on technical training. When employees' needs and preferences are not taken into account in designing technical training, they may not complete the training, retain understanding of the concepts, or apply any learning on the job. (Combs & Davies, 2010: 103)

The argument on the quote on employees can be extended to partners and customers if the organization has, as mentioned, an extended enterprise. To some stakeholders technical training is considered time consuming and unnecessary and due to this it is advisable to meet with all the stakeholders and discuss the challenges and opportunities to come into a solution where the training activities are aligned with business objectives. Which means that stakeholder needs are to be collected and analyzed. Collecting stakeholder needs happens in two directions, top to bottom and bottom to top. In top to bottom direction, the executives, managers, and experts dictate what the stakeholders need in

regard to future plans, expectations and strategy or new product launches but the employees working in the field give the bottom to top input. This leads to an abundance of input, which needs to be analyzed and then validated. The fact is that stakeholders usually know what they want but might not know what they need. Sometimes the answer is not training, according to the literature. The literature also states that there are different extents to which the analysis needs to be made. Depending on the business case it might be more practical to analyze the needs after prioritizing the stakeholders needs, which allows effective use of the technical training organizations resources. The bottom line is, that it is the technical training organizations responsibility to partner up with the stakeholders to be sure that the products and services fit the stakeholders needs. It is important to make sure that stakeholders understand that technical training is always considering their needs and to communicate it.

Now the stakeholder management is shortly discussed as seen by Combs & Davies (2010). In the quotation from Demystifying Technical Training by Combs and Davies, why stakeholder management is needed is summarized.

> Stakeholders support technical training when they are actively engaged, and they see that their driving needs are being met. If training professionals communicate with stakeholders early and often, stakeholders are more likely to understand and support technical training programs and initiatives. However, stakeholder management requires more than good communication. Effective stakeholder management involves knowing how to manage relationships between people to achieve their support. (Combs & Davies, 2010: 112)

Stakeholder management should start from the top. A steering committee should be established to oversee and direct the technical training. The steering committee should have at least one high-level executive and the body of the committee should be comprised of senior stakeholders and a sponsor should be a part of the committee. A sponsor is an appointed executive level person who champions technical training and makes strategic decisions, addresses departmental or functional barriers and other matters. The appointed sponsor should be interested in technical training and have a vision on where technical training is heading. The committee's functions should happen on the strategic level to ensure business strategy and technical training strategy align with one another. One key function of the committee is to make sure that the technical training function does not overlook critical business objectives and also, grants the possibility for the technical training function to decline training requests if they are not in line with the strategy. The committee chair should always come from within the business to ensure relevancy on the decisions the committee makes. All in all, it is imperative that the people who are

selected to any position contributes to the cause of creating more "pull" for technical training. When the correct people are selected and "pull" is created, stakeholders are engaged over department boundaries and over geographical hierarchy. To identify the right stakeholders from the organization charts, brainstorming and interviews might be needed because informal leaders might not be visible from the organization chart, but informal leaders have leverage on decision making and attitudes. Once the stakeholders are identified they need to be interviewed to understand their needs in the business regarding technical training. The following charts, figure 10 and figure 11, illustrate two different methods on identifying critical stakeholders and categorizing all stakeholders.
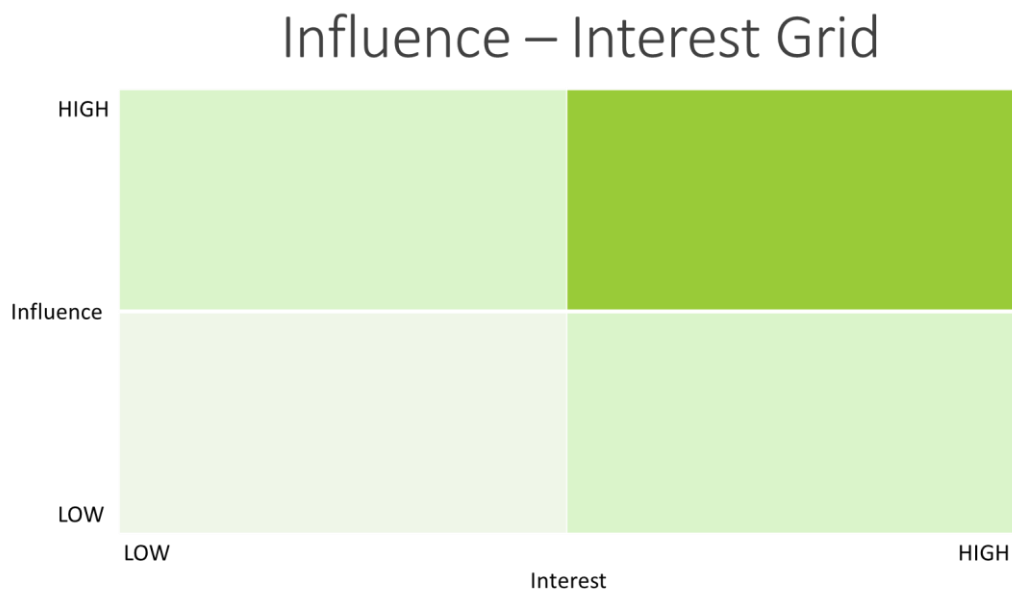

Figure 10. The Influence - Interest Grid.

The Influence – Interest Grid developed by Straker (2009) is relatively easy method of categorizing and identifying key stakeholders according to Combs & Davies (2010:114). The grid categorizes stakeholders to four different categories and suggests actions based on the category where the stakeholders is placed.

- Stakeholder with high influence and high interest: These stakeholders should be held close and seen that their needs are met.

- Stakeholders with high influence and low interest: These stakeholders should be kept informed on technical training actions and communications about the impact, which technical training has, should be frequent.

- Stakeholders with low influence and high interest: These stakeholders should be interviewed on how they would like to be involved.

- Stakeholders with low influence and low interest: Stakeholders should be checked periodically to see if their position changes in the grid.

The second way of identifying stakeholders is known as "stakeholder mapping". According to Combs & Davies (2010) it illustrates the relationships individual technical training experts have with the stakeholders. The mapping is presented below in figure 10.
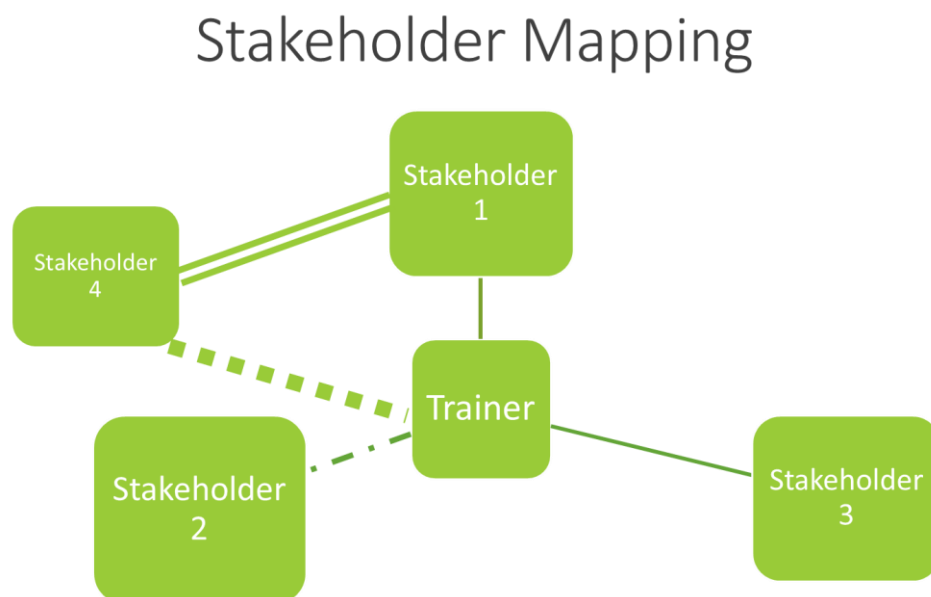
Figure 11 Stakeholder mapping

The stakeholder mapping uses different types of lines to illustrate the relationship between the training expert and different stakeholders and by using this knowledge the technical training organization can prioritize where actions and of what kind should be taken. It is also noted that the methods for analyzing and categorizing stakeholders is not limited to the presented methods. As analysis is a part of stakeholder management it is usually seen as a managerial job but instead, the whole technical training team

should participate in the mapping to get the actual relationships on record, instead of the managers perspective only. This task should be done periodically to ensure that decisions are not made on outdated knowledge. Conclusion is made that the whole technical training team should be involved in analyzing and engaging the stakeholders, especially when the organization is operating internationally or across organizational boundaries. This analysis, identification of needs and interests should be done in a relationship building way over time with the notion that team members can be given stakeholders as "customers" so that a team member "owns" the relationship. The dealing of customers should not be arbitrary, but it should be based on experiences with the specific stakeholder and team member or on the role within the team. If the team resources allow, specific titles and position can be created on the managerial level. The source suggests that in international business the cost of travelling to meet the stakeholders is worth the cost. Meetings with stakeholders help to build relationships and allows stakeholders to present their issues, concerns and opportunities depending on where on the hierarchy they stand. Executives, managers and employees have different needs and expectations and by meeting with them individually, stakeholder needs identification is more accurate. When it comes to stakeholder management techniques, training team members may need to adjust their approach depending on the stakeholder due to their individual personalities and experiences. Tools come in handy when dealing with different personalities and utilizing these tools aid in finding more information or receiving constructive feedback for example. The reality is that it is inevitable to meet a stakeholder who is not willing to cooperate and then the personality and temperament tools used in managerial work comes handy. As a final note on stakeholders, Combs & Davies (2010) argue that overlooking stakeholders or dealing with the matter without professional seriousness, it is difficult for the technical training organization to be successful and therefore, it is paramount that the customer service, which the technical training organization provides, is on an exceptional level.

In the following subsection the existing knowledge on organizational perspective of technical training is discussed shortly.

4.3   Organizational perspective

This subsection covers the existing knowledge on the organizational perspective of technical training.

In organizations the business units bear huge weight in determining how the training organization is seen. If the business units see the training organization as a legitimate part of the whole organization, they take the training organization onboard early on into the business processes and initiatives. When not, the outcome is usually that the mistakes of a product or a system are blamed on the training organizations lack professionalism or competence. But on the other hand, training experts should identify when the problem is in the training and when other solutions are needed for problem solving. Not all problems can be solved by technical training. The organizational perspective can be seen from the stakeholder perspective also. If the training organization is not held legitimate by the business units and other stakeholders, such as partners, the stakeholder management efforts tend to be high and the technical training experts need to be aware that the expectations are high in regard to engagement and management of the stakeholders. Thus, when legitimacy is high, stakeholders does not need to be managed so firmly (Combs & Davis 2010).

The value chain of technical training, when considered in the organizational perspective, is strategic in terms of activities instead of transactional and therefore, should not be seen as a human resource activity, even if the function would reside in the HR department. As the value chain is not clear in all organizations the value of training is often overlooked when contracts are made because the contracts are naturally made by those people who work in operations or other similar business units and technical training is not identified in the value chain. But when training is overlooked, the cost of lost opportunity may be considerable when organizations do not involve training functions to the processes. This is only one example of the different view's organizations hold on technical training. The views differ in the importance of technical training, not so in the importance of training in general but according to a study by Morrow, Jarret & Rupinski (1997) mean return of interest was roughly 400 % higher in sales and technical training than in management training (Combs & Davis 2010).

In organizations where there are multiple training units, a collaboration between the units is essential for creating a stronger image on the training functions. Therefore, building good relationships in between training units important. The same notion goes for relationships between training units and human resources because HR is usually responsible for talent management and training units can bring vital information to the table regarding the current situation of the workforce and amount and level of expertise on the company and vice versa, HR can filter for example, applicants to the training courses.

Strategically it does not matter where the technical training functions, but according to Combs & Davies (2010) HR executives may not fully understand what technical training is used for and what the value is and therefore, if technical training resides in business units it may be more beneficial for the company. The benefits on having the technical training function residing inside a business unit are that business goals and objectives are then easier to manage, and it allows technical experts and training experts to build relationships easier. It is noted that technical training should be positioned quite high in the organizational hierarchy for it to fully contribute to the company objectives. According to the literature, technical training may be structured in a multitude of ways depending on the company and the business. The structures in the literature are centralized, de-centralized and hybrid (Combs & Davies, 2010). There are benefits in all structures. De-centralized structure is fast in responding to training requests and trainers report to business unit managers, for example. The centralized structure on the other hand is cost efficient and ownership is clear. The hybrid structure lends both benefits but creates tension in the organization, because of unclarity of ownership.

