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CBM Delivery Governance

Case: Wärtsilä Technical Service, Power System Service

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Abstract

When replacing a digital platform within Wärtsilä Technical Service, Power System Service, a new service will be offered to the customer. The main purpose of this thesis is to create work processes for the delivery of the new service and to also constitute a stakeholder analysis for the new service. The aim with the processes is to clarify how the delivery governance of the new service will be managed.

The method of performing this work can be characterized as a qualitative method. The data has been collected through meetings with employees in Wärtsilä, as well as through other sources within the company. Tools that have been used are PowerPoint and Visio, where PowerPoint has been used for the stakeholder analysis and Visio for the work processes.

The result of this thesis is the design of the work processes for the new service and how the continued work should proceed to achieve fully approved processes. The work has also resulted in a stakeholder analysis where stakeholder collaboration with the department CBM 4Stroke & Aux is presented. This analysis has given rise to the work processes. The work processes describes the delivery governance and they are necessary for the department to be approved as a service supplier by different classification societies.

Language: English	Key words: Delivery governance, Stakeholder analysis, Work process

EXAMENSARBETE

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Abstrakt

Vid byte av en digital plattform inom Wärtsilä Technical Service, Power System Service, kommer en ny service att kunna erbjudas till kunden. Huvudsyftet med detta examensarbetet är att skapa arbetsprocesser för leveransen av den nya servicen och att även utföra en intressentanalys för servicen. Målet med processerna är att de ska förtydliga hur leveransstyrningen av den nya servicen ska skötas.

Metoden för att utföra detta arbete kan karakteriseras som en kvalitativ metod. Datan har samlats in genom möten med anställda inom Wärtsilä, samt genom andra källor inom företaget. Verktyg som har använts är PowerPoint och Visio, där PowerPoint har använts till intressentanalysen och Visio till arbetsprocesserna.

Resultatet av detta examensarbete är utformingen av arbetsprocesserna för den nya servicen och hur det fortsatta arbetet bör se ut för att uppnå helt godkända processer. Arbetet har även resulterat i en intressentanalys där intressenternas samverkan med avdelningen CBM 4Stroke & Aux presenteras. Denna analys har legat som grund för arbetsprocesserna. Arbetsprocesserna beskriver leveransstyrningen och behövs för att avdelningen ska kunna godkännas som serviceleverantör av olika klassificeringssällskap.

Språk: Engelska Nyckelord: Leveransstyrning, Intressentanalys, Arbetsprocess

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List of Abbreviations

CBM = Condition Based Maintenance

TS = Technical Service

RPA = Reference Performance Analyser

RPAViewer = Reference Performance Analyser Viewer

CM = Condition Monitoring

PM = Preventive Maintenance

UNIC = Unified Controls

WOIS = Wärtsilä Operator’s Interface System

ADC = Asset Diagnostic Case

1 Introduction

This thesis is concerned with delivery governance for a department in a multi-international company and a global leader in advanced technologies. The assignment was given to me on behalf of Condition Based Maintenance (CBM), a department that belongs under Wärtsilä Technical Services. In this chapter I will present and give an overview of the background of the thesis. I will also discuss the problem area and main goals of the work. Finally I will present the disposition of the thesis.

1.1 Background

In year 2001 the Condition Based Maintenance centre was established in Wärtsilä Finland Oyj, Vaasa. The purpose of the department is to offer the customer a remote monitoring service. The data from engines in ships or in power plants is collected and analysed in the CBM centre. After the data is analysed, a report over the engines condition is created and sent to the customers. Today the CBM centre monitors over 400 installations and over 1700 engines world-wide. A geographical distribution of the CBM customers is shown in ***figure 1***. The figure does not include all of the installations that has CBM service, but it gives a general picture over CBM's customers. The way of working in the CBM centre has remained mostly unchanged for over 16 years, but now with a change of the digital platform some of the working procedure is going to be updated. The need for change in the CBM centre is driven by the customers. The customers expects that their vendors develop the service that is offered to them and that new required service functions are being developed.

Figure 1. An over view of installations with CBM service (Wärtsilä, Global Contract Centre, 2018).

In order to deliver an effective and secure CBM service, the required information is available from many different stakeholders that are involved with the CBM department. With some changes in the working procedures, new processes need to be created and old ones updated. By identifying the stakeholders and their interactions with the CBM centre, creating and designing new work processes will be simplified. The problem today is that the roles are unclear and that also leads to the fact that the responsibility for various activities is undeclared. The department Quality Management that belongs under Technical Service, Power System Service, Engine Service TS & I, also have requirements with regards to the work processes. The department requires that the work processes are done and that they are updated.

1.2 Problem specification

Wärtsilä Condition Based Maintenance has for a long time used a software called RPA that analyses engine and installation data from all over the world that has the CBM service. The data that is analysed, receives from several sensors on an engine. From the data that the software and later the responsible CBM reporter is analysing, the engine's overall condition can be obtained, more about this in chapter 3.2. Then the CBM experts uses the application RPAViewer to view the results of the analyses and create a monthly report that is sent to the customer. The RPAViewer user interface can be seen in ***figure 2.***

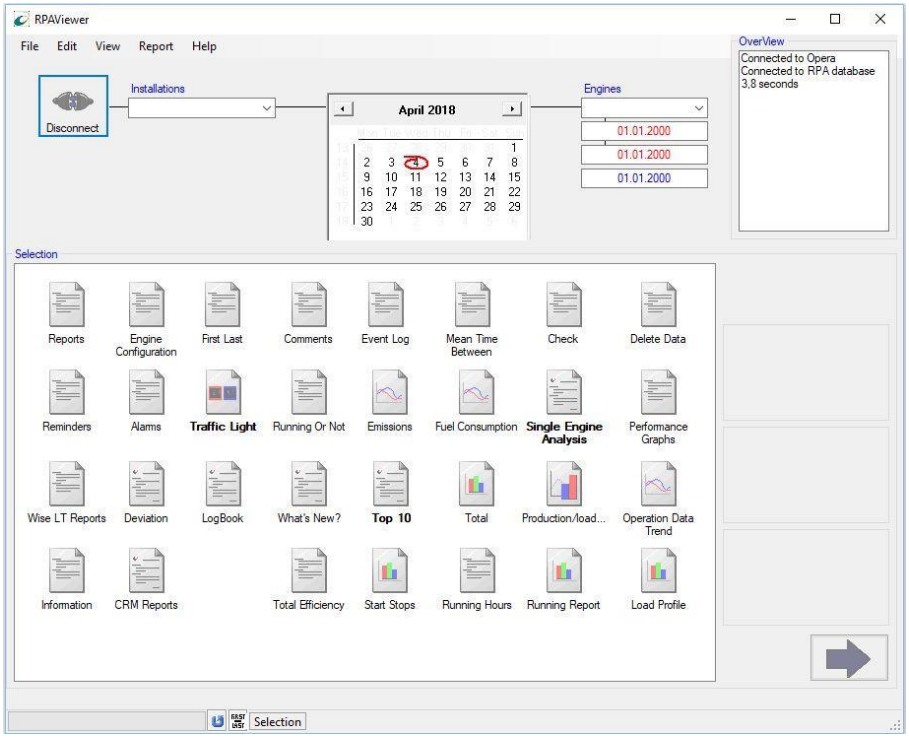

Figure 2. RPAViewer interface.

Wärtsilä plan to take a new CBM infrastructure in use during 2018. The change of platform means that the governance of the CBM service and delivery is also updated. The term governance reflects who has the power and who makes the decision with regards to the new functions and services. In other words governance reflects how an organisation and its services should be managed and how it will be implemented when making decisions within the organisation. With the new platform, CBM is going to offer new types of functions and services, for example daily abnormal detections. In the new platform algorithms are used to automatically check for abnormalities and performance deterioration in sensor and alarm signals from the engines that are monitored. The service delivery is going to be handled more globally, since there are persons involved with CBM in Expertise Centres world-wide. Today Wärtsilä has eight Expertise Centres around the world.

Because of the upgrade, working processes needs to be updated and new ones created. These processes can also be useful for new employees and other interested review, so they know how CBM handles the delivery governance of the service to the customers. In advance for the employees to work in a good environment and to have good instructions of their work, the processes needs to be created. The work processes also needs to be in order for the classification societies. If the processes are not updated or missing, these societies cannot approve CBM as a Service Supplier, which is an important sales enabler.

1.3 Objectives of the thesis

The main objective of this thesis is to update and create new documents for the service delivery of the daily abnormal detections. To help the employees who work with CBM delivery in their daily work, the work processes needs to be clear. In order to develop and create these processes I will start by performing a stakeholder analysis. The analysis will make it easier to understand which of the stakeholders are affected by the department and which stakeholders that affects the department.

When creating or developing new products or solutions, it’s important to be in contact with both existing and new customers. In my thesis I will also see the problem from a customer’s point of view. This in order for the new service to better meet the customer needs.

