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Developing a Customer Request Process

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This thesis focuses on the improvement of the customer request process in the case company. The business problem of this study is the current customer request process which is poorly defined and lacks some of the key features. Presently, the customer request process is used to manage both the customer's enquiries and requests. Due to the poorly functioning process, the customer's requests and the factory replies are scattered in various places which means that the information flow is not secured and effective. To address this challenge, the objective of this thesis is to develop and implement a new customer request process.

This study is carried out by examining and evaluating the current state of the process in the case company. The challenges revealed in the current process are explored using the existing knowledge and a case example from literature. This approach leads to the suggestion of a new process model. This initial model for the customer request process is tested to ensure that the planned process features and the supportive tool are meeting the target. Based on the results, the finalized proposal for the customer request process is presented and later implemented.

The study uses quantitative methods for process performance analysis and qualitative methods for process stakeholder interviews to analyse the current state of the organization and the customer request process. The main data source is the company's information system and personnel interviews.

The result of the Thesis is a new tool for managing customer requests. Features of the tool and existing documentation management system create the new customer request process which is presented and taught to the organization at the implementation stage of this study.

The outcome of this study is the new customer request process which helps the case company in the systematic management of customer requests and enquiries. This will improve the customer experience of the case company's customers, which can be seen in increased NSP score. Additionally, it will support the case company's quality-producing ability, which can be measured in cost of poor quality.

Keywords	Customer request process, process model, customer relationship management, customer experience

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Abbreviations and Acronyms

NPS	Net promoter score
COPQ	Cost of poor quality
PU	Production unit (factory)
LSU	Local sales unit
OEM	Original equipment manufacturer
DocStage	a system for customer documentation management in the case company
CRTool	a new tool for managing the customer request within the case organization
Change Request	a request from customer to change something in the scope of delivery. This starts a feasibility study in case company.
Change Order	an order from customer authorising a variation into the scope of delivery.
ERP	Enterprise Resource Planning
VSM	Value Stream Map
DOE	Design of experiments
ETO	Engineering to order

1 Introduction

This Thesis focuses on the development of a new process model for more systematic management of customer requests in the case company. The current process lacks in performance to manage the increasing number of customer requests in the company. Presently, the manufacturing industry is focusing more and more on the customers. In modern markets, a customer oriented organization and agile processes are seen as necessary steps for building competitive advantage. Therefore, improving the customer request process is seen as a key step towards improved customer experience.

1.1 Business Challenge of the Study

The case company of this study faces a challenge of improving its current process to manage the customer requests which often turn into enquiries to change something in the scope of delivery. However, this process is currently separate from the company's other information systems and tools. Therefore, the customer request as well as company reply (e.g. quotation for a change order) and the actual outcome of the change order are often scattered in various places. This poorly handled customer request process results in decreased customer satisfaction, increased costs and poor quality when handling the requests.

Instead, a systematic and transparent customer request process would support and increase the service quality and customer experience when dealing with the case company. The results are then anticipated to improve and can subsequently be measured by increased Net Promoter Score (NPS) results.

1.2 Case Company Background

The case company of this study is an industrial company manufacturing electrical equipment with the headquarters in Zurich, Switzerland. Typical