Another part of the organizational perspective is marketing. Marketing technical training is basically the same as corporate marketing anywhere. Defining the market, value propositions and using emotional drivers to make things easier. The literature showed that many training functions did not have a marketing plan for their function and that the same functions had problems in communicating their activities to the stakeholders even though it is the training functions responsibility to market the activities to the stakeholders. The literature pointed out that for some reason technical training functions were not driven like a business unit, because marketing was missing. Technical training organization can function to a higher degree of efficiency if the organization adopts marketing and builds competencies to carry out marketing work. But due to marketing being only a part of the organization function of technical training it is advised in the literature to use a selective approach rather than an inclusive approach to marketing. In the selective approach only a selected way or method is used to market technical training to stakeholders. The idea is to market the technical training's functions and benefits throughout the value chain and to make all stakeholders see that technical training is an investment on both sides. Value propositions are great tools in explaining to stakeholders why they should invest in technical training. Value propositions and customer value propositions are discussed in the literature vastly, but value propositions are not the topic of this thesis and therefore, not discussed any further. On the next section, literature on strategy regarding technical training is discussed.

4.4 Strategy

This section discusses strategy in technical training. In technical training the strategical literature is noticeably missing according to Combs & Davis (2010: 2) but the literature for training solutions is abundant. Although Combs & Davies (2010:123) writes; "…we explain the importance of establishing strategy and revising it overtime to guide the direction of the technical training organization.", emphasizing on the importance of having a training strategy and later on explicitly pointing on the alignment of business strategy and training strategy to achieve business goals. Combs & Davies also argue that even though there is some literature on training strategy, but only a few discusses training strategy on a company level. Rather the discussion is on training course or training solution strategies. This entails that without understanding what the business strategy is expecting from the training organization and without understanding why a training strategy is needed, the training organization has little chances of succeeding in prioritizing its actions to suit common goals. The action to align with the strategy is to integrate the technical training activities to the activities of the business strategy. The following activities are fundamental to allow training activities to stay aligned with the business strategy. First, the technical skill development areas must be identified from the business strategy. Second, confirming priorities from technical leaders. Third, focus and review prioritized trainings. Fourth, understand the details of the prioritized programs. Fifth, when approving training plans, verify alignment. Sixth, change direction according to priority. The activities and their nature insist that technical training organization is proactive towards managers or stakeholders who are responsible of the prioritized and strategic programs. Mechanisms and structures need to be created for communication and reporting because this is an ongoing process instead of an annual event.

Combs & Davies argue that a need for technical skills may be identified for the company to achieve goals set by the business strategy, which creates a strong link between company strategy and technical training functions. As some stakeholders, discussed in the previous section Stakeholder Perspective, participate in the planning of the business strategy they naturally expect that technical training does the same in their department and it is up to the training department to identify if they have the resources and capabilities to execute strategies to assist the company in achieving its strategic goals. If the case is that the training department realizes that they do not possess competence or resources to execute the strategy laid up by the company, it is up to the manager of the training department to come forth and raise concern to the executives and explain why

the strategy is inexecutable in terms of technical training. As with all strategy executions, it comes down to resources and competence, whether the strategy can be executed, and technical training is no different. Technical training function cannot train something they do not understand or to a mass they do not have the resources for or in a time frame, which is not in line with the complexity of the topic or the available resources.

The building of technical training strategy begins with defining key components (Combs & Davies 2010). The components are mission statement, vision, strategic objectives, guiding principles, business and operating models, portfolio of products and services and a roadmap. Vision is more than just a memorable statement of the future, which in technical training strategy has to be linked to the vision of the company. Mission statement on the other hand describes why technical training exists in the first place. Its purpose is to clarify what technical training does and, as with vision, it is not just a string of fancy words. Both statements should be developed with the whole team and not just by managers to ensure understanding within the team. As Combs & Davies (2010) cite Morrisey (1992) on page 129: "The value is in the process itself: the thinking, discussion, evaluation, modification, and reflection." It is also advisable to get stakeholders onboard when defining vision and mission statements to have an understanding on the purpose of technical training and to ensure alignment with other business unit statements.

One key component in strategy development are strategic objectives. The idea of strategic objectives is to focus the operation of technical training for one year. All strategic objectives should be result-oriented in nature, rather than activity-oriented for them to be measurable. Measurability is essential for determining if any training program or solution was successful. It should be noted that a single training course is not the same as a training program. Training program suggests to a collection of training courses which prepare a training participant for a specific job, for example a service engineer. Due to the nature of measurable strategic objectives Combs & Davies (2010) suggest that technical training organizations should only have from five to seven strategic objectives because if there are too many objectives the strategy might not be clear enough or the expectations for technical trainings organizations capabilities have been overestimated. This can lead to a situation where all objectives are sought for, but none are achieved. The objectives should be in alignment with the stakeholders' objectives to show business interest alignment and customer care. After defining the strategic objectives, they have to be communicated to all stakeholders and to the technical training team in order for

them to better understand their role and function in the organization. To ensure that strategic objectives are reached, training managers should enable resources and have meetings with the technical training experts to monitor progress.

Once the strategic objectives are defined, guiding principles should be established. The purpose of the guiding principles is to remind that technical training organization will follow the agreements. The guiding principles should be validated, even though they can be created inside the technical training team, because they set hard limits for times when tradeoffs may be needed. Technical training guiding principles should not be confused with training policies, which usually dictate that for example, attending training courses has to be first approved by supervisor or what is the minimum number of participants for a given course or program. Guiding principles are defining what technical training does, for example, only gives technical training and not soft skill training or that the organization supports business objectives directly but have to give resources for content maintenance. The guiding principles need to be visited periodically to break behavioral patterns, which are not in line with the principles and processes has to be created to support the guiding principles for them to actually take place.

Guiding principles and strategic objective lay the foundation for a business model, which shows the stakeholders and customers how value is created through the training organizations functions. There are several sources explaining business models and the need for them, but it all comes down to the same idea: communicating value. In technical training strategy, business models should be scalable as far as it is practical and suits the strategic objectives. The idea of scalability is that with minimal resources the existing training courses or programs can be scaled down to serve smaller audiences or scaled up to serve larger audiences. Some items and functions were brought up by Combs & Davies (2010: 134), which can be designed to be scalable. They include learning management systems, e-learning and voluntary instructor pools to name a few. Voluntary instructor pool scalability was discussed in detail due to the fact that the number of voluntary instructors limit the overall total audience size i.e., how broadly the training can be delivered to the extended enterprise and customer base, which in turn entailed that programs should be created to encourage people to enroll into voluntary instructor training due to positive effects on the bottom line through cost savings. When there are more voluntary instructors in different locations, whether geographically, organizationally, or both, with vast expertise, it is strategically sound. Scalability should be considered when deciding on the strategy and priorities and the fact that nothing lasts forever due to ever

changing technology, business and market, the business model itself should be evaluated from time to time to ensure success in the long-term. With the business model an operating model should be created, published, and communicated for the stakeholders to see how technical training organization operates. Publishing and communicating the operating model also show the stakeholders how and where they are involved in the training organization. It should be noted that an operating model is not a flow chart depicting processes or an organization chart. Its singular purpose is to depict the relationships of technical training organization and whom they serve.

One part of building a technical training strategy is creating a portfolio of products and services. The portfolio should be focused on the products and services, which provide the most value and are in line with the strategic objectives. Also, wider product and service offering should be avoided if resources are limited. In a limited resource situation, it is better to have a smaller portfolio, which serves critical parts of the business. As Combs & Davies (2010: 137) argue: "It is important to understand the capabilities required to deliver a specific service and ensure the training organization has the capabilities and resources in place." The reality is, as it is in business in general, that everything changes. Therefore, changing the offering to support business when the business changes and the resources with them is essential. Combs and Davies suggest a number of factors for the portfolio, which can be considered: stakeholder priorities, long-term strategic needs, volume expectations by service or product, scalability, investment, and maintenance and overlap between organizations services. A strong argument in the literature was to identify stakeholder needs for technical training, preferably throughout the year and afterwards communicated back to the stakeholders to receive feedback. Then the programs or initiatives are approved and funded, which then leads to developing courses for the needs of the stakeholders, which were in line with company strategic objectives. Prioritization is made and then finally, the developed courses are bundled into curriculums, which are then presented in a portfolio as products and services. After the training courses are developed and training team has all assets in its use and the portfolio is done it is time to deliver training. Training delivery is discussed in subsection 4.1.4.

As for any business strategy, roadmaps are essential for technical training strategy. Roadmaps are developed to provide a high-level presentation of all programs, which are either in development or in planning. The literature emphasizes that roadmaps are not to be mixed with learning paths, any kind of curriculums or project plans. In technical

training, roadmaps are considered to be schedules for development and launch for different technical training programs (Combs & Davies, 2010). As roadmaps show the training programs, which are in development, it is easy for any stakeholder to see, where resources are allocated at what time and stakeholders can see that steps are taken to deliver training programs according to their needs. According to the literature, roadmaps are generated every 1 – 3 years, but not in a way where new roadmap is developed once the old has expired or reached its end. The roadmap should be renewed as things progress. This way, the roadmap may be used as a tool for recognizing dependencies between different parts of the organization and stakeholders or possible conflicts in schedules and expectations in delivery times and it is easier to keep up with the development and not to lose track on where the roadmap started and what was the strategy. The use of a roadmap also allows the technical training organization to use old roadmaps as documents to follow whether initial plans were met or not.

As mentioned earlier in the text and in the literature, any department or organization needs to have capabilities to execute a strategy. This part of the section addresses those capabilities found in the literature regarding technical training. According to Combs & Davies (2010), there are three different capability types, which are essential to technical training. Those capabilities are people-related capabilities, process-related capabilities and technology related capabilities. The first capability, people-related capability, can be summarized as the skills, knowledge, and abilities of the hired personnel of the technical training organization. The strategic side of the person-related capabilities is to identify the gaps and address them. The gaps are identified by first assessing the current capabilities to prevent the organization from making decisions based on assumptions. The voluntary instructor pool may be useful in filling in the capability gaps, without making big changes, which lead into change management plans and executions. The second capabilities needed for strategy execution, process-related capabilities, are important because they reflect on the effectiveness and focus of the technical training organization. The processes which affect and are related to the stakeholders are the most important processes, which need to be reviewed. These include (Combs & Davies, 2010: 144); gathering requirements, prioritization, training content review, governance, roles and expectations, training content archival and accessibility. Combs & Davies also argue that by making processes easy for the stakeholders increases the cooperation and involvement of the stakeholders. Processes in general need to exist for any organization to be able to be consistent in their actions which they do to achieve strategic objectives and to

be overall efficient. There is no exception for technical training functions and when developing technical training processes, stakeholders should be taken onboard to test that the process does not miss any marker. According to the literature, this involvement of stakeholders strengthens the relationship between the organization and the stakeholder. Literature suggests that there are standards, which mature process owning organizations have and they include the following:

- Process ownership

- Supporting process links

- Accessibility of processes

- Process documentation consistency

- Stakeholder feedback

The literature strongly points out the involvement of the stakeholders to be a key factor in maintaining and developing processes and that all processes should have a designated owner who is responsible for the process and its materials. Also, the literature points out that following processes should be enforced to some degree, otherwise people will start to veer away from following the processes and then traceability is inadequate, when problems occur. On the other hand, too much enforcement with no leeway makes the organization seem bureaucratic, which then may have the effect of driving stakeholders away, because working with bureaucrats is seen as hard and tiresome.

For all processes there are key components, which need to be considered when creating a process. Those key components are name, definition, explanation, users and owners, triggers, steps, tools, outcome and indicators. The literature is vast on process management and related topics but in this study, the processes and process management are not on the agenda.