1.4 Focus and limitation of scope

The CBM delivery consists of three different areas. These areas are life cycle support governance, implementation of new installations to the CBM infrastructure and CBM service delivery governance. Each of these areas are very broad and my focus have been on the last one, CBM service delivery governance. CBM service delivery can be divided in two different services, monthly reports and daily abnormal detections. My main focus will be on daily abnormal detections since this is a new service that CBM will offer to their customers.

1.5 Disposition

In the first chapter of the thesis, the background, problem area and the objectives of the thesis is introduced to the reader. Also in the first chapter the focus and limitations of the thesis is discussed. The second chapter presents Wärtsilä in brief and the organisations structure. General information about Condition Based Maintenance will also be presented in the same chapter as Wärtsilä CBM. The third chapter presents the theoretical framework of the thesis. Stakeholder analysis and mapping work processes are the main topics that will be discussed.

The fourth chapter presents the method and working procedure for the thesis. The reliability of the method is also presented in this chapter. The fifth chapter will introduce the CBM Production. In this chapter the stakeholder analysis and work processes will be presented. The fifth chapter presents the final results. The sixth chapter contains the discussion. This chapter reflects on how well the goals of the thesis were reached and problems that has occurred. Suggestions further research and the final conclusion is also included in the sixth chapter.

2 Wärtsilä in brief

Wärtsilä Corporation was founded in 1934 in the municipality of Tohmajärvi, Finland. Today Wärtsilä is a multi-international company and a global leader in advanced technologies and complete lifecycle solutions for both the marine and the energy market. Due to Wärtsilä's integrated offering of services and products, they are well positioned in the market. To secure and strengthen Wärtsilä's position on the global market Wärtsilä has done market driven investments in R&D and also focused on digitalisation.

In 2017, Wärtsilä's net sales totalled EUR 4,9 billion and the company had approximately 18 000 employees. The company has operations at over 200 locations in more than 80 countries around the world. Wärtsilä is divided into three main business areas; Marine Solutions, Energy Solutions and Services (Wärtsilä, 2017a) (Wärtsilä, 2017b) (Wärtsilä, 2018). From ***figure 3*** the net sales by business area 2017 can be seen.

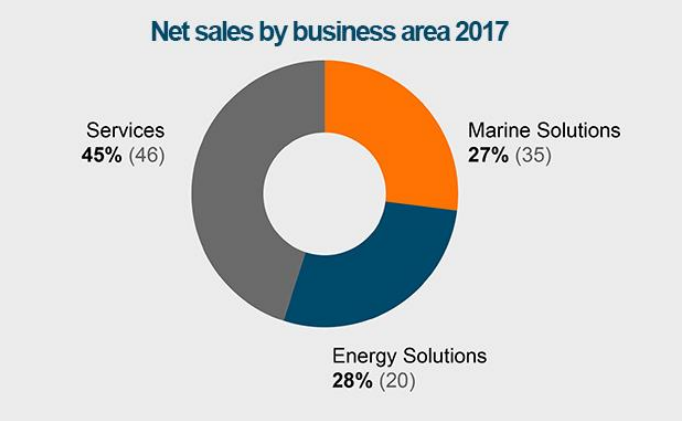

Figure 3. Net sales by business area in 2017 (Wärtsilä, 2018).

2.1 Marine Solutions

Marine Solutions is one of the three business areas in Wärtsilä. Marine Solutions provides marine and oil & gas industry customer's innovative products and integrated solutions that are customized to meet the customers' requirements. Wärtsilä has a very strong position in all major marine segments as a provider of highly ranked ship machinery and systems. In 2017, Marine Solutions had a net sales of EUR 1,3 billion, which is 27 % of Wärtsilä's net sales (Wärtsilä, 2016a) (Wärtsilä, 2017a) (Wärtsilä, 2018).

2.2 Energy Solutions

Wärtsilä's second business area is Energy Solutions. Wärtsilä Energy Solutions, a leading global energy system integrator, offers a wide range of environmentally sound solutions. Energy solutions offering to their customer includes ultra-flexible internal combustion engine based power plants, utility-scale solar PV power plants, energy storage & integration solutions, as well as LNG terminals and distribution systems. At the end of 2017, Wärtsilä had 67 GW of installed power plant capacity in 177 countries around the world. In 2017, Energy Solutions had a net sales of EUR 1,4 billion. The net sales for Energy Solutions 2017 is 28 % of Wärtsilä's net sales (Wärtsilä, 2016a) (Wärtsilä, 2017a) (Wärtsilä, 2018).

2.3 Services

Wärtsilä's third business area is Services. Throughout the whole lifecycle of the customer's installations, Wärtsilä Service is there to support them by optimising efficiency and performance. Wärtsilä is dedicated providing high quality, expert support and the availability of services in the most environmentally and safe way possible to the customers anywhere and anytime. In order to maintain this service to the customers Wärtsilä Services network consists of approximately 11000 professionals in 160 global locations and is delivering services to more than 12000 customers every year. Wärtsilä has launched innovative new services that supports the customer's business operations, such as service for multiple engine brands in key ports, predictive and condition based maintenance and training. Wärtsilä Services net sales in 2017, were 45 % of Wärtsilä's net sales. The net sales for Services in 2017 were EUR 2,2 billion (Wärtsilä, 2016a) (Wärtsilä, 2017a) (Wärtsilä, 2018).

3 Condition Based Maintenance

In this chapter I will go more into detail what condition monitoring and condition based maintenance is. In this chapter I will also describe in more detail the CBM department at Wärtsilä. I will describe the department's way of working and what their main tasks are. In this chapter I will also describe the CBM product delivery process, in order to provide a better insight in how the service delivery is governed.

3.1 General information about CM and CBM

To detect a deviation or an error in an engines performance parameters, is important when something is happening to a production equipment. With condition monitoring (CM) consequential damages can then hopefully be avoided. Traditionally condition monitoring can be divided in to two different parts, subjective and objective condition monitoring. The subjective part includes to *see, feel, listen and smell*. In the objective part one will use sensors and measurements systems that provides values for either direct assessment or as a basis for trend analysis. Both of these types of monitoring is important, but with increasing complexity of the engines and low manned production, the role of objective monitoring is increasing (Johansson, 1997).

The optimal way to monitor a parameter is to follow in time the variations that occurs. For this purpose a control chart can be used. In this type of chart the variations should stay between two control limits and the control chart should also set off an alarm if the derivate becomes too steep. An example of a control chart can be seen in ***figure 4*** (Johansson, 1997). Typical parameters that are monitored for an engine are charge air pressure, charge air temperature, turbocharger speed and exhaust gas temperatures. In chapter 3.2 further details concerning he number and types of parameters for Wärtsilä CBM is presented.

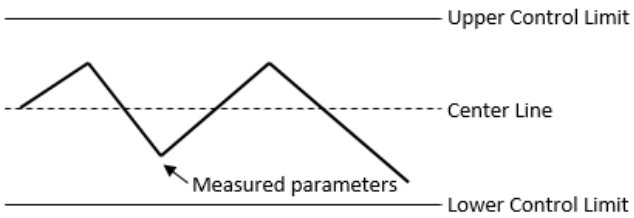

Figure 4. An example of a control chart (Johansson, 1997).

A condition based maintenance (CBM) action is a preventive maintenance (PM) action that consists of three characteristics. The first characteristic is a measurable parameter that correlates with the degradation in the performance over time and the onset of failure. The second characteristic is that changes in the measurable parameter is received from data collected by using appropriate condition monitoring techniques. The last character is that when collecting the data no human needs to intrude into the object. The most important factor is the ability to identify a measurable parameter that provides a correlation between the measurement and the level of degradation. Vital for implementation of CBM is a combination of the understanding of failure mechanisms, availability of appropriate measurement technology and the analysis tool (Ben-Daya, et al., 2016).

According to Ben-Daya, et al. (2016) CBM deals with maintenance actions that is based on the items condition or state. The state characterizes the level of degradation due to some degradation mechanism that depends on physical characteristics, operating environment and operating load. Four steps are required for a CBM approach to maintenance. These steps are:

1. Collect data using sensors and condition monitoring devices
2. Use data to estimate the condition if the item has not failed or to detect the fault if the item has failed
3. Predict future condition
4. Take suitable maintenance action

3.2 Wärtsilä CBM

Wärtsilä CBM as a department belongs under Wärtsilä Technical Service. However after 1:st of March 2018, there will be some changes in the organisation. The CBM department that this thesis work has been done for is now called *CBM 4Stroke & Aux* and Technical Service is now *Technical Service, Power System Services*. In this thesis I choose to refer to CBM 4Stroke & Aux as only CBM. The service that CBM offers is available for both marine, power plant and oil & gas installations as a part of a service agreement. CBM optimises the availability, reliability and performance of the customer's equipment, through the diagnostics of key parameters and provides decision support. The estimation of equipment health is based on continuously measured data that is processed and replicated to Wärtsilä. On regular basis, detailed reports are provided by Wärtsilä experts to the customer.

The CBM Centre 4-stroke has three areas of focus:

1. With competence in monitoring and CBM with respect to 4-stroke engines, CBM provides data-analysis and technical support on-time, to ensure customer satisfaction. The benefits for the customers are for example optimised equipment performance, long-term predictability and inshight into equipment condition and optimised sheduled and un-scheduled maintenance.

2. Keep and maintain connectivity to all installations enabling CBM, remote support and other remote services.

3. Improve and develop the CBM products and services in co-operation with Services development organisation.

(Wärtsilä, 2016b; Wärtsilä, 2016c)

The CBM centre was established in year 2000 and the first connection made with the CBM service was to a power plant in 2001. One year later, in 2002, the first cruise ship was connected and it still is as of 2017. Today the experts within the CBM-team supports more than 400 installations and monitors over 1700 engines worldwide. The engine experts at CBM analyse data and gives advice to the customer. The result of the analysed data is an electronic report that is sent with agreed upon intervals to the customer. The report is customer specific and can include an engine health overview, equipment diagnostics, trending and predictions, maintenance advice, statistics of production and load profiles.

An overview of the CBM work-flow can be seen in ***figure 5.*** The measured values from sensors on the engine is collected and processed by the engines control system, UNIC. The data processed by UNIC is collected in WOIS and then sent daily wirelessly to Wärtsilä. The data is stored in a database and processed by algorithms using a rule based diagnostic tool. After the evaluation tool has processed the data, the experts analyse the data and creates a report that is sent to the customer (Wärtsilä, CBM, 2017). In the work-flow at CBM described above, my thesis is situated at the expert analysis and frequent reporting part of the work-flow. My thesis work is concerned with how the delivery governance of the daily abnormal detections proceeds from the start to end.

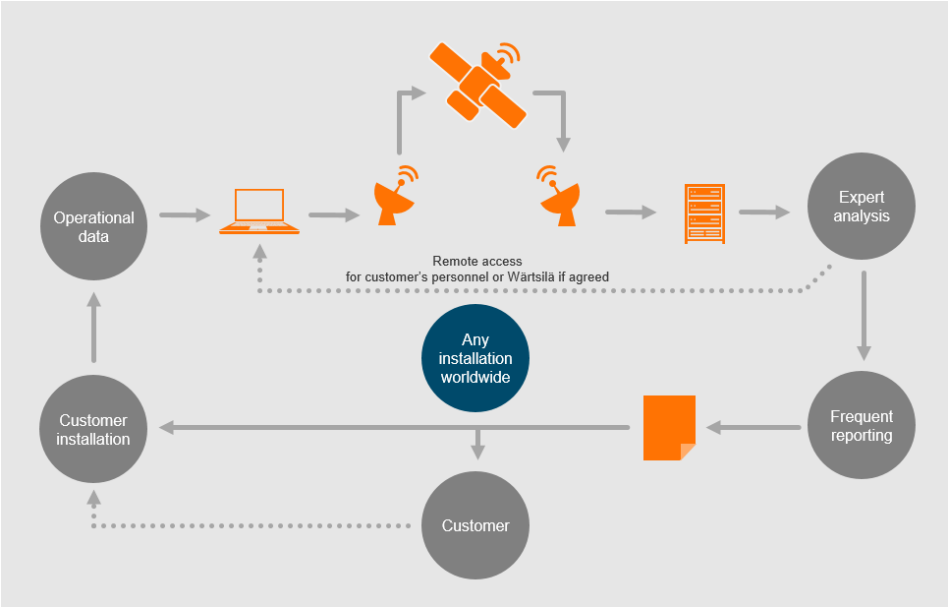

Figure 5. CBM work-flow (Wärtsilä, CBM, 2017).

To get a better insight into the data that CBM engine experts analyses and writes reports on, ***figure 6*** shows some of the measured parameters that are analysed. The number of parameters are different for every installation and they also depend on the engine type. CBM provides data from approximately 200 sensors per engine. After the parameters are received, the CBM system calculates the ideal operation parameters based on the engine type. The data presented in the CBM Report represents a daily average.

Operation data	Unit	Site values	High-spread	Low-spread	Comment(s)
Ambient temperature	°C	0,889	40,000	10,000	
Fuel oil pressure, engine inlet	bar	6,9	9,5	7,0	
Lubrication oil pressure, turbocharger B inlet	bar	2,7	2,5	1,3	
Charge air pressure, engine inlet	bar	2,5	2,4	2,1	
Charge air temperature, after cooler	°C	64	60	50	
Exhaust gas temperature, after cylinder A6	°C	445	439	359	
Exhaust gas temperature before turbocharger A	°C	323	569	489	
Generator bearing temperature, ND-end	°C	82	80	50	

Figure 6. Example of measured parameters. (Wärtsilä, CBM, 2017).

3.2.1 CBM production process

The CBM Production Process can be divided into two processes; CBM System Delivery and CBM Service Delivery. The delivery of the CBM System is gathering everything from a CBM request, to establish the remote connection for the installation. CBM Service Delivery includes the on-going work until the service is ended. ***Figure 7*** shows the CBM Production Process at a high level. The two main processes can be further divided into the sub-processes; Offering, Order, Delivery Planning, Mobilization, Configuration, Reporting and Delivery Period.

Figure 7. The CBM production process.

CBM Service is often a part of a long-term service agreement, but can also be offered to the customer during the warranty period of the engine. Therefore, the production process starts with a salesperson offering the service to the customer. After the request is handled, an order from the customer is received. During this phase the main actions are to check that all the mandatory data is available in the system and that there is reserve capacity at the CBM Centre. Delivery Planning is the third sub-process and here the main activities are to go through the network layout, deliver the configuration to the subcontractor, plan the time schedule and order hardware and software. This process is performed after the Connectivity Service has received the purchase order. The next steps are for the mobilization and configuration phases. During these phases, the ordered system is delivered to the site and the commissioning is performed. In addition, the connection is verified to the installation and a pilot report is made, before the second main process begins.

The delivery of the service consist of two sub-processes; Reporting and Delivery Period. These two phases are an on-going CBM work that continues until the service is ended. Having the pilot report accepted, the reporting process can begin. During the reporting process the performance data from the engine is analysed and the responsible CBM expert writes the monthly report. Cost transfer and invoice activities is also a part of the delivery process. Finally, in the last sub-process, different kinds of contract data needs to be followed-up, so that an agreement about the closing period is clear to both CBM and the customer.

4 Theory

In this chapter I will present the theory that will provide the frame-work and foundation of the thesis. First I will present theory concerning stakeholder and the stakeholder analysis. The chapter concludes with a discussion concerning mapping work processes and which type of process maps are suitable for the work presented in this thesis. Stakeholder analysis and mapping processes are connected with each other. A stakeholder analyse is one type of a process map, but I will describe it separately since it plays a central role of my thesis. After the stakeholder analysis is completed, it will be easier to create another type of process map that describes the way of working with the daily abnormal detections.

4.1 Stakeholder analysis

To be able to discuss what a stakeholder analysis is, the stakeholders need to be defined and identified. In this section I will go through stakeholders, what a stakeholder analysis is and different ways to do a stakeholder analysis.

4.1.1 What is a stakeholder?

There are two different kinds of definitions of a stakeholder. The first one is the most focused one. “Stakeholders without whose continuing participation the corporation cannot survive as a going concern”. These kind of stakeholders are owners, customers, employees and suppliers. The second definition of a stakeholder has a broader definition and includes “any group or individual who can affect or is affected by the achievement of the firm’s objectives”. This definition also includes competitors, governments, special interest groups and the media.

Over time there have been different distinctions between different kinds of stakeholders. There have been distinctions between internal and external stakeholders, primary and secondary stakeholders, and actual and potential stakeholders. Different approaches regarding stakeholders have created different perspectives on the stakeholder definition. Some people only rely on that the stakeholder is included in the “value-creating network”. Others think that this focused definition is too narrow and that the stakeholders are being treated as “secondary” or less important, and that the focused definition is misleading (Matikainen, 1994). In regards to my thesis the first stakeholder definition is the most appropriate definition. This since my thesis considers stakeholders described in the

definition “Stakeholders without whose continuing participation the corporation cannot survive as a going concern”. These stakeholders are for examples customers and employees.

4.1.2 What is a stakeholder analysis?

A stakeholder analysis can also sometimes be called a stakeholder map, but that is a term that is more seldom used. Today a stakeholder analysis is used as a technique for getting a better view of the internal and external surroundings of an organisation. The purpose is to better understand which stakeholders the organisation needs to relate to and how the collaboration between them is working. A stakeholder map is a simple graphical representation of the results of a stakeholder analysis. ***Figure 8*** shows a general stakeholder map (Andersen, et al., 2008).