The final capability to be addressed is the technology capability. Technology which can be used in technical training is vast and the literature studied for this thesis did not cover the different technologies available for technical training but the capabilities they provide. Technology is a strategic asset, which allows the technical training organization to reach

further audiences and technology can increase the level of training in the form of inter-action between all of the participants of a training session, including the trainer. Strate-gically new technology, which is implemented is not a capability the training organization has, but a capability the training organization will have in the future. Technology can be considered as a current capability when the implementation phase is over, and the tech-nology has been integrated into the organization. If the organization does not have the needed technology to execute its strategy, the organization can create a plan to obtain that technology. The key is to identify the technology, which has the longest effect on the training organization. But new technologies, which are just implemented, take time to have an effect due to the time needed to learn how to use the new technology. Below are listed some types of technologies, which were addressed in the literature.

- Machinery and equipment

- Content management technology

- Learning management systems

- Modern graphics technology

- Simulators

- Support systems

- Internet technology

As with most experts, the technology used is based on the individual's skills and knowledge of existing technology, it is strategically important that new and modern tech-nologies are procured and implemented to strengthen the technical training organization.

Kaplan & Norton (2004) point out that when dealing with intangible assets, such as em-ployee's skill, the financial performance is not affected directly and to utilize the intangible assets to their full extent tangible assets, such as machines, equipment and tools need to be invested on. When the skill level of the employee is increased it may through com-plex cause and effect chain increase revenue by increasing customer satisfaction, which then may lead to customer loyalty. Kaplan & Norton also argue that the possible success

from intangible assets may only be realized when the assets are in line with the company strategy, and they argue that using the balanced scorecard to measure alignment of the company's capital. Kaplan & Norton also argues that strategic readiness is critical for the company to be able to meet its goals. Strategic readiness according to Kaplan & Norton is the skill and skill level the employees of the company have in order to perform the processes, which are critical to the company. Strategic readiness includes, in addition to the skill of the employees, information technology and the organization. Information technology needs to be at the level, where it allows critical processes to run smoothly. Organization needs to have an enabling culture and strong leadership, which together allow department goals to be in alignment with the organization's strategic objectives. This alignment creates an environment where employees of all levels and positions have a common understanding on how their work supports the company strategy.

As a summary, it is imperative for the technical training organization to have a solid strategy based on the company's business strategy with achievable strategic objectives. Business model and an operating model are paramount to have in the technical training strategy and the capabilities to execute the strategy. On the next section the existing knowledge of immaterial supply chains related to technical training is discussed.

4.5   Immaterial Supply Chains

This section of the literature review addresses the existing knowledge on immaterial supply chains. As material supply chains are vastly discussed in the literature with processes and management tools and methods, the immaterial supply chain literature is not so abundant. Nevertheless, the literature points out that material supply chain methodology, practices, theory, processes, and management is transferrable to immaterial supply chains regardless of if the original supply chain is physical or virtual. The same principles of value creation by supplying the right product, or anything immaterial, in the right time to the right recipient apply. In the modern era, where information technology is ever increasing in the business world, managing the flow, quantity and quality of information is critical because the immaterial supply chains are linked to the material supply chains. As Dedeke points out in Information Quality by Wang et al. (2015: 87): "The processing, storing, transmission, and management of information have become significant activities of supply chains." Even though the immaterial supply is seen as a secondary thing in the supply chain, it is noted in the literature that immaterial supply chains work as a link between different and independent chains. Immaterial supply chains have an effect on

customer satisfaction and the quality of the immaterial product, which is supplied, creates risks to the supply chain in general and through that it has an effect on the bottom line. The effect on the bottom line may come from customer satisfaction of the fact that if the immaterial supply chain is not operating, it hinders the operation of the material supply chain, which in turn creates losses.

Lee (2004) argues in the Triple-A Supply Chain that for any supply chain to be successful it needs to be agile, adaptive and aligned. Agility in the context means that in a case where the main supplier of a product is unable to provide the products, the company may use existing alternative sources to fill the need for the product in question. Agile chain can be created by the six steps introduced by Lee (2004)

1. Continuously provide data of supply and demand to the partners

2. Develop relationships with suppliers and customers, which are collaborative in order to design or redesign processes, products and backup plans

3. Design products which have common parts and processes and are differentiated in the final production process

4. Have an inventory of bottleneck components

5. Build a logistic system, which can respond quickly to unexpected needs

6. Create a backup plan team

Lee (2004) argues that when the market or the company strategy changes, the supply chain needs to adapt to the change otherwise the supply chain begins to deteriorate. Adaptability creates sustainability to the supply chain, which is one key tenet of supply chain management according to the literature on supply chains. Requirements for building an adaptive supply chain are:

1. Identifying future trends

   a. Ability to track economic changes

b. Know what the end-user needs in addition to knowing what immediate customers need

2. Ability to change supply chains

a. Develop new suppliers to support existing suppliers

b. Product designers need to understand implications designs have to the supply chain

The final part of the Triple-A approach is alignment of objectives, which if missing affects negatively the functionality of the supply chain. Alignment creates risk, cost and reward sharing between the entities in the supply chain. Lee (2004) states that companies should align in several ways. Information, identity, incentives and behavior. Aligning information means that all entities in the supply chain have access to the same information sources. Identity alignment means that everyone in the supply chain knows their role and responsibility. Incentive alignment refers to maximizing supply chain performance instead of only maximizing returns. Behavior alignment refers to analyzing supply chain partners to predict how they behave with current incentives. Which then leads to redesigning the incentives to support the supply chain's performance.

Literature suggests that in order to have a high functioning supply chain, the internal functions need to know what other functions are doing and why. Cross-departmental transparency is the key and Beth et al. (2003) pointed out, that bringing the senior leaders across functions together periodically to align interest was a successful investment. This alignment reflects to the end user satisfaction in the supply chain as well, according to Beth et al. (2003). Beth et al. (2003) argues that alignment is necessary but to fully work, there needs to be common metrics, penalties and incentives, otherwise the alignment is superficial. Beth et al. (2003) pointed out that large quantity of innovation comes from the supply chain, which entails that information in the supply chain should flow to both directions. Innovations in the supply chain, which are not considered or studied are lost opportunities. The literature suggests that functioning supply chains are not build with technology alone but with a combination of talent. Technology is needed in a supply chain but the people using the technology and innovating are the key to success in supply chains. The next section discusses the conceptual framework.

4.6   Conceptual Framework of This Thesis

This section discusses the conceptual framework of this thesis. The conceptual framework for this thesis and business challenge was created according to the findings and associated literature on technical training, strategy of technical training and the immaterial supply chains. The illustration of the framework is presented in figure 12.
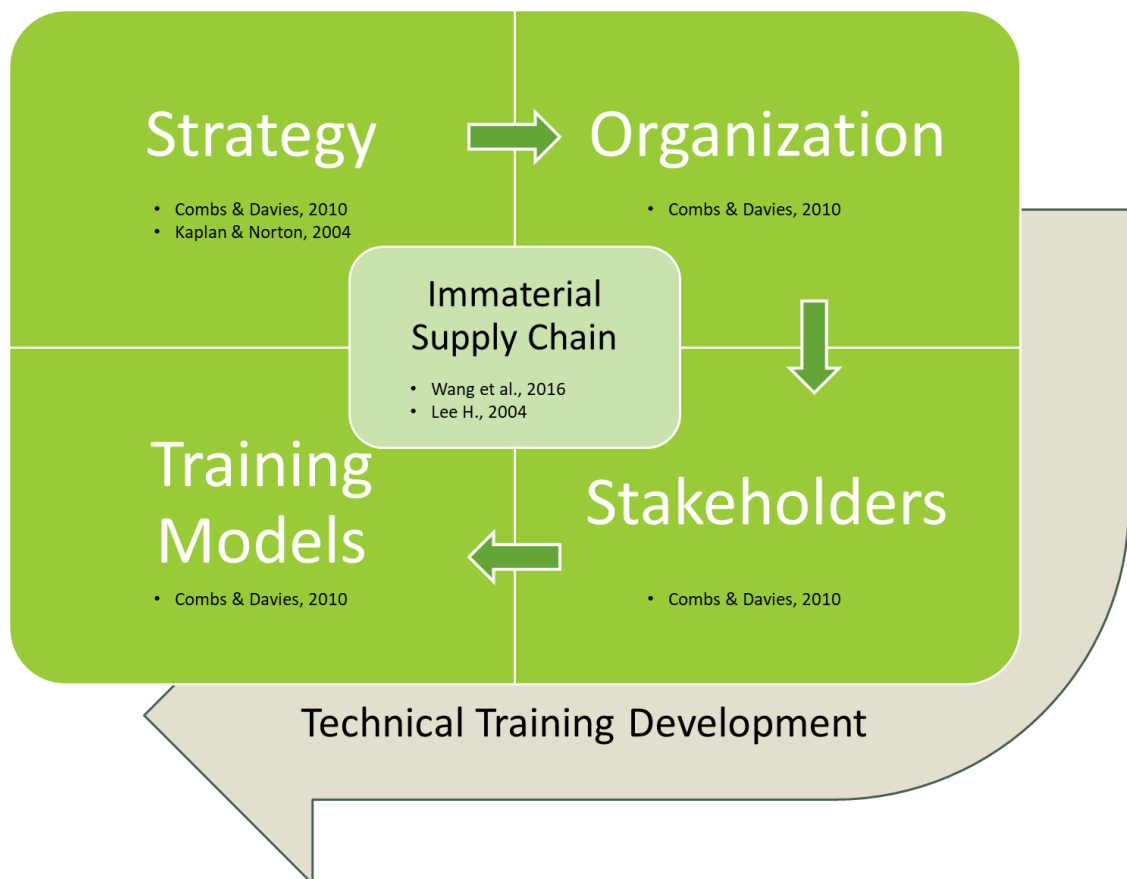

Figure 12 Framework

The first element of the conceptual framework is creating a strategy for technical training, which is in line with the corporate strategy. This provides means for the training department to contribute to the corporate's strategy and provide visibility to the department's goals and intentions.

The second element of the conceptual framework is to create an organization, which is able to execute the established strategy. The organizational structure can be centralized, de-centralized or a hybrid of both.

The third element of the conceptual framework is to identify key stakeholders, map the stakeholder relationships and identify stakeholder needs. Thus, creating value for the stakeholders and customers.

The fourth element is to create training models, which are adaptable to the needs of the stakeholders and which serve the corporate and department strategy. Together with the second and the third element the fourth element is called technical training development.

The final element of the conceptual framework is the establishment of immaterial supply chains across the extended enterprise to provide critical information paths from all access and touch points to all stakeholders and other entities in the supply chain.

The framework is not meant to be a single use system, which is started, finished and discarded. The framework serves as a continuous system to create, maintain and update technical training with a purpose to deliver a better training outcome.

In the next section the proposal building is discussed.

5   Building Proposal on technical training for the Case Company

This section merges the results of the current state analysis and the conceptual framework towards the building of the proposal using Data 2.

5.1   Overview of the Proposal Building Stage

As it was described in the current state analysis, section 2 of this thesis, the key findings were lack of field training, no training strategy and non-existing immaterial supply chains. The issues were present in the investigated literature to which the literature gave information on how to develop processes, strategy and so forth. The conceptual framework was built on these findings. The literature on technical training gave the best practices on how to build and develop technical training and training strategy. The literature gave multiple possibilities on developing supply chains from which the best practice for the case was taken.

The proposal was built in cooperation with Manager 1 from the informant list in table 8. The proposal's core was discussed on several short meetings with Manager 1, in which the grounds for the proposal was shown. The proposal was then shown to Manager 1 and Manager 2 from table 8, introduced in section 5.2, in a meeting where all the steps were first presented and then openly discussed. After the meeting, a draft of the proposal was given to Manager 1 and Manager 2 to study and comment for input. That input was used to build the proposal. In the next subsection findings of data collection 2 is discussed.

5.2   Findings of Data Collection 2

The second data collection was gathered according to the data collection plan, which was introduced in the beginning of this study. For this data collection, the managers introduced in section 5.1 were consulted. The input from the informants was used to further develop the proposal to solve the business challenge this thesis is discussing. The input to the proposal can be seen in table 8, which is shown below.

Table 8 Data collection 2

Informant	Technical training development	Strategy	Immaterial supply chain
Manager 1	• Voluntary instructor pool • Combining e-learning with hands-on • De-centralizing the organization		• Create easy access and workflow
Manager 2	• Bring in the stakeholders	• Establishing, implementing and executing strategy	• Digitalization • Data tools and data control • Part of quality process

As seen on the gathered information in table 8, Manager 1 gave input to the topics of technical training development and immaterial supply chains. Manager 2 gave input to the topics of technical training development, strategy and immaterial supply chain. The inputs and findings are discussed below.