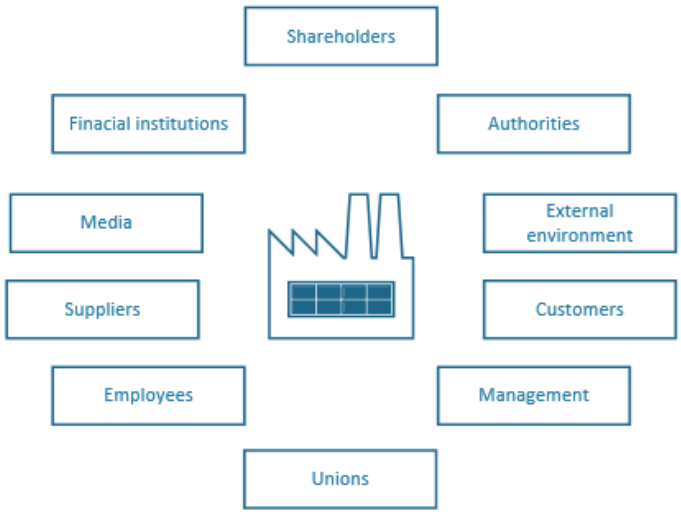

Figure 8. A general stakeholder map (Andersen, et al., 2008).

Andersen (2007) describes a stakeholder analysis as following: “A solid understanding of who the organisation’s stakeholders are, what expectations they hold, what they are satisfied with, and in which areas they would like to see the organisation improve”. The stakeholder analysis is not a reconciled, general tool with different steps to be performed, it’s aim is to generate a higher awareness of the stakeholders that have an interest in the organisation. To do an stakeholder analysis once or twice a year can open up the “eyes” of the organisation. The analysis can also generate ideas how to improve the organisation. When it is performed at a higher level in the organisation an overall understandig of the organisation’s position will be created (Andersen, 2007).

Stakeholder expectations can be added to the stakeholder map, as shown in ***figure 9***. This so the organisation more easily can see what the stakeholders expect from them. At first the organisation assumes that suppliers and other stakeholders appreciate the business they are doing and that the stakeholders have no other expectations than continuing in the same direction. If the organisation then looks closer at the stakeholders expectations they might see that they expect something very different. For example employees no longer wants to be paid more for their efforts, they rather expects to get a clear career path and lifelong learning. Also in ***figure 9*** you can see the position or attitude of each stakeholder towards the organisation. These are often included in the stakeholder map. There are different models that defines the stakeholders position, but the following definitions are simple to use according to Andersen, et al., 2008:

- Positive, interested in cooperation for mutual benefit
- Neutral, no strong position or attitude towards cooperation
- Negative, sees benefit for itself in disadvantage for us

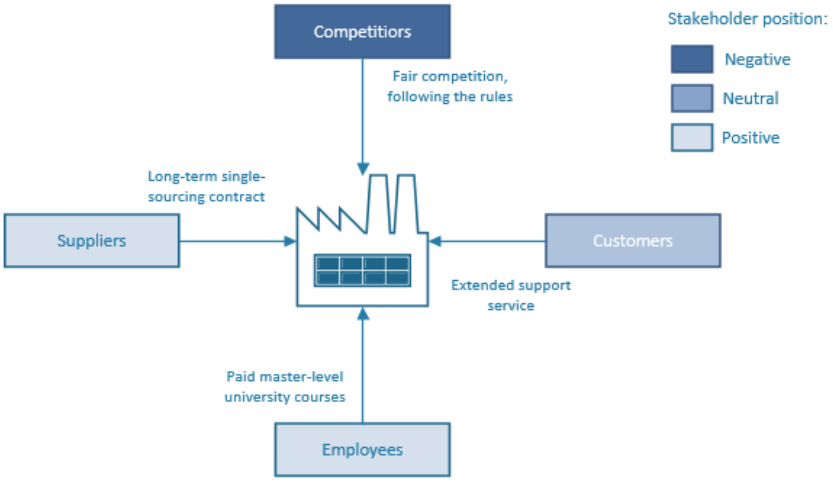

Figure 9. A stakeholder map with the stakeholder's position and expectations shown (Andersen, et al., 2008).

4.1.3 Establishing a stakeholder analysis

According to Business for Social Responsibility (2011) stakeholder mapping or analysis is a process that demands a collaboration to research, debate and discuss several perspectives in order to settle on a list of stakeholders. The process can be divided into four distinct phases:

1. **Identify**. List relevant stakeholders
2. **Analyse**. Understand the perspective and interest of the stakeholder
3. **Map**. Visualizing the relationships
4. **Prioritize**. Rank stakeholder relevance and identify problems

Identify. The first step in the mapping process. This phase is best done with a brainstorming session. The list of stakeholders for your organisation, project etc. depends on the business, its impact and the current engagement objectives. Important to remember is that the stakeholder list will change as the environment surrounding the company changes or the stakeholders change their expectations or make their own decisions (BSR - Business for Social Responsibility, 2011).

When creating a stakeholder list, a good thing to do is to place the stakeholders in a logical pattern. This because it will be easier when doing the three following phases in the stakeholder analysis process. (Andersen, et al., 2008) During the brainstorming session there are some points that can be good to consider. To be social, aware and diverse are three of them. The last two are that you have to learn from the past and the ongoing environment, and to be thinking forward.

Analyse. After one has identified the stakeholders and have the list ready, it is time to do some further analysis. The benefits of this phase is that one will better understand the stakeholders' relevance and the perspective they offer. One will also understand their relationship with you as an organisation. BSR (2011) have developed the following list of criteria that will help one in analysing the stakeholders:

- **Contribution (value).** Does the stakeholder have information, counsel, or expertise on the issue that could be helpful to the company?
- **Legitimacy.** How legitimate is the stakeholders' claim for engagement?
- **Willingness to engage.** How willing is the stakeholder to engage?
- **Influence.** How much influence does the stakeholder have?
- **Necessity of involvement.** Is this someone who could derail or delegitimize the process if they were not included in the engagement?

To these five criteria's you can assign the values low, medium or high with respect to each stakeholder. This will help one to see which stakeholder is most important and which are less important.

Map. The third phase in the stakeholder analysis is to map stakeholders. Mapping is a visual exercise and analysis tool that will be used for further research concerning the stakeholders and which of them are most useful to collaborate with. This process will help one to see where the stakeholders stand when they are compared to each other and evaluated according to the same criteria (BSR - Business for Social Responsibility, 2011).

One way to do the mapping is to place your organisation at the centre and place the stakeholders around it. To make the stakeholder map easier to interpret one can choose to place the stakeholders in a more logical pattern. For example one can place customers on one side and suppliers on the other, and internal stakeholders grouped together. To illustrate the relationship between the two parts arrows can be used (Andersen, et al., 2008).

Prioritize. In this last phase one will take a close look at stakeholder issues and make a decision if they are good for your organisation. According to BSR (2011) these questions can be good to ask:

- What are the issues for these priority stakeholders?
- Which issues do all stakeholders most frequently express?
- Are the real issues apparent and relevant to our engagement objectives?

Andersen (2007) have after many years of studying and working with stakeholder analysis, provided five steps that can be followed to create a stakeholder analysis. These five steps are similar to the four steps that BSR (2011) have developed and. According to Andersen (2007) the first and second step are the same as BSR (2011) have described that is to identify and classify the stakeholders according to criteria that have been predetermined. The third step is to identify the stakeholder's needs and expectations. For this the Kano model can be used (see ***figure 10***) where the straight diagonal line describes the expressed requirements of the stakeholder. These are the only requirements that the stakeholders will describe if asked. The lower line describes requirements that are basic and are not expressed. These two sets of requirements are complete demands imposed by the stakeholders. If these two requirements do not give enough satisfaction, one can look at the third set of requirements.

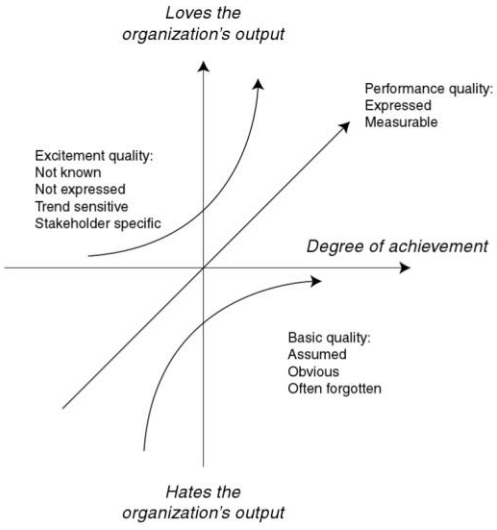

Figure 10. The Kano model and different types of stakeholder requirements (Andersen, 2007).

The fourth step is trying to figure out how the stakeholders are or will act towards the organisation, for this a stakeholder classification matrix with labels in each field is constructed. The last step that Anderson (2011) describes is to develop strategies for how the organisation should handle the stakeholders.

4.2 Mapping work processes

Many people may be involved in different parts of an organisations total work process. However there are few of these people that can visualise the whole work process. Therefore I will in this chapter present how to map work processes and explain why this can be useful. Different types of process maps will be presented and the information concerning these processes will be then be applied in the practical part of this thesis.

4.2.1 Purpose and approaches

"A logical series of related transactions that converts input to results or output."

(Andersen, 2007)

Andersen's (2007) definition above relates to what a process is. The word process is very general and to specify that the process is taking place inside an organisation the words *work or business* is usually added in front of the word process. According to Andersen et.al. (2008), a business processes can be defined as follows;

"A chain of logically connected, repetitive activities that utilizes the organisation's resources to refine an object (physical or mental) for the purpose of achieving specified and measurable results/products for internal or external customers."

Depending on how complex the work process is, only a simple flowchart may be needed or if many people are involved, the benefits achieved from mapping work processes can be considerable. While creating the maps, and after they have been completed, many different uses in the organisation may be served. In training new employees, or when the organisation strives for some types of standards and certifications, or when one wants to identify some improvements in the processes, different kinds of process maps may serve as good tools.

When is it useful to map one or several processes? One situation is if the organisation has a process that is being performed often, but there is no one single person that has the whole

picture of the process. So to easier understand the whole process and its steps and flows, there may be a need for mapping the process. Another reason for mapping processes is if an organisation recruits new employees or transfers people from other areas that needs to be trained. If there are no process maps available, or if they are old and not updated, there may be a need to map the processes involved. There are several other reasons for why there may be a need to map a process, but one thing that is related to my thesis work is if the organisation is setting up a new infrastructure. To map an ideal process and be able to design the new infrastructure is a logical approach. In ***table 1*** different use cases and preferred type(s) of maps are shown (Andersen, et al., 2008). In chapter 4.2.3 the different maps will be presented and how they are used for different purposes.

Table 1. Different types of process maps are suitable for different uses (Andersen, et al., 2008)

Process map use	**Suitable type of process map**
Obtain a general understanding of the flow of process steps	• Basic flowchart • For complex processes, flowchart divided into segments or levels
Prepare training materials	• Basic flowchart • Cross-functional flowchart • For complex processes, flowchart divided into segments or levels
Identify areas in need of improvement	• High-level processes overview map • Cross-functional flowchart
Analyse the cost structure of a process	• Flowchart with cost data
Analyse time performance and capacity / capability issues in a process	• Bottleneck map • Flowchart with load statistics
Analyse responsibility issues in a process	• Cross-functional flowchart
Understand the organisation's place in its surroundings and links to other actors	• Stakeholder map
Map ideal processes in preparation for acquiring new infrastructure or software system	• High-level process overview map • Basic flowchart • Cross-functional flowchart • For complex processes, flowchart divided into segments or levels
Map work processes to meet external requirements for process documentation	• Depends on the format required
Create better insight into the structure and processes of the supply chain the organisation is a part of	• Stakeholder map • Supply chain model
Prepare for a merger	• High-level process overview map • Basic flowchart • Cross-functional flowchart • For complex processes, flowchart divided into segments or levels

4.2.2 The work of mapping a process

In this chapter I will describe and present the overall mapping process, the so called meta process.

Figure 11 shows the overall mapping process and the different phases are explained below.

Figure 11. Overall picture of the meta process.

I will focus on the first and third phase, because the second phase will be described in chapter 4.2.3, that covers the different types of processes.

The first phase, Plan, consists in clarifying the background and purpose of the process mapping; why do one want to map the process? The background and the use of the map will provide a helping hand during the planning and execution phases. After the purpose has been defined, the next step is to define which process(es) that are going to be mapped. Both the departure point and endpoint of the process need to be clearly defined and what is to be included in the process also need to be defined. This part of the process might be a challenge, but by regarding the process as a work unit, this challenge can be clarified. (Andersen, et al., 2008)

After the purpose has been defined and which process are to be employed, the next step in the first phase is to choose the approach. According to Andersen et al. (2008) there are five questions to go through in order to choose the correct approach. These questions are:

1. *Who should be involved?* All people that have some knowledge of the process that has been identified may contribute to creating the map. People with different types of experiences and knowledge are required in the mapping process and five to eight people in the group may be optimal. When deciding who should be involved, the stakeholder analysis gives a good answer to this questions.

2. *How should they be involved?* The people involved can create the work process from the beginning with group sessions or they can also do this with meetings or sessions, where drafts made individually that are discussed.

3. *How much time can one spend on the task?* This varies and depends depending on the complexity, knowledge and resources of the process. The resources that are available, indicates how much time the people involved can allocate on constructing the map and how much time the group have to complete the map. Also, if the process is new or familiar will have an impact on the time required.

4. *What are the relevant sources of information?* Information that the process map can be based on may come from many sources, for example from documents, people and observations. Documents include work instructions, procedures, different kinds of manuals and production data, all are useful when creating a process map. These documents describe how the process should be performed, but this might not be fully the same as how the process is performed in reality. In this case, it is good to interview and observe key persons that work with the actual process.

5. *What level of detail should be used?* The level of detail depends on the situation. To get a good process map, the level of detail needs to give one an understanding of the process and not only be a surface description. The process map should not consist of too many details either, since that will make people lose sight of what really is important.

The second part of the meta process is to execute. There are different kinds of process maps that can be chosen between when creating a process, these variations are discussed in the following section. According to Andersen et al. (2008) organisations often only use one or two of the different maps in an iterative process where the sequence varies.

Implementation is the last phase in the meta process. In this phase, an important subtask needs to be done. This is to create an acceptance for the changes that have been made and to create a good environment for the implementation that is auspicious. To avoid any complications with both the process itself or with the people involved in the implementation, this stage is important (Andersen, et al., 2008).

4.2.3 Types of process maps

As mentioned earlier there are different kinds of process maps that could be used in the execute phase. In this chapter I will describe what a basic flowchart and a cross-functional flowchart is, since they are the most relevant to my thesis. Other types of process maps are bottleneck map/flowchart with load statistics, value chain map/high-level process model and stakeholder map. A stakeholder map is not going to be presented in this chapter since it has been described already in chapter 3.1.

Basic flowchart. A *basic flowchart* is a good map to use when one starts mapping a process. The other mapping processes described can be helpful for the organisation to use later if they want to go forward with what has been visualized using the basic flowchart. The basic flowchart shows the interaction between different activities in a process. A flowchart is often seen in business presentations and can also be found in different kinds of software, like Microsoft Visio. The flowcharts consists of a set of symbols that have a distinct meaning. Wärtsilä has their own modelling templates and stencils to use, when creating processes in Microsoft Visio. Wärtsilä's symbols are the ones I am going to use, when designing work processes for CBM. ***Figure 12*** shows examples of symbols that are common. These symbols are from Microsoft Visio, where several other symbols are found depending on what type of process that is designed. Andersen, et al. (2008) presents in their book common flowchart symbols that are same as the symbols presented in ***figure 12***. The name of the symbols may vary, depending on the source, but the meaning is the same.

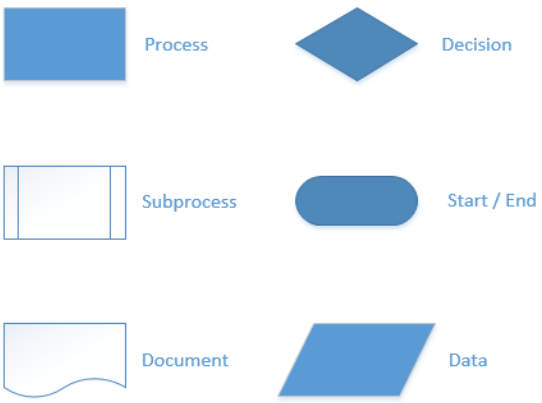

Figure 12. Examples of some flowchart symbols (Microsoft, 2013).

Creating a basic flowchart consist of five steps. The first step is to define the start and end points of the process. Depending on whether one is designing a new process or making smaller changes to an existing process, the way of working varies. When creating a new process it is often easier to start from the end of the process and work ones way to the start. This is also useful when making a thorough revision of a process. When making smaller changes to an existing process the way of working is the opposite of when creating a new process.

The second step is to select a graphical way to present the purpose of the process. There can be several ways to present ones process and one do not need to follow any specific rules. As mentioned above, the purpose with the flowchart is to make it as clear as possible and easy to understand for the people involved. When creating a basic flowchart it is important to not only define the start and end points in the process. This because the process often interacts with other processes and the boundaries for all processes need to be well defined. This is the third step in the process, and in this step the focus need to be limited one relevant tasks.

If a process includes several activities, it can be useful to break these down into smaller parts during the construction phase. If the total process has several sub-activities, these can be worked with separately before they are put together into the total process. This is the fourth step in the constructing process. The fifth step in the design process is noticing what needs to be done after all the other steps. Useful to do, before the construction has begun or during the construction of the map, is to answer or discuss certain important questions. These questions relate to stakeholders and to the outputs to the customers.