Based on the findings from the current state analysis and the conceptual framework, the informants for data 2 were selected. The input from both of the informants were well received and added to the proposal. The input from Manager 1 consisted of extending the voluntary instructor pool from subject matter expert engineers to sales experts and field experts and to incorporate e-learning to all of the company's training plans in addition to de-centralize the training department. De-centralization was proposed by Manager 1 to establish local training sites and training specialists to certain hot spots in the company's business units abroad. Manager 2 input to technical training development was to include stakeholders from the whole enterprise to the development and execution of future trainings.

The proposal for creating a training strategy was well received by the informants, from whom one gave input to the proposal. The proposals strategic part in a nutshell was that a strategy, which contains clear accomplishable strategic goals, should be created. Manager 2 input was "Without the implementation and the execution, the strategy will just be a bundle of words without any actual influence." The input from the informant was implemented to the proposal.

The proposal to establish cross-departmental immaterial supply chains, which would extend throughout the value chain was opened up to the informants to clarify the meaning

of immaterial supply chains. The proposal received input from Manager 1, which was that the created system or process should be easy to access and use, with minimal efforts and to be included in the workflow of all related parties. The input from Manager 1 was implemented into the proposal. Manager 2 input regarding immaterial supply chains was to ensure that when digitalizing the immaterial supply chains, data control and data tools are ready and the capabilities to use them are ready. Manager 2 also stated that the immaterial supply chain is, or should be, a part of the quality process. In the next subsection the findings and ideas found from the existing literature are presented.

5.3   Case Relevant Findings and Ideas from Literature

For this study, a multitude of sources was read, and the following ideas and findings was selected for the proposal.

The literature had many key points regarding training models and training development. Most obvious was the system to manage technical training, called ADDIE, which manages the whole life cycle of a training program, course, or a module. ADDIE is scalable, which made it a strong candidate during the study. Most of the literature revolved around strategy planning, stakeholder needs, funding etc. and not so on the actual planning of courses or programs due to the fact that one size does not fit all due to differences in the content and business environment.

Creating a department strategy, which is aligned with corporate strategy, as discussed in section 4, was identified in both the current state analysis and in the examined literature. Multiple sources claimed the same basic idea, that a department has to have an executable strategy which is in line with the company's strategy. The literature stated that in order for the strategy to work, goals need to be set in order for the strategy to be executable. This finding is paramount for developing the training guidelines, which is the thesis topic.

The literature showed that to execute a strategy the organizational perspective has to be considered, meaning that the department organization needs to be built to serve the department strategy, without forgetting the stakeholders' needs. The literature did not differentiate stakeholders but discussed stakeholders as one group. In this proposal the stakeholders may be internal, such as engineering department, who are delivering infor-

mation, or external stakeholders who are receiving information, such as partner companies, end-users, consultants, and different authorities. The organization should serve the strategy, the departments workforce and all the stakeholders for the organization to be successful. Tied into the umbrella of technical training development and management in general, the literature said that stakeholders should be considered as a top priority and the stakeholders should be managed and treated as a customer or an asset, depending on the role of the stakeholder. Stakeholder management was a reoccurring topic on the literature. Stakeholders and their connections and relationships should be mapped and utilized to create value.

For the part of immaterial supply chains, the literature was quite straight forward. Immaterial or information can be handled just like any material in a supply chain, internal or external. The literature showed multiple ways of handling material flows in a supply chain but together with the current state analysis findings and the discussions with the informants on Data 2, the most suitable supply chain model was found to complement the existing company supply chain model.

In the following subsection, 5.4 Draft of the Training Guidelines Proposal, the preliminary proposal is presented and discussed.

5.4   Draft of the Training Guideline Proposal

The proposal consists of four elements regarding strategy and training management and one element regarding immaterial supply chains, as described in the conceptual framework. In the following text the elements are broken down to pieces and the functions and expected outcomes or results explained. An illustration of the proposal regarding the strategic and technical training development can be seen below in figure 13. An illustration of the immaterial supply chain is presented later in this subsection.

Figure 13 Strategy and technical training development

As seen in figure 13, the proposal starts with the creation of a department strategy, which aligns with company strategy. Strategically important stakeholders are then mapped, and input is received from the stakeholders regarding their technical training needs. All this is carried out along with the input and expertise of the training organization regarding training. Together these inputs are used to create a training model, which serves the business. The training model then produces training programs, training curriculums and tailored events according to the needs of the company and the stakeholders. All produced outputs and the training model are then continuously managed using the ADDIE system. In the following text the proposal is explained in detail by the element.

5.4.1 First Element of the Proposal, Strategy

The first element is to study what is the company strategy and what are the company's strategic goals and the timeline in which the goals are expected to be reached. After the company strategy and the company roadmap has been studied, the department strategy can be created. The benefit on creating a company strategy is that it addresses many challenges brought up in the current state analysis, which was that there was not a strategy in place for the department, which in turn created an inefficient environment for training and supporting the enterprise. An illustration of the first element can be seen below in figure 14.

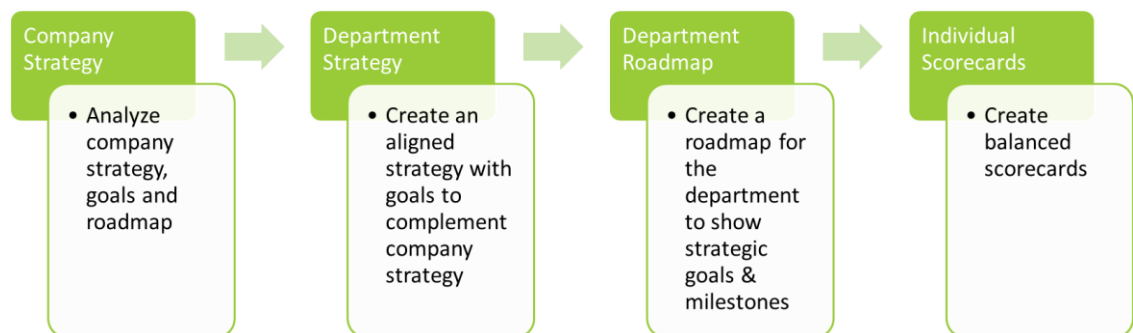| Company Strategy	Department Strategy	Department Roadmap	Individual Scorecards
• Analyze company strategy, goals and roadmap	• Create an aligned strategy with goals to complement company strategy	• Create a roadmap for the department to show strategic goals & milestones	• Create balanced scorecards

Figure 14 Strategy creation, implementation, and execution

As seen in figure 14, the analysis of the company strategy is carried out first and upon which the department strategy is created to steer the training of the affected stakeholders. A department roadmap is created to give the department's members an idea where, when, and how the company and the team is going. The final part of the illustration shows the creation of individual scorecards. Using individual scorecards makes managing the strategy implementation easier according to the literature. The proposal is to strategize the training of stakeholders based on the results of stakeholder mapping presented in the third element of this proposal draft. A strategic goal would be to fully or partially train key stakeholders within a given timeframe. This would create a sense of urgency to the company and a buy-in for the stakeholders to train their workforce. In addition, this steering of stakeholders would create an opportunity for creating measurable key performance indicators.

5.4.2   Second Element of the proposal, Organization

The second element of the proposal is the creation of a training organization to create training projects and curriculums and to manage the training function in close ties with the stakeholders. In this organization the stakeholders may be internal or external. The proposed organization can be seen in figure 15 below.
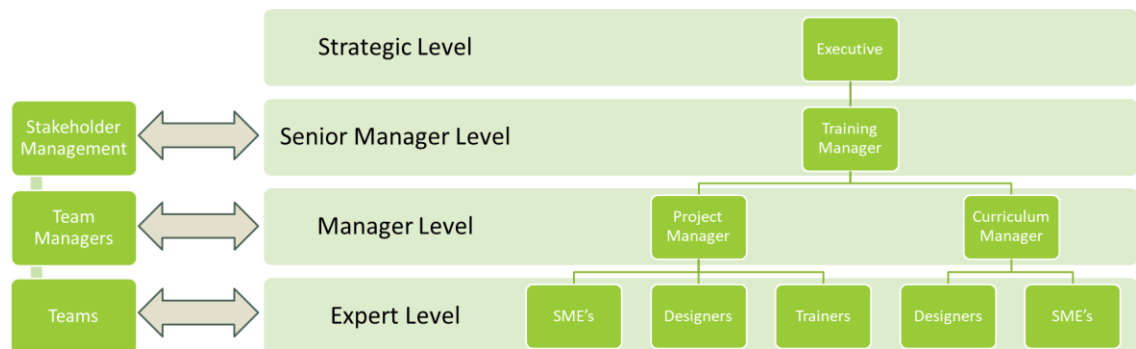

Figure 15 Organization proposal and stakeholder connections

As seen in figure 15, the organizational structure is as follows; the executive level person is responsible for bringing the company's strategy to the department level and to oversee that the strategy is aligned and implemented in the department. The executive level does not normally interact with the stakeholders. The training manager is positioned on the senior manager level, communicating the strategy to the stakeholder's management, creating official ties with internal and external stakeholders. The purpose is to create official agreements with stakeholder's management so that in the stakeholder's organization there are people who are interested and responsible for seeing that their team managers are aware of the possibilities that technical training brings to the enterprise. On the manager level there are two different positions, which can be combined if the company does not have the needed resources. The purpose of the project manager is to manage training projects, for example training a partner company's whole personnel within a set timeframe. It is also the responsibility of the project manager to communicate and create agreements with the stakeholder's team level management in order for the stakeholder to include training in the team's schedules and for the parent company to have the training materials and overall readiness complete. The curriculum manager is

responsible for managing the relationship between the subject matter expert's and curriculum designers in addition to taking part in curriculum design on a top level. The subject matter expert's together with the curriculum designer create the content according to the stakeholders and customer's needs. The subject matter experts are not working for the training department, even though they are identified in the organization chart. The subject matter experts work for whatever department their expertise is based on, engineering, sales, aftermarket, field service, projects etc. The subject matter experts are not necessarily interacting with the stakeholders depending on their role. As explained by Combs & Davies (2010), engineers, for example, tend to be more interested in things and not people and this may create friction between the training participants and other stakeholders, and it must be considered when the subject matter experts are to directly interact with the stakeholders. Designers and trainers interact directly with the stakeholders, preferably on all levels, without cutting corners in communication and decision-making hierarchy. The purpose for this is to make the transition of information smoother. Still, usually the most common interaction between trainers and designers is with the stakeholder team management and stakeholder teams. To clarify, the stakeholder team may be consisting of people to be trained by the training department. Designers work with the trainers in creating training project content. The trainers cannot be left out from the design process to ensure the best possible outcome as the existing literature has shown. The key point is that the organization is there to deliver technical training for stakeholders, with the right people in the right places executing training strategy to complement business strategy.