A final advice that is good to consider during the construction and designing phase is to start the process by drawing a rough map that focuses on the major activities and not to add the details at this stage. Often software is used in designing the map, but this might lead to that the person at the keyboard gets too much influence. Software is good for storage and distribution, but at the beginning of the construction, drawing the map by hand is often better, since then the software is not in focus (Andersen, et al., 2008). ***Figure 13*** shows a simple flowchart, but note that flowcharts can have many variations in the design.

Figure 13. Example of a basic flowchart.

Cross-functional flowchart. Described in the paragraphs above was the basic flowchart. The difference between the basic flowchart and the cross-functional flowchart is that the cross-functional describes who performs the activities and to which department they belong. As for a swimming pool, the cross-functional flowchart have lanes, and the flowchart is therefore often called “swim lane flowcharts”.

With many lanes in the flowchart, there are many different persons, departments and organisations involved. If there are many people that need to approve for example a test, the test itself might lose some of its value and information might get lost every time the activity changes lanes. Pros with a cross-functional flowchart is that you will get a better overview of the process and see which departments that are involved. This type of flowchart also shows if the process is logical or involves a lot of back-and-forth motion between different departments. Knowing this may help to do some improvements in the work process.

A basic flowchart can be used when developing a cross-functional flowchart, but it is recommended to start from scratch. The principles to construct the flowchart are the same as for the basic flowchart. At first, you need to define the boundaries for the start and end points and they need to be well defined. After the process boundaries are identified, the activities in the process identifies, with the important outputs. Here follows the same advice, if creating a new process, start from the end point, and if you are updating an old process start from the beginning.

When the activities are identified and the next step is to determine which department that is in charge for the activity. Activities defined, it is time to visually create the swim lanes that corresponds to the departments and to make the flowchart more optimal, placing the departments in close cooperation close to each other. Here the term *department* should not been taken literally. This term can refer to a single person, a part of a department, another

company, and so on. By placing the items continually correct in the swim lanes, the flowchart takes place. When the flowchart is finished, it might look like ***figure 14*** (Andersen, et al., 2008).

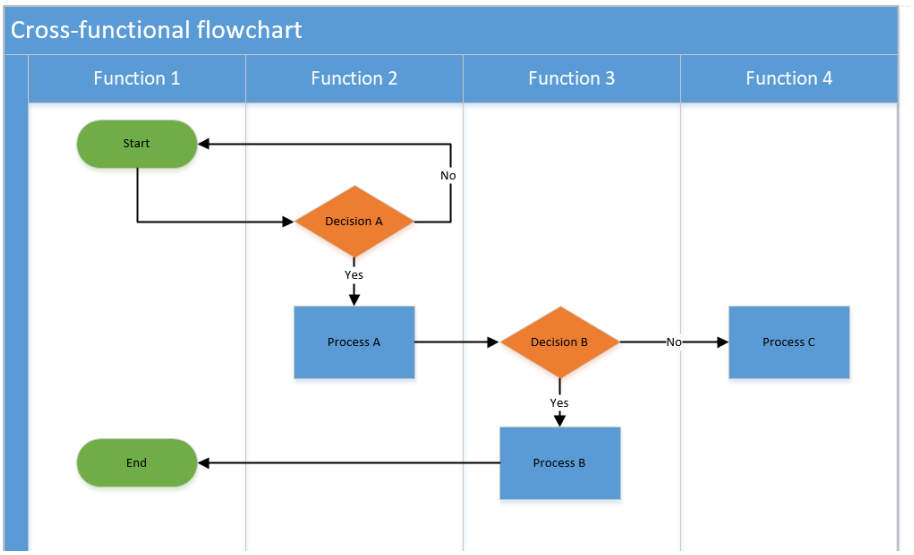

Figure 14. Example of a cross-functional flowchart.

4.2.4 Conclusions

Process maps in two different companies have often different styles, symbols, orientations and levels of detail. Important is that the organisation has found a way to construct and work with the process maps, that this is known within the whole organisation and that the process maps gives the message that the organisation wants to deliver with the maps. The process maps should be easy to access if there is a need for change, since every change in the process itself needs to be updated in the process map. An updated process gives a better insight in how the process works and the people involved will get a better understanding of the process.

After an insight is reached the next phase creating process maps, is to put the map into use. This often leads to implementing decisions for improvement and changes. After this is finished, a good process-oriented organisation is implemented and there is hopefully an improved performance in the organisation.

5 Method

In my introduction I presented that I would perform a stakeholder analysis and working processes for the new service that CBM will provide to the customers. In this chapter I will explain how we specified the problem within CBM, the selection of the theory framework, the data collection, the platform selection and at last I will explain the data compilation.

5.1 Problem specification

The thesis was ordered by Condition Based Maintenance, Wärtsilä Technical Service, Power System Service in autumn 2017. The main purpose of the thesis was decided through a meeting with my supervisors from Wärtsilä and Novia University of Applied Sciences. During this meeting we briefly discussed the problem in CBM and several suggestions for how to solve the problem came forth. After more discussions with my supervisor at Wärtsilä the aim of this thesis became clear. In CBM a new platform is going to be used during 2018 and the delivery governance of the service is renewed. For this a stakeholder analysis and process maps need to be created.

5.2 Selection of theory frameworks

After the purpose of the thesis was decided, the next step was to select the theory framework. The aim of the framework is to create a deeper understanding and provide a deeper analysis of the purpose of the thesis. The framework determines how I perceive, understand and interpret my data. For this thesis I decided to go deeper into stakeholder analysis and process maps, since these two are the two main tools used in this thesis. To be able to find a theory framework that suits this work I have used the keywords “Stakeholder analysis” and “Work processes” when searching for data both at the internet and in the library.

The search resulted in many resources that were useful for this thesis. Several books and articles were found about the stakeholder analysis and the work processes. Since a stakeholder analysis is one type of a process map, the search for the theory were easier to find. When I chose between the resources I looked if the authors for the books or articles were reliable and if they have been writing several text about the same themes. The resources that were found have been very useful during the practical work of the thesis.

5.3 Data collection

The method used in this work to help me reach my goal, is a qualitative method. *"A qualitative methodology refers in the broadest sense to research that produces descriptive data – people's own written or spoken words and observable behaviour."* (Taylor, et al., 2016). According to Taylor, et al., qualitative methodology, is more than a technique to sample data.

The method used for collecting the qualitative data for this thesis is by having meetings and discussions with my supervisor at Wärtsilä, colleagues and stakeholders involved with the new service offered by CBM. In order to get more information than what has emerged during the discussions and meetings, the Wärtsilä intranet has also been used. This method has been used for both the stakeholder analysis and for the process maps. For the stakeholder analysis Kim Nordkvist's Master's Thesis (2013, p. 44) has also been a resource used in this thesis, since his thesis includes a section concerning CBM stakeholders. ***Figure 15*** describes the stakeholders to the CBM Centre and how they interact with each other. Based on this figure and other data, I have created a stakeholder analysis for the daily abnormal detections.

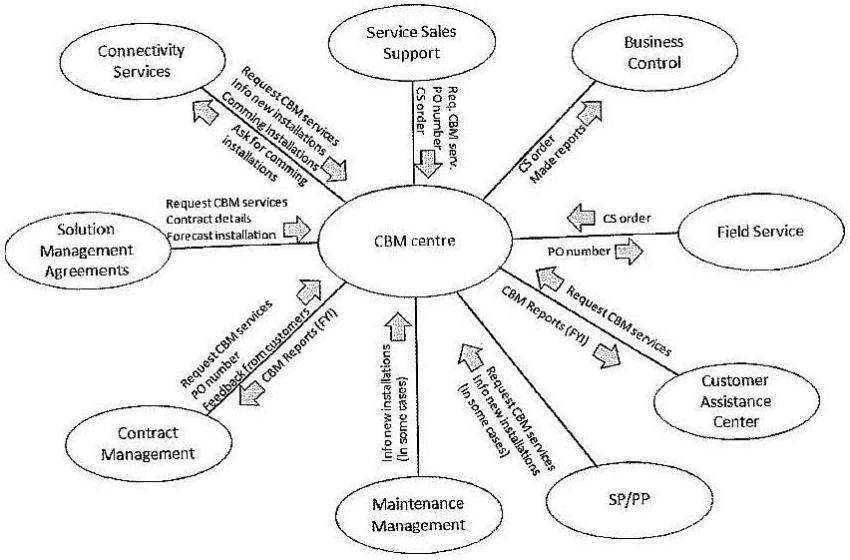

Figure 15. CBM Centre Stakeholders (Nordkvist, 2013)

From the gathered data patterns I have developed notions, insights and understanding. In other words, working this way the qualitative research is inductive (Taylor, et al., 2016). This corresponds well with the purpose of the thesis, since I have collected the data through meetings and observations.

5.4 Platform selection

Before processing the data, platforms to perform the practical work was selected. For the process maps, Microsoft Visio Professional 2013 was the most suitable choice. The reason for this is that Wärtsilä uses this program to create its process maps. In Visio, Wärtsilä has templates and symbols as described in chapter 4.2.3 that must be used when creating process maps within the company, so that all maps follows the same layouts. Another reason for this choice is that I am familiar with this program from earlier work creating process maps.

For the stakeholder analysis Microsoft PowerPoint was selected. PowerPoint is today well known and most people are familiar with it. Wärtsilä also uses Office365 that includes many different working tools that are standard in many offices, and it also includes PowerPoint. Since no new tools need to be installed and no learning of tools is needed in this thesis, time can be saved on this.

5.5 Data compilation

After the data was collected, the next step was to compile the data. In this section the data compilation for both the stakeholder analysis and the process maps are going to presented.

Stakeholder analysis. To get a good overview of the stakeholders I choose to use the function SmartArt in Microsoft PowerPoint. Using hierarchy as format for the layout of the stakeholder map, the department concerned, in this case CBM and the daily abnormal detections, could be in the blue box and the stakeholders could come below the department concerned. ***Figure 16*** describes the way I constructed my stakeholder map. In this stakeholder map there are several stakeholders (sub departments) that belongs to same department and these departments can be seen in the orange boxes. Since there are many different departments and sub-departments, constructing the stakeholder map in this way gives a clearer view of them all.

Figure 16. Construction of the stakeholder map.

In a stakeholder analysis, the relationships between the department concerned and the stakeholders need to be identified. Since I choose to use the hierarchy format, I described the relationships and which kind of information the involved shared with each other in a table. This was also done in Microsoft PowerPoint.

Work processes. The process maps are, as described in chapter 5.4, compiled in Microsoft Visio Professional. The process maps are constructed from the collected data through meetings and discussions with all those involved in this process. The activities and responsibilities in the process are inserted in the map and different kinds of symbols are used depending on the activities. Cross-functional flowcharts with swim-lanes are used in this thesis, since there are different functions / departments involved in the delivery of the daily abnormal detection process. Every swim-lane represents a function and every function have their own activities and responsibilities. In the process maps constructed by this approach, there are several functions and from the maps the correlations between these functions can be seen. ***Figure 17*** shows the process, Deliver CBM services, that is used today and that process includes the daily notifications / daily abnormal detections. The circled part of ***figure 17*** shows the part of the CBM service that I have deepened and conducted a more detailed process about the daily notifications. The figure gives an example of how the processes may appear when the collected data is inserted. ***Figure 17*** shows a process map with only one function, but in the upcoming processes there will be more functions involved in the service.

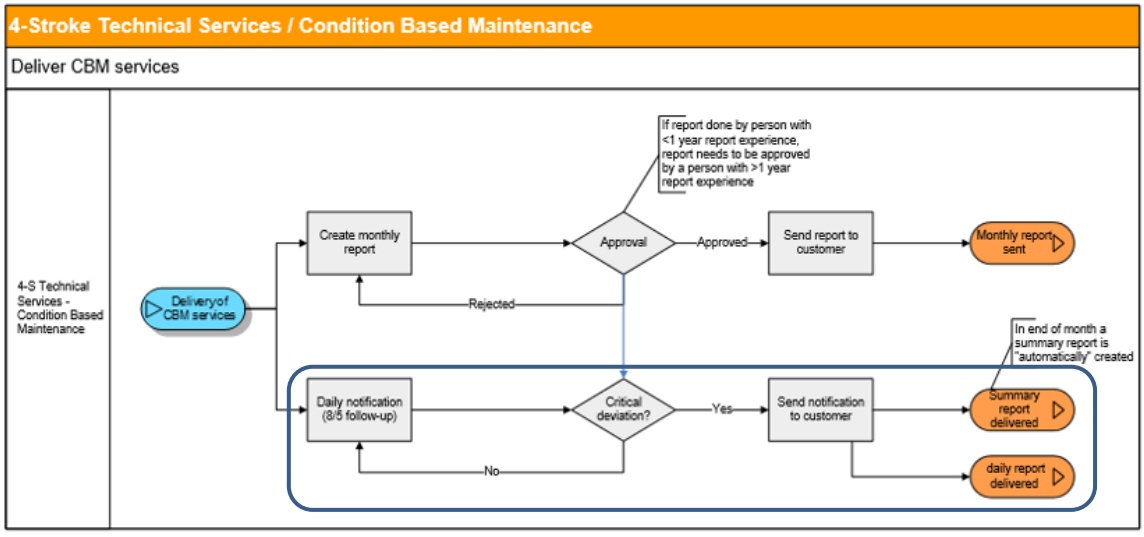

Figure 17. Delivery of CBM services and circled is the part that concerns this thesis (Wärtsilä, 2016)

5.6 Reliability

The reliability in this work is, according to me, good. The information for the process map is gathered from employees within the company and a very close collaboration throughout the whole process gives the final map and analysis a good reliability. However the results can be hard to implement anywhere else than in Wärtsilä. This because the information have been collected from only Wärtsilä employees.

6 Results

In this chapter the result of the thesis is presented. In section 6.1 the stakeholders for the department CBM and the daily abnormal detections are presented. The collaboration between the stakeholders and the concerned department are also presented in this section. Section 6.2 presents the results of the work processes. The work with the processes is still continuing and therefore no final work processes are presented. Instead there will be presented the current status for the processes and what will take place in the near future.

6.1 Stakeholder analysis

In this section I will present the stakeholders for the new service offered by CBM, the daily abnormal detections. Identifying the stakeholders for the new service that CBM can provide to the customers, will be helpful for all partners involved. A stakeholder analysis and a stakeholder map, can help people to easy see which of the stakeholders that are necessary for the service and how the collaboration between the stakeholders and CBM is working.

Figure 18 shows the stakeholders that are involved with the new service, daily abnormal detections. The figure gives a clear indication of how many different departments that can be involved with one service. The stakeholder map shows stakeholders that are involved with the delivery of the service in one way or another. In the map there are stakeholders that includes the service into agreements, people developing tools used in the service. More of the stakeholder's functions and interactions with CBM can be found in ***table 2***.

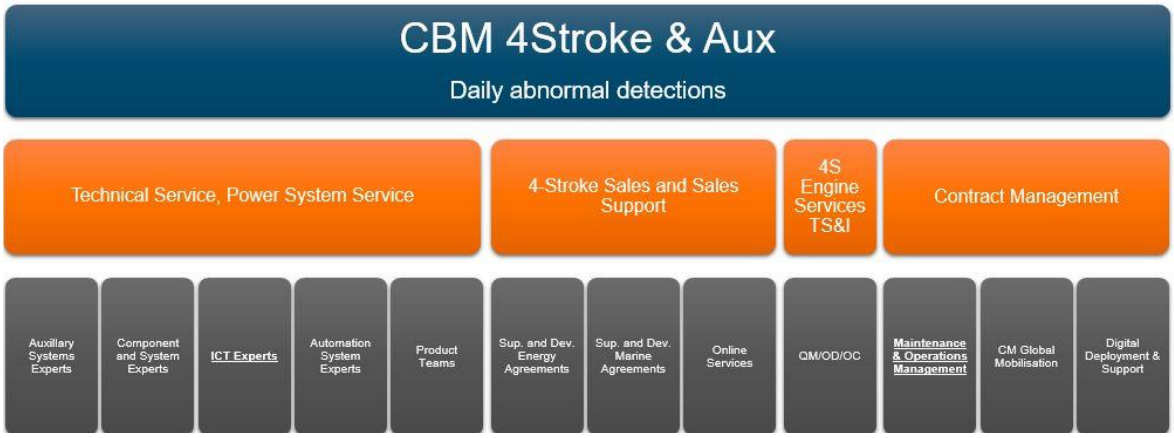

Figure 18. CBM Stakeholders for daily abnormal detections.

Table 2. Interactions between stakeholders and CBM 4Stroke & Aux.

CBM 4Stroke & Aux Stakeholders, daily abnormal notifications			
Technical Service, 4S	Auxillary Systems Experts	Offer their expertise in order for a valuable service to be offered to the customer →	CBM 4Stroke & Aux
	Automation System Experts	Offer their expertise in order for a valuable service to be offered to the customer →	CBM 4Stroke & Aux
	Component and System Experts	Offer their expertise in order for a valuable service to be offered to the customer →	CBM 4Stroke & Aux
	Product Teams	Offer their expertise in order for a valuable service to be offered to the customer →	CBM 4Stroke & Aux
	ICT	Offer their expertise in order for a valuable service to be offered to the customer → Ensuring that connectivity to installations are in order → ← Info about new / old installation	CBM 4Stroke & Aux
4-Stroke Sales and Sales Support	Support & Dev. Energy Agreements	Includes CBM Services in agreements → ← Info about CBM Services	CBM 4Stroke & Aux
	Support & Dev. Marine Agreements	Includes CBM Services in agreements → ← Info about CBM Services	CBM 4Stroke & Aux
	Online Support	Offer their help with Wärtsilä Online Services and develope the Online Service Portal →	CBM 4Stroke & Aux
Contract Management	**Maintenance & Operations Management**	Provides Operations & Maintenance support for our customer's needs → Feedback from customer ← CBM Reports	CBM 4Stroke & Aux
	CM Global Mobilisation	Lead, develop and deliver connectivity solutions to each ship/ plant under contract → Feedback from customer ← CBM Reports	CBM 4Stroke & Aux
	Digital Deployment & Support	Develope, enhance and maintain solutions in existing agreements → Feedback from customer	CBM 4Stroke & Aux
4S Engine Services TS&I	QM/OD/OC	Ensuring that work processes are in condition →	CBM 4Stroke & Aux

Among stakeholders, there are those who are more important than others. For this service the most important stakeholders are ICT and Maintenance & Operations Management. These are marked with bold and underlined text in ***figure 18*** and ***table 2***. ICT is handling the configuration, connectivity, patching and life cycle support for Marine and Energy Solutions in the service contracts. If there is problem with these things, the responsible expert or other ones concerned can contact ICT.