5.4.3   Third Element of the Proposal, Stakeholder Management

The third element is closely tied to the second element due to the nature of the second element. The third element is stakeholder management. The utmost task for a technical training department to be successful is to deliver what the stakeholders or customers need and want and that cannot happen if stakeholders are not taken into fold, when developing, maintaining, and carrying out technical training. But, with numerous stakeholders, it is recommended to map the stakeholders to find key stakeholders in order to create a clear image on the needs of the larger pool of stakeholders. The selected method from the literature is to map the stakeholders in two different ways, the first being the influence-interest grid mapping. On the following figure, figure 16, the grid is shown.
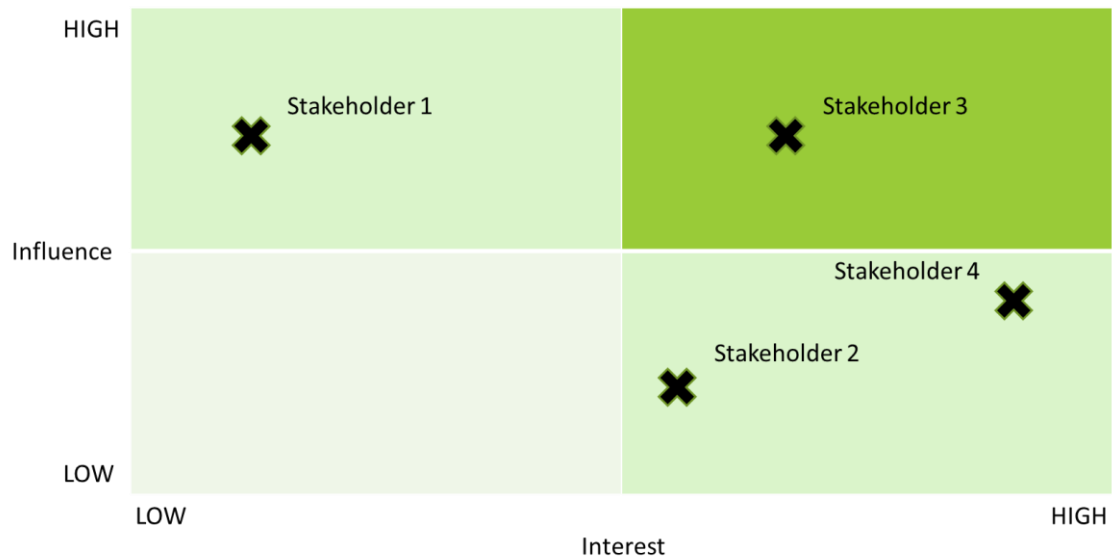
Figure 16 Influence-interest grid

The proposal is to use the shown influence-interest grid, figure 16, to map which of the stakeholders have highest influence in the business in general and which of those have the highest interest in participating in technical training development. This is a method to ensure stakeholder's commitment to the technical training.

The influence-interest grip mapping works as any other 4-field mapping system. A given stakeholder, in this case, is placed on the influence axis, reaching from low to high. This is to measure how much influence the stakeholder has on the business or to the technical training content. Then the stakeholder is placed on the second axis, interest, based on their actual interest on giving or receiving training, depending on the role of the stakeholder. Then the combined result places the stakeholder somewhere on the grid. The same task is done to all relevant stakeholders and then the results are compared. Note that, according to literature, the stakeholder with the most influence is not always a better candidate for technical training compared to a stakeholder with relatively higher interest.

The results of the mapping give guidelines on whom to include in training development regardless of if the stakeholders are internal or external. The most promising candidates are then selected to the pool of stakeholders who are used to develop and pilot technical training programs and courses.

After the stakeholders are mapped for influence-interest, then the trainers, voluntary in-structors, designers and so forth should be mapped for connections within the stake-holder group. The method of stakeholder mapping is presented below on figure 17.
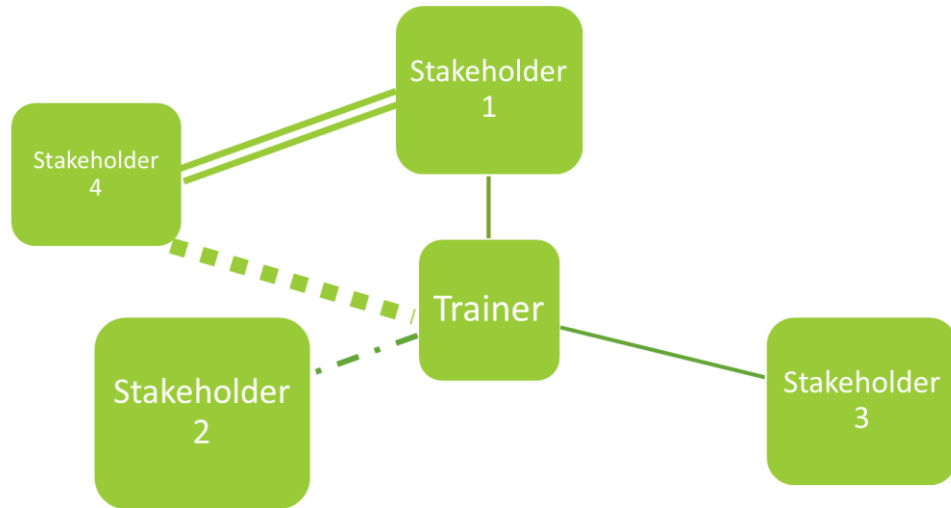

Figure 17 Stakeholder mapping

In figure 17, stakeholders have been mapped in relation to a trainer. In the diagram, different types of connections are illustrated with different types of lines. A single solid line depicts a solid connection between the trainer and a stakeholder. A double solid line depicts a strong trust and connection between the two stakeholders. The bold dotted line depicts an unofficial connection between the trainer and a stakeholder. And finally, the dash-dot line depicts a negative connection. The proposal is to map the connections between individual training organization and affiliated persons to the stakeholders. This gives an understanding on desired communication channels, preferred trainer-stake-holder bonds, etc. The result of the mapping can be used to receive informal yet critical information regarding training outcome and training needs. It can also be used to direct resources to the stakeholders benefit if a stakeholder has, for example, a favorite trainer due to personal connections or language skills. The results can be used to strengthen existing connections and to create new connections if needed. After both mappings have been concluded, they are to be regularly maintained to be in the forefront of any changes.

5.4.4   Fourth Element of the Proposal, Training Model

The fourth element of the proposal is the training model. The training model is created by the output of the first, second and third element. The model is proposed to be built to

serve the multinational corporation, for which this study is carried out for, in a global business. Because the company operates across the globe and the company has partners and other stakeholders all around the world, a centralized training organization was taken out of consideration as well as a fixed or centralized training facility and it was agreed that the model should be need-based rather than supply-based. Due to the challenges laid by global operations and the possibilities of e-learning, the proposal is to combine e-learning with de-centralized technical training to create a flexible environment where to operate. The proposed way is that for all courses and programs the company would have a preliminary e-learning courses, which would be done beforehand. The completion of the e-learning courses would be a prerequisite to participate on to the hands-on part of the program or course. Curriculums should be designed to serve the business and stakeholder needs. An illustration of the proposed model can be seen in figure 18, below.
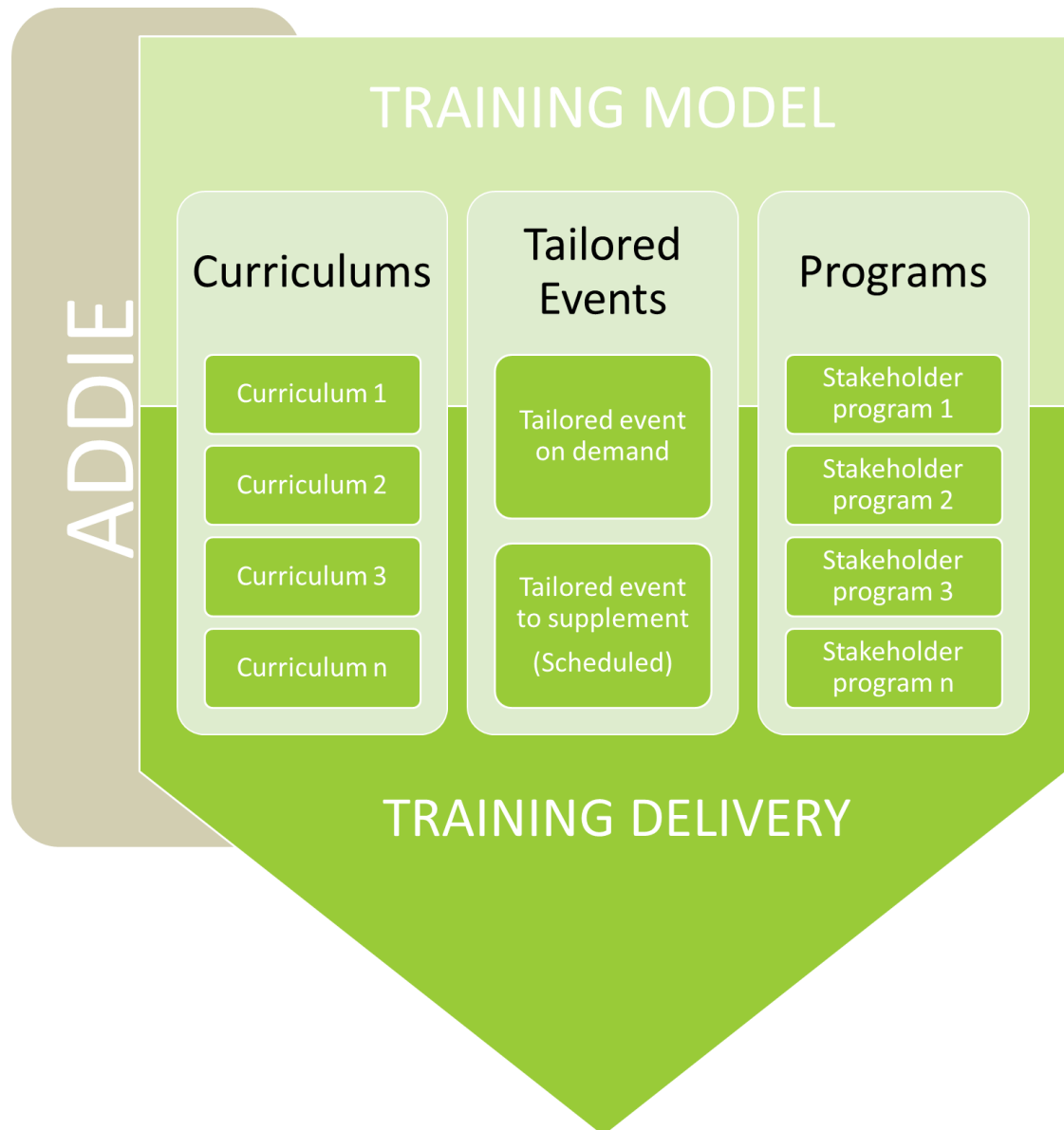
Figure 18 Training model

As figure 18 illustrates, the training model has three main parts: curriculums, tailored events and programs. The curriculums are a collection of training courses and training modules designed to lead to a certain skill set and eventually certification. Tailored events are either need-based events, which are created on stakeholder or customer request to suit their specific needs or scheduled events to serve a larger group based on the current or existing base of trained personnel and their identified needs. Programs are dedicated curriculum, training event and course ensembles, which aim to achieve strategic goals, such as completion of workforce training of a single partner company or other stakeholder to the agreed target skill level.

5.4.4.1 Curriculums

The proposal is that curriculums are based on what is needed to achieve a skill set to work in a certain job. Initial proposals of curriculums can be seen on figure 19 below.

Marine Commissioning and Service Engineer Curriculum
- Commissioning and service training
- Product training
- IMO & SOLAS regulations
- Business training
- Personal effectiveness training
- (Installation training)

Land Global Commissioning and Service Engineer Curriculum
- Commissioning and service training
- Product training
- NFPA, FM and VdS codes and standards
- Business training
- Personal effectiveness training
- (Installation training)

Land Local Commissioning and Service Engineer Curriculum
- Commissioning and service training
- Product training
- NFPA, FM and VdS codes and standards (relevancy for local market)

Marine/Land Installation Supervisor Curriculum
- Installation training
- Extended Marine/Land regulations training
- Product training
- Business training
- Personal effectiveness training

Figure 19 Proposed initial curriculums

The proposed curriculums on figure 19 are based on what skills are identified as needed for a person to be successful on the job. A marine commissioning and service engineer must know how to commission and service the installed system and be familiar with the products to the extent that the person is able to repair and troubleshoot individual components onsite. Land global and land local commissioning engineers must have the same skills to be successful. For marine and land commissioning and service engineers it is imperative that they are aware of the regulations, codes, and standards, which affect that system operation and installation. Otherwise, they might end up commissioning or servicing systems, which may cause a risk for the company, customer, and health. For complementing the overall understanding of the work land global and marine commissioning and service engineers are doing, they are proposed to go on business and personal effectiveness training. Business and personal effectiveness training creates added

value for the company and for the customer through customer care. The training of personal effectiveness and business training is important for marine commissioning and service engineers and land global commissioning and service engineers because they are in direct contact with the customers and usually are the first and last touch point for the customer. Installation supervisors for both land and marine are needed to be trained for installation of products and systems and installation supervisors need to have a detailed understanding of the relevant rules and regulations of firefighting installations. Installation supervisors of course need to be aware of the products which are installed to the site and understand the business, for example, cost-benefit relationship, budgets, customer care etc. Installation supervisors should also be trained for personal effectiveness because they are running an installation crew and are at the forefront in the field and in direct contact with customers and surveyors, etc. For marine and land global commissioning and service engineers, installation training is not mandatory but recommended due to the fact that sometimes add-ons to the firefighting system are needed during commissioning or service visits.

5.4.4.2 Tailored Events

The proposal for tailored events consists of two different types of events. Demand-based events and scheduled events to supplement completed training programs and courses. The proposal is illustrated in figure 20 below.
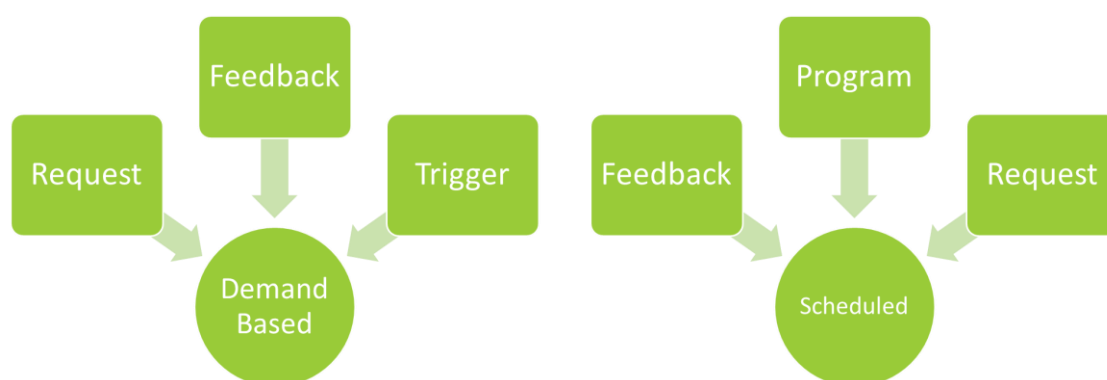

Figure 20 Tailored training events

The illustrated proposal, figure 20, consists of two tailored events, demand-based and scheduled. The demand-based event inputs are requests from stakeholders, feedback from completed training courses or programs and other triggers, such as product changes or new features on an existing product or system. The scheduled event inputs

are feedback from completed training courses and programs, requests from stakeholders. Scheduled events can also be integrated to training programs developed by the training organization. Delivery methods for tailored events can be e-learning, online live training, hands-on training in the training facility or at customer site or a combination of any of the methods. The basic idea is that demand-based events can be held on a short notice at any time and location, but the scheduled events are held based on gathered data and identified need.

5.4.4.3   Training Programs

The proposal for training programs is that for selected key stakeholders, such as business units or partners, training department creates training programs according to the training strategy and the strategic goals. The training programs are developed specifically for individual stakeholders. An illustration of the proposed programs can be seen in figure 21.

Program Stakeholder 1	Program Stakeholder 2	Program Stakeholder 3	Program Stakeholder n
• Training delivery type • Schedule for training • Follow-up • Certification • Strategic importance	• Training delivery type • Schedule for training • Follow-up • Certification • Strategic importance	• Training delivery type • Schedule for training • Follow-up • Certification • Strategic importance	• Training delivery type • Schedule for training • Follow-up • Certification • Strategic importance

Figure 21 Training programs, general

As seen in figure 21, a program is developed for different stakeholders to serve the business according to the company and department strategy and to serve the stakeholder need. Training delivery needs to be agreed with the stakeholder for the training to be efficient for the stakeholders. It is not as important that the delivery of training is easy or efficient for the training department as it is for the stakeholder. A schedule must be created and maintained to execute the program. The basis for the schedule comes from the

stakeholders, not from the training department. The training department needs to have sufficient resources to serve the stakeholder needs. Follow-ups must be agreed on. What is the time-interval for regular follow-ups on fulfillment of training needs, etc. Certification paths and execution must be well communicated and within possibilities, scheduled for individuals in the stakeholder's workforce. Strategic importance of the stakeholder must be followed throughout the program due to possible changes in the business environment, which might affect the criticality of the training program and then the distribution of training department's resources. In table 10 an example of a training program is presented.

Table 9 Example of a stakeholder training program

Training Programs					
	Target stakeholder	Target individual	Target role	Curriculum	Responsible Person
Program 1	Stakeholder 1	Field Engineer 1	Local Land C & S Engineer	• Curriculum 1 • Curriculum 2 • Curriculum 3	Project Manager A
		Field Engineer 2	Local Land C & S Engineer	• Curriculum 1 • Curriculum 2 • Curriculum 3	Project Manager A
		Warranty Engineer 1	Field warranty engineer	• Curriculum 3 • Curriculum 4	Project Manager A
		Site Supervisor 1	Site supervisor	• Curriculum 5	Project Manager A
	Notes:	• Quarterly interview with stakeholder's team manager regarding progress and changes. • Site visit every 6 months after completed training programs to verify and update learning.			Project Manager A Trainer A

In the illustrated proposal, table 10, of the training program a stakeholder's program is shown. The table shows for which stakeholder the program is created for and a list of individuals inside the current program and their targeted future roles. Linked to the roles and stakeholder's profile are the curriculums, which are needed to be completed to reach the target role with adequate skills and information. Last on the horizontal vector is the person responsible for overseeing the completion and execution of the program. The final part of the program is the notes part. In this part of the table all related functions and plans are written which are needed for this program. The program is created in cooperation with the stakeholder's management. In the following table, table 10, a training program is shown in detail.

Table 10 An individual stakeholder's detailed training program

Training Program					
Customers & Stakeholders Limited, Lcc					
Training target	Training Delivery	Schedule	Follow-up actions	Other actions	Preferred trainer
System A commissioning and service for: - John Johnson - Allan Albert - Becky Barley	E-learning	Q2, 26.-30.4.	LMS		
	Online training	Q2, 1.5.-20.6.	Feedback, send 21.6., collect 24.6.	System A exam in LMS	1st: Trainer A 2nd: No
	Onsite remote assistance	Q3, according to customer schedule			1st: Trainer A 2nd: No
Training target	Training Delivery	Schedule	Follow-up actions	Other actions	Preferred trainer
System B commissioning and service for: - Becky Barley - David Demeanor	E-learning	Q3, 25.-31.7.	LMS		
	Hands-on at local facility	Q3, 3.-7.8.	Feedback, send 10.8., collect 13.8.	Interview local trainer	
	Field training	Q3, according to service schedule	Online meeting, schedule with team manager	Interview local trainer	Local trainer
Training target	Training Delivery	Schedule	Follow-up actions	Other actions	Preferred trainer
Installation supervisor - John Johnson - Allan Albert	E-learning	Q2, 1.4.-20.6.	LMS		
	Hands-on at training facility	Q2, 23.-25.6.		Pipe installation test	1st: Trainer B 2nd: Trainer A
	Site visit	Q2, 26.-27.6.			
	Business training	Q2, 28.-31.6.		Dinner	

In table 10, detailed descriptions of training target, training delivery, schedule, follow-up and other actions are shown. In addition, a preferred trainer by topic is listed, based on stakeholder mapping. The training target depicts the curriculum for a given individual and the schedule shows at what time the training should be held and when it is completed. Follow-up actions show what is used to receive input from the given training and to see

if additional training is needed. The column for other actions shows actions to be taken to gather information on the training outcome or anything which is relevant to the training organization or stakeholder. Preferred trainer or trainers are selected with stakeholders, based on skill, knowledge of the topic, language skills, personality, and stakeholder mapping. A reserve trainer should always be selected to avoid cancellations.

5.4.4.4   ADDIE

A part of the training model is to utilize ADDIE throughout the training model. ADDIE is an acronym for Analyze, Design, Develop, Implement and Evaluate. The system is proposed to be used to continuously improve the training offering as a whole. An illustration of the ADDIE system can be seen on figure 22 below.

Figure 22 ADDIE

As described in the literature part of this study, ADDIE is a system used to develop and maintain technical training. The first step is to analyze the need for training and the current method. Based on the results, objectives are created, established, or changed on the design step. On the third step training materials and methods are developed and then on the fourth step they are implemented. In the final step the training outcome is evaluated and then the process begins from the start. More details on the ADDIE system can be found from the section 4.1.1 Differentiators of this thesis. This concludes the

proposal draft on the technical training development and in the following text the proposal for guidelines for establishing immaterial supply chains is discussed.

5.4.5   The Fifth Part of the Proposal, Immaterial Supply Chains

The final part of the proposal are the immaterial supply chains. As seen in the conceptual framework, the immaterial supply chain is embedded or working in the background of the proposal. The proposal is to establish an immaterial supply chain, which would expand over the enterprise. In figure 23 the proposal is illustrated.
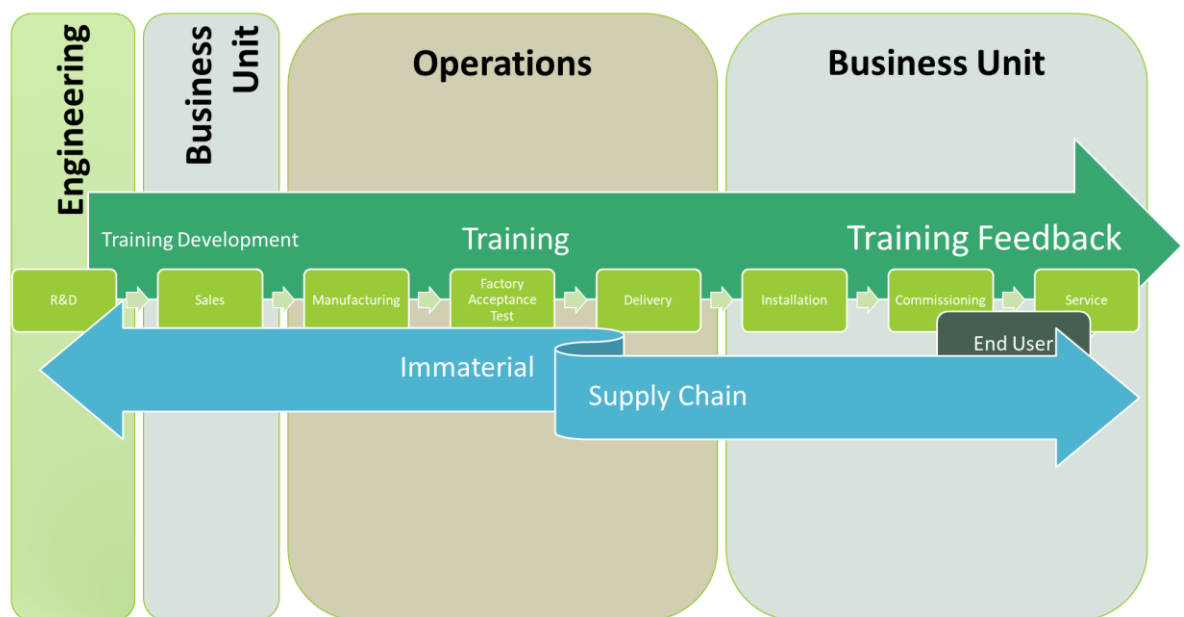
Figure 23 Proposal for immaterial supply chain

As seen in figure 23, the immaterial supply chain flows through the company's main processes. The main processes are depicted in a logical flow of a product or system, which is sold to a customer. The first step is that the product is developed in research and development under the engineering department. The second step is that a business unit sells the product to a customer. On the third step the operations department begins to manufacture the product, tests the product, and delivers the product to the customer. After the delivery, the business unit, which sold the product, has the product installed, sees that it is commissioned according to company protocol. On completion of the commissioning the product is handed over to the end-user. When the product is in the possession of the end-user, the business unit sees to that the product is serviced according to maintenance schedule.