Department Maintenance & Operations Management have skilled, experienced and proactive persons out in the Expertise Centres that supports the customer. If there are any abnormal detections on the installation, the persons in the centres supports the customers with the responsible expert's advices.

Online Support may in the near future become more and more important as a stakeholder for CBM 4Stroke & Aux. This because the development of the Online Portal and visualization of the daily notifications will become important to the customer. Because of this it is not marked with bold and underlined text in ***table 2*** and ***figure 18***. Online Support and Wärtsilä Online Service gives the customer access to information about their installations and equipment through the Online Portal.

Even though only a few of the stakeholders are marked as more important, they are all still important for the service to work as it should. The marked stakeholders are the ones more important for the delivery of the service and the ones more often in contact with the responsible expert / CBM Team.

6.2 Work processes

In this section the result of the working processes are going to be presented. The work behind these processes have been going on for several months and is still continuing. The workflow in the process, daily abnormal detections have been discussed and worked out with some employees from the organisation Maintenance & Operations Management, which is a part of the Contract Management Team.

The daily notifications can be done in either the CBM Team or in the Expertise Centres, depending on the contract. As for now we know what activities and responsibilities every single function have. If the daily notifications are handled in the CBM Team and there is an Expertise Centre involved, a draft of the process can be seen from ***figure 19***.

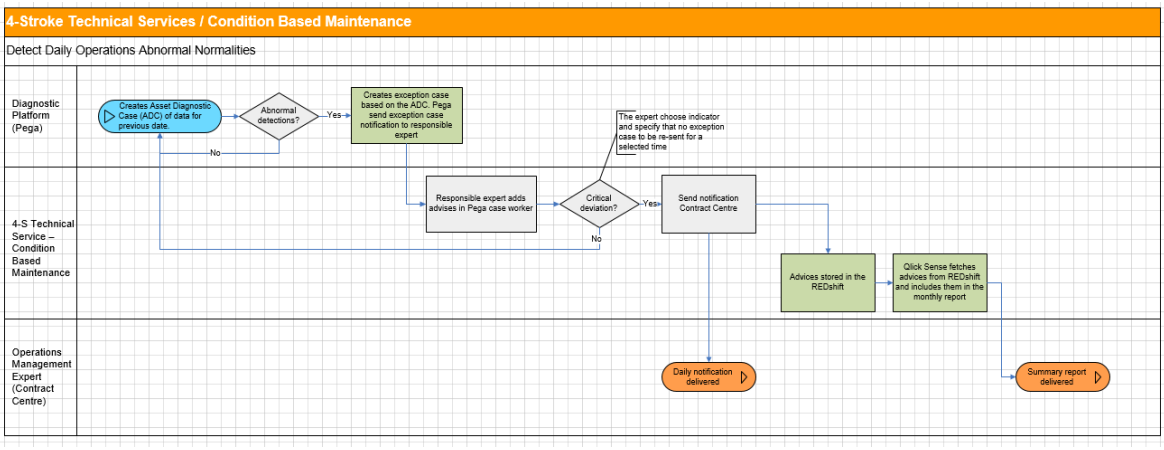

Figure 19. A first draft of the work process for the daily abnormal detections

The diagnostic platform creates an Asset Diagnostic Case (ADC) of the data from the previous date and if there is abnormal detections, an exception case will be created based on the ADC and sent to the responsible expert. The expert can then add advice to the exception case if necessary and send it to the Expertise Centre. The Expertise Centre can then decide if it needs to be sent to the customer and if other stakeholders needs to be informed of the exception case. The daily notifications with the expert's advice are going to be saved in the database REDShift and then included in the monthly report that is delivered to the same

stakeholder as the daily notifications. The process is the same if the responsible expert is located in the Expertise Centres. The described work-flow is only an initial draft, since the discussions are not finished and the processes approved.

Until now we have made drafts of the processes depending on the contract types and where the responsible expert is located. Having it that way, there will be many different processes. After more discussions, and since the different processes constructed so far follows the same path, constructing the processes depending on if the Expertise Centres are involved or not would be a better solution. This would reduce the number of work processes to only two. Having fewer work processes, the total work surrounding the new service will be more simpler concrete and easier to handle. The next step in order to get to the final work processes is to gather the activities and responsibilities that are identified and create two processes that suits for the different contract types and the involvement of the Expertise Centres. After this a discussion with the employees within TS, Power Generation and Gas Solutions need to take place before a final version can be approved.

7 Discussion

The purpose of this thesis work was to create a stakeholder analysis and to develop work processes for the daily abnormal detections. The work processes have been my main focus in this thesis, but performing the stakeholder analysis has been useful when creating the work processes. In this chapter I will discuss how I reached my goal, if there were any problems or complications and if there are further developments that can be done. Finally I will present the final conclusion of this thesis.

7.1 How well did I reach the goal?

When looking at the results, the thesis has fulfilled its purpose quite well. A stakeholder analysis has been done in Microsoft PowerPoint and has been presented at Wärtsilä as a presentation. If there is a change in the future and the analysis needs to be updated, this can be done easily in the presentation. The possibility to be able to make quick changes in the analysis is also an argument for the choice of platform. Looking at the theory concerning the stakeholder analysis and the results, they interact with each other. During the work to reach the final result, I followed the steps described by the theory. In that way the result ended up as good as possible.

The main focus in this thesis was to create work processes. No finalised work processes are presented in the thesis and the purpose in that way were not fully reached. The way of working with these work processes have been identified and how the work should continue has been established. Looking at the result, the information that we have today and the main way of working with the delivery of the daily abnormal detections is identified. Looking at it this way, and that we know what needs to be done next, the purpose of the thesis is fulfilled. In the thesis, looking at the processes from a customer's perspective has also been done. Discussions have not been held with external customers, but with the internal customers (Contract Management) that have a close relationship with the external customers.

7.2 Problems and complications

Even though a method for this thesis was developed, the way to the final result has not been without problems and complications. These problems and complications are going to be described in this section.

The work with the processes is the part of the thesis that have contained some problems. The discussions about the delivery of the daily abnormal detections have been done with Contract Management and this part of the work also needs to be discussed with Technical Service, Power System Service. When taking the discussion with Technical Service other inputs concerning the delivery process may appear and these needs then to be taken into account. After hearing both parties, a dialog needs to be established with both to reach the final work processes.

Another reason for why the work processes have not been finalised is that Wärtsilä have to follow with all its departments and the customers, that this is the correct way to deliver this service. This complication can delay the finalised processes and hopefully they will be completed by the end of this year.

7.3 Further development

As mentioned in the results the stakeholder map and analysis represents the stakeholders that are involved in the service delivery. In this thesis the analysis gives an overall picture of the current state of the stakeholders. This is something that can be developed in the future and creating a more detailed analysis. In this way one can see what the different stakeholders expects from CBM and what their position is, if they are interested in the service or not.

Since there are no approved work processes yet, the work regarding the processes needs to continue. The daily notifications are going to be sent to the customer in one way or another, depending on what is going to be decided in the processes. There has been some discussions if these notifications are going to be visible for the customer in the Wärtsilä Online Service Portal directly the platform creates the exception case. This is something that already exist in Contract Management with the service offered today, but those notifications are only shown in Contract Management and not to the external customers. I think that this is a good thing to develop in the near future, since all the needed data are available.

7.4 Final conclusion

Both before and during this thesis project I have worked as a trainee in Wärtsilä, CBM 4Stroke & Aux. The experience and insights I have taken with me from working at CBM have helped a lot during this thesis project. To have the opportunity to do both the regular work and this thesis work for the same department have been very interesting. A benefit for my part from the thesis work is that many new contacts have been created within the company. Hopefully will this thesis also have an impact on the company and the department in many ways. By clarifying the activities and who is responsible will give the stakeholders a better understanding of the delivery process. Additionally, with decent and well-structured documents the activities and responsibilities will be put in context.

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