In all these steps information regarding the sold product is created. And in all steps, information should be received. Without an immaterial supply chain, the information is lost or not transferred efficiently between all stakeholders. Regarding technical training, the training development begins when the product is being developed and the actual training starts well before the installation of the product. Training feedback is gathered from the stakeholders after training is completed. Without a functioning immaterial supply chain, the development of training falls behind. The proposal is that from all access points, which are the steps mentioned afore, information on changes, challenges, methods etc. would be supplied to all necessary stakeholders. On the figure 24 the described supply chain is illustrated.
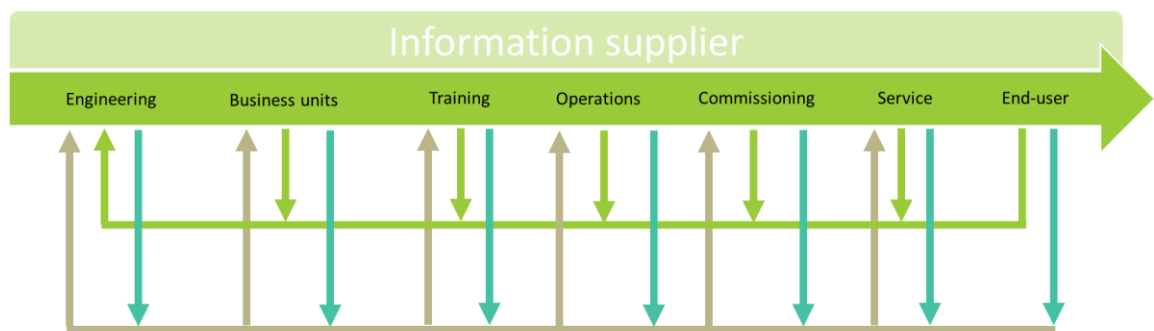

Figure 24 Immaterial supply chain access points and information flow

As figure 24 shows, in the supply chain there are information suppliers who are giving and receiving information. These suppliers are, but not limited to, engineering, business units, training, operations, commissioning, service, and end-user. In the normal information flow, which is based on Lean as Lean is used in the company, the information flows according to the thick green arrow, from engineering to other departments and entities in the supply chain. As new information is acquired by the information suppliers in the supply chain, that information is passed down back to engineering along the thin green line. Engineering processes the information and distributes it again along the supply chain's thick green line. This part of the proposal is the normal way of supplying information along the path to whomever the information concerns. This way all the information is handled and distributed professionally and efficiently. The second part of the supply chain is proposed to be established to handle urgent situations and make information distribution more agile. The basic idea in the proposal is that regardless of who the information supplier is, that information is immediately distributed all across the supply chain. For example, a design flaw is noted in Operations. That information is passed along the blue line, from which it will travel to all touch points in the supply chain along

the grey line. Note, that in the agile supply chain the end-user may supply information but not receive information from the agile supply chain. The proposal considers that the probability of false or immature information distribution is high enough to cause a risk, that the end-users receive unfiltered or unmoderated information, which would have a negative impact on the company. As the information is distributed in the agile supply chain the same information is also fed to the normal supply chain to ensure that none of the affected parties are left out.

A part of the immaterial supply chain is the information distributed in the technical training via the training model. As the aforementioned supply chain provides data to and from the stakeholders in a fast pace using the agile method, the training department must be ready to implement the new information to the training materials. Therefore, it is paramount that the immaterial supply chain regarding training is up to the task. To prevent bottlenecks from happening, the training department needs to have an adequate number of trainers and voluntary instructors and some of them need to have the readiness to travel on a short notice due to some stakeholders wanting to have the training onsite. Also, curriculum and project designers must have enough time to update and add new information to the training materials. Finally, all parts of the immaterial supply chain must be aligned to the serve the business strategy and goals.

To enable the establishment and implementation of the immaterial supply chain, as Manager 2 pointed out in section 5.2, the tools to control the flow of information in the immaterial supply chain must be ready for use and all of the related persons must have the skills and capabilities to carry out the new tasks. As the amount of information may be moving in a fast pace, conventional communication channels, such as e-mails, cannot be used to communicate changes in the information, which means that the IT-department must be brought to the fold. One argument on implementing immaterial supply chains was that the control of information in technical training is a quality matter, which directly impacts the company's business.

Together all parts of the information supply chain with the strategic goals and stakeholder participation and technical training development cover what is needed for creating strategic guidelines in technical training development and immaterial supply chains. In the next section the validation of the presented proposal is discussed.

6 Validation of the Proposal

This section reports on the results of the validation stage and points to further developments to the initial Proposal. At the end of this section, the corrections to the proposal are presented.

6.1 Overview of the Validation Stage

This subsection discusses the validation of the proposal discussed in section 5. Validation was done using data 3.

The initial proposal described in section 5 was presented to key internal stakeholders. The focus areas of the proposal were discovered during the current state analysis and the related literature was studied to find suitable solution alternatives, which were then used to create the initial proposal. The focus areas discovered in the current state analysis were missing field training, absence of training strategy and immaterial supply chains. The produced conceptual framework from the studied literature addressed the focus areas and other challenges brought up in the current state analysis.

The first step of the validation was to find the key internal stakeholders from the company organization and send invitations to them to participate to the validation phase. This was carried out in cooperation with the training manager. The internal key stakeholders were found from the company's organization chart.

The second step of the validation was to present the proposal to the internal key stakeholders in a meeting and to receive feedback from the internal key stakeholders to improve the proposal.

The third and the final step of the validation was to implement the received improvement suggestions to the proposal.

In the next subsection the findings from Data 3 are presented and discussed.

6.2 Findings of Data Collection 3

The data for Data 3 was gathered according to the data plan, which was presented in section 2. For this data collection feedback from business directors and managers was gathered after the business challenge solution proposal was presented to them. The solution proposal is introduced in section 5. Below the summary of the feedback is illustrated on table 11.

Table 11 Initial proposal feedback.

Informant	Technical Training Development	Strategy	Immaterial Supply Chain	Notes
Manager 1	• Voluntary instructor pool • Combining e-learning with hands-on • De-centralizing the organization		• Create easy access and workflow	
Manager 2	• Bring in the stakeholders	• Establishing, implementing and executing strategy	• Digitalization • Data tools and data control • Part of quality process	
Director 1		• Training should be linked to strategy		• Support for the proposition
Director 2	• Virtual-training, e-learning, etc. to enhance efficiency • Curriculums should be implemented and extended to commercial training	• Training is a strategic matter in the whole organization	• Should be seen from the whole organizations perspective and implemented to existing models	• Good entirety • What is going to be implemented
Senior Manager 1	• Certification and re-certification joint rules		• Open platform to access information	• Consider to include "Skills Matrix" • Company activity on training should exceed customer activity

As seen in the table 11, the internal key stakeholders presented feedback and improvement ideas to the proposal. The feedback from Manager 1 and Manager 2 was included to the table to present a coherent list of feedback from the directors and managers in the internal key stakeholder group. In the following text the feedback and improvement ideas are discussed in detail.

The first topic to which improvement ideas and feedback was presented was the technical training development to which feedback was presented from four informants. The focus areas in which to develop the proposal was to increase the role of e-learning and other forms of virtual training, bring the stakeholders in to the development phase of technical training, to create local training hubs, to extend the proposed curriculums to existing commercial trainings and to create joint rules regarding certification and re-certification of the trained individuals. Voluntary instructor pools were discussed, and the proposal received support from all parties on the basis of utilizing the existing talent and knowledge within the enterprise.

The second topic to which improvement ideas and feedback was presented was the strategy. In total of three informants presented feedback and improvement ideas to the strategy. The focus on the ideas was on establishing, implementing, and executing the strategy, linking training to the company strategy and that training is a strategic matter in the entire organization. In general, the strategic part of the proposal was well met.

The third topic to which the informants gave feedback and improvement ideas was the immaterial supply chain proposal. Four informants gave ideas on the topic. The focus areas were to create an easy access to the supply chain and to create an easy method on putting it on the existing workflows, implementation to existing models, create open platforms to access the information, to select data tools and control as part of the company's digitalization plans. Immaterial supply chain was seen as part of quality processes.

Outside of the topics, open comments were gathered as notes on the proposal. Three informants presented open comments. The first open comment was that the proposal is fully supported. The second comment was that the proposal is good as an entirety which followed a question that what is going to be implemented from the proposal in actuality. The third comment was to include the company's "skills matrix" to the proposal and that the proposal should consider that the customer should not have to pull to receive the proposed service but that the training department should push the service.

In the next subsection the improvements to the proposal are discussed.

6.3 Improvements to the Proposal Based on Findings of Data Collection 3

In this subsection the corrections to the initial proposal are discussed. The corrections are split in to three different topics, which are technical training development, strategy, and immaterial supply chains. The corrections by topic are discussed in their respectful subsections.

6.3.1 Technical Training Development Improvements

As described in section 5 the technical training development of the proposal consists of the organization, stakeholder involvement and training model. The corrections suggested by the informants in data collection 3, in addition to the previous suggestions by manager 1 and manager 2, were to create a pool of voluntary instructors, combine e-learning and other virtual training capabilities and methods to the existing training model

and proposal. The de-centralization of the training organization was put to the table as an improvement suggestion. Stakeholder involvement for both external and internal stakeholders to participate in the technical training development was emphasized and that the rules regarding certification and re-certification would be made together with the affected business units.

The suggestion to create the voluntary instructor pool ties directly to the proposal as the proposal includes the subject matter experts and trainers who may have a dual role as voluntary instructors. A corrected presentation of the suggested organization can be seen below in figure 25.
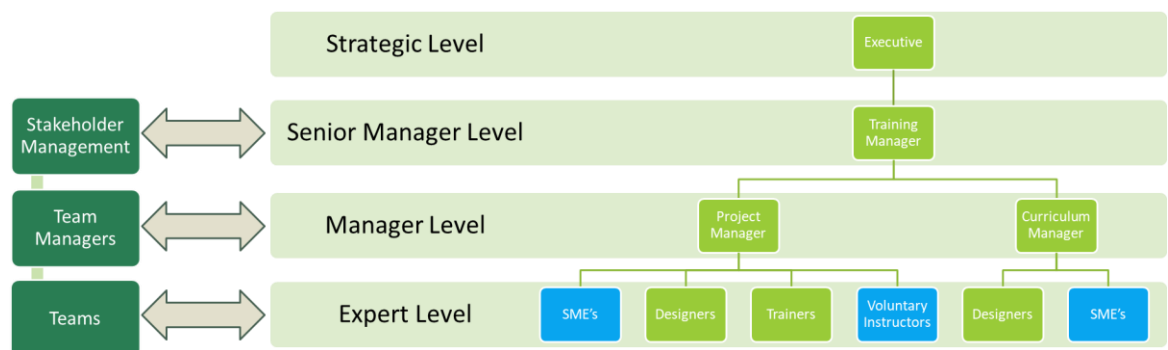

Figure 25 Improved Organizational Structure

As seen in figure 25, the organization is divided in to four different levels. The strategic level, senior management level, management level and expert level. On the expert level the subject matter experts, SME's, are borrowed from their department to share their expertise to the designers, trainers, and voluntary instructors. The designers work on the project design or curriculum design creating and managing content. Trainers carry out the projects with the designers, subject matter experts, and the voluntary instructors and in addition provide bottom-up insight for the organization. The voluntary instructors are borrowed from other departments to provide specific knowledge and skill regarding certain training projects and parts of the curriculums, and to provide extra workforce when needed. As seen on the improved organization structure, the stakeholder management normally communicates with the senior management level and the stakeholder team

managers communicate with the manager level of the training organization. Stakeholder teams are in communication with the expert level, but the presented communication model is not binding. The improved organization structure is scalable, which means that double roles can be appointed in smaller organizations and multiple positions of the same title may be appointed in larger organizations, which enables the de-centralization of the training organization into local training hubs with local managers and experts which in turn solidifies the involvement of the stakeholders as the involvement takes place locally and globally.

The improvement suggestion regarding e-learning and virtual training implementation are related to the training model's training projects and the delivery of the training. As online capabilities are increasing all the time globally, the emphasis on the virtual training delivery is considered in the improved training model.

The suggestion on extending the training curriculums to the commercial trainings of the company is included in the future plans of training development.

Certification and re-certification improvement suggestion related to the rules of certification were discussed shortly but to no effect. The improvement suggestion is considered in the training organization but was left out of scope regarding the thesis due to the fact that certification and the rules of certification are only discussed in the side notes in this thesis. In the next subsection the feedback and improvement suggestions regarding strategy are discussed.

6.3.2   Strategy Improvements

This subsection addresses the improvement suggestions and feedback related to strategy improvements of the proposal. The feedback on the strategic part of the proposal was well met and the foremost improvement suggestion was to establish, implement, and to execute the strategy for the strategy to take place in the actual work.

The overall message from the informants was that training should be linked to the company strategy. Even though training is seen as a fundamental part in the whole organization the link between the company's strategic goals and business unit plans is missing.

In the next subsection the immaterial supply chain improvement suggestions and feedback are discussed.

6.3.3 Immaterial Supply Chain Improvements

This subsection addresses the improvement suggestions laid out by data 3, and the related feedback.

The first suggestion to improve the proposal on creating immaterial supply chains was to create an easy access to the system with minimal effects to the existing workflow. This suggestion was based on the experiences on existing cross-departmental functions and their challenges. The challenges are that in the existing organization structure there are not so many cross-departmental processes which are easy to manage and creating a new process which has no owners or responsible persons could end up as quickly as it started. The improvement suggestion was considered but found too challenging to solve within the timeframe of this thesis.

The second suggestion was to find the data tools which enable the use of the immaterial supply chain across the extended enterprise and the control measures to control all the data and the data flow. This suggestion was seen as a part of enterprise-wide transformation called digitalization. It was noted that the immaterial supply chain is recognized as a part of quality processes. The improvement suggestion was found to be out of bounds from the thesis outline as the solution and the solution building ventures towards information technology field of expertise.

The third suggestion was to implement the idea to existing immaterial and material supply chain models and that the whole chain should be looked at from the company perspective. The improvement suggestion was considered and added to the proposal. The illustration of the improved proposal can be seen below on figure 26.
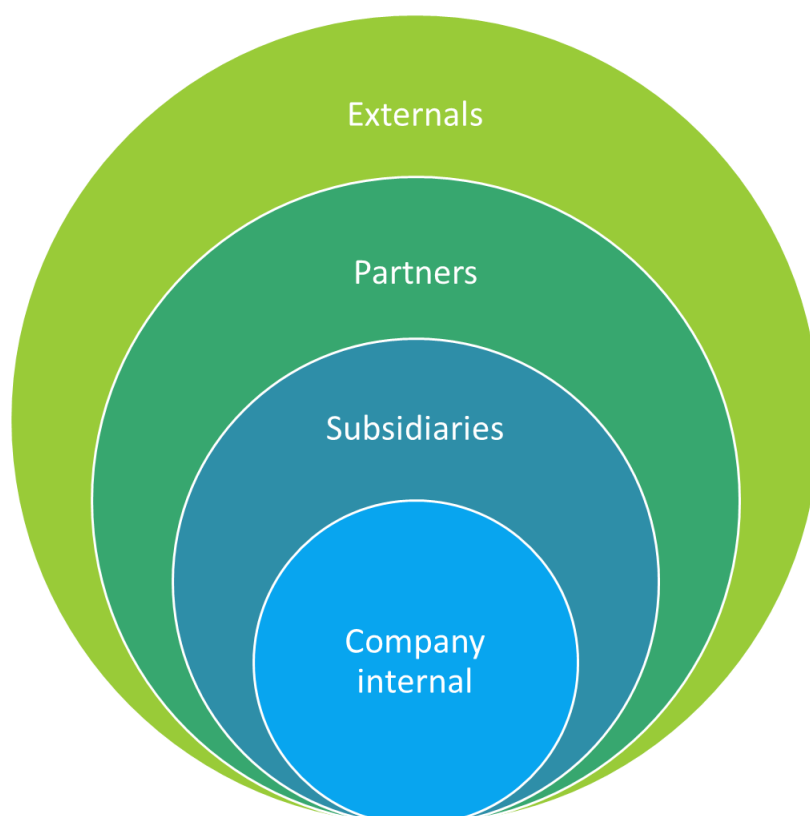
Figure 26 Improved Immaterial Supply Chain Base Model

As seen on figure 26, the immaterial supply chain base model shows the individual parts of the extended company. The suggestion is to create immaterial supply chain, which carries through the entire enterprise reaching the external parties such as customers, inspectors etc. The concept is the same as in the proposal, but it is not limited to training functions and related functions, and the purpose is to use the existing models in the proposed immaterial supply chain.

The fourth suggestion was to create an open platform to access all the information. This suggestion ties closely to the second improvement suggestion and as the second suggestion, the extent of the improvement suggestion is too large to fit into the time frame of this thesis.

In the next section the conclusions regarding the work on this thesis is discussed.

7 Conclusions

In this section the executive summary is addressed, the next step towards implementation is discussed and the thesis is evaluated by the author. The final part of the thesis are the closing words.

7.1 Executive Summary

This thesis was carried out to address the business challenge of the company, which was that the working field engineers are not trained adequately to carry out their work according to feedback from the field. As the company operates in the business of fire suppression, it is paramount that the field engineers are able to carry out their jobs above standards.

The thesis was carried out by following the research approach of design research. As the model dictates, the thesis was done in four main steps. The first step was to conduct a current state analysis to root out the fundamental reasons in the company processes which may be contributing to the challenge in a negative way. The current state analysis also consisted of interviews of stakeholders to map the extent and to get insight from the business on what is causing the challenge. The second step of the thesis was to investigate the existing literature regarding the challenge, which in this thesis was the literature on technical training and related strategy and immaterial supply chains. The existing literature provided information and implementable models on the solution of the business challenge. Based on the existing literature, a framework to address and solve the business challenge was created. The third step of the approach was to create a solution based on the current state analysis, knowledge from the existing literature, and the created framework. This solution was then presented to the company in the fourth step to validate the solution and to receive feedback and improvement suggestions, which were then added to the solution proposal thus, creating the final business challenge solution.

The current state analysis revealed that the existing training model was not effective in terms of the business environment and the outcome of the training, regarding transfer of skill and knowledge, was below the expectations. I addition, the training model's processes were analyzed and found lacking. The processes had many parts, which were not carried out by the persons involved in the process, or the process involved other parties who were not aware of the process and the processes were not known outside

of the training function. The current state analysis also revealed that the training function did not have a strategic plan or strategic targets and that the immaterial supply chains were missing.

The existing literature provided information and solutions on how to create a technical training model including strategic and organizational components and the basic idea on how immaterial supply chains should be handled.

The proposal to address the business challenge included the following: A strategy in technical training, which is tied to the company strategy, which is then broken down to clear strategic objectives all the way down to the individual level. A scalable organization model with deep stakeholder involvement with de-centralized training functions and a combined training delivery method of virtual, e-learning and hands on training. A technical training model based on stakeholder needs, which includes individual training programs per customer, curriculums per job title or function, tailored events to supplement or to serve, and a continuous improvement process. A base model for immaterial supply chains to supply information, knowledge, and skill to all parts of the enterprise.

The proposal was presented to the company directors and managers operating in the involved business units. The feedback and improvement suggestions were gathered and implemented into the solution proposal, creating the final proposal. The improvement suggestion key points were related to the training organization, training delivery, certification, immaterial supply chain integration to existing models and extending the solution to other training functions, such as design training.

The implementation of the solution increases efficiency of technical training, which in turn has an effect on quality of service and customer and stakeholder satisfaction, which both have indirect effects on the bottom line.

The next section addresses the next steps towards implementation of the suggested solution to the business challenge.

7.2   Next Steps Towards Implementation

In this section the steps towards implementation are discussed.

The first step to implement the guidelines to the existing model would be to create a strategy and strategic goals as described in the text. The second step would be to create a plan to change from the old organization to the new organization and it would be recommended to use change management methods and tools for a smooth transition to take place. Changing to the new organization would include hiring new talent, or recruiting from the existing talent, to fill the new positions, such as local trainers in the local training hubs, training project managers, designers, etc. The third step would be to transition from the existing training model to the new one, which would include stakeholder mapping, interviews, delivery planning etc. The second step and the third step would not happen overnight but in incremental steps along the year due to the fact that the existing model has created a training calendar and participants have already enrolled to the training courses on the calendar. The fourth step would be to do the final change from the existing model to the new one and along it the new model should be marketed to the stakeholders. The final step would be to implement the suggested immaterial supply chain to the existing models. In the next section the topic of thesis evaluation is discussed.

7.3   Thesis Evaluation

In this section the validity, reliability, logic, and relevance of this thesis are discussed and how the initial plan met the outcome of the thesis.

The thesis's object was to create guidelines to improve training offering as described in section 1. As the thesis was built and carried out on existing model based on Kananen's design research, the structure and flow of the work was predetermined and as such based on a reliable source. The thesis work began with the current state analysis and during the analysis it was noted that the findings forced to assess to either stay on the original plan to create guidelines or to change the objective to process development. The decision was made to remain on the original plan and to create guidelines to improve the training offering. The next step in the thesis was to study the existing literature on the subjects of technical training, strategy, and immaterial supply chains, with the focus being on technical training and strategy and the immaterial supply chains being a supplemental topic. As the literature on training is vast, the literature search relating training was limited to technical training and after limiting the criteria for the existing literature it was found that existing literature on technical training was extremely limited. Other relating topics, such as, product training etc. was available but as in the literature of technical

training was plainly explained (Combs & Davies 2010) that is not the same as technical training. The literature on strategy was studied on a surface level in addition to what the literature on technical training had to offer on that part. Supply chain literature was studied as planned, as a supplementing topic. In hindsight more literature should have been studied on strategy and supply chains to produce a better and fuller outcome. With the combined research of quantitative and qualitative methods as described by Kananen 2013) the research was adequate to produce a proposal and a final outcome for this thesis and provide a solution to the business challenge.

In the following subsections validity, reliability, logic, and relevance are discussed. These four criterions are the basis on which this thesis is evaluated.

7.3.1   Validity and Reliability

As Kananen (2013) describes, information should be considered as raw material for science to be processed in correct methods for a creditable end result to emerge. This means that if the material gathered for the research is contaminated or does not represent the population, the results does not reflect reality and therefore, the validity and reliability of the study or research is questioned. The material in this thesis was gathered in three different stages, called data, according to plan depicted in section 2.2 in a way which gathers information from all parts of the organization interacting with the training functions, but at the same time ensuring that the sample does represent the population and individual opinions are rooted out. As quantitative research's most important part is external validity, the chosen method of design research does not lack on external validity due to the fact that the method insists on having the involved people related to the business challenge onboard the study or research. In the thesis all interviewed persons were in close ties with the training function and with their respectful customers. Other validities in quantitative research methods are structural and content. In design research the framework which is selected for the study should be followed strictly, which in turn provides structural validity. Content of the study is validated by referring to existing studies where the model has been used and repeatedly found just. The thesis's framework was followed through and the content validity was checked from the sources. Validity and reliability in qualitative research are based on how accessible the information is and how consistently the information can be interpreted to reach the same conclusions. Sample saturation is one basis of validity and reliability in qualitative research. All presented arguments are pointing to the fact that documentation is key in proving justification on the study results, as all data can be interpreted in a different way, depending on the question

or focus. Validation of credibility on information provided to the data collections can be justified by information saturation. Information is considered to be saturated when new information is no longer received when collecting data (Kananen 2013). All data used in this thesis, which does not fall under nondisclosure agreements, was documented, and presented in this thesis. In the next subsection logic and relevance criterion are discussed.

7.3.2   Logic and Relevance

As Saunders et al. (2012) argue that the thesis must stand up to the closest scrutiny, a flow of logic and a number of assumptions will be the basis of the research design. Logic in this context means that the research is done in a systematic way thus, disregarding beliefs. The thesis was carried out in a logical pattern as described in section 2. In the plan, an end result comes out from each step and each step is described from beginning to the end thus, making the plan and method logical.

Relevance of the results and findings can be seen as something that directly addresses important issues to the managers (Saunders et al. 2012). Relevance of the study was proven whilst carrying out the thesis work as company management took interest in solving the challenge and periodically called on meetings. Based on design research, proving the relevance of the study is futile as the method itself is created to address business challenges, which itself makes the study relevant.

7.4   Closing Words

"The only constant in life is change" once said a person and in finishing this thesis I agree. While carrying out the work to create proposals and finalizing the solutions to the business challenge, the way we interact in the world has changed and by some, it will remain as new and never return to the old. The relevance of technical training in technology business will never change but the way we deliver training must change according to our environment and by the way we conduct business. Between the time this thesis work was started and when it reached its end, delivery of technical training has changed from "close up and hands on" -type of training to online delivery. Yet, the relevance of this thesis remains. As it provides ways and ideas on how to establish or re-organize a technical training function to provide better service and quality for all stakeholders involved in technical training as providers or receivers. Even in ever changing situations.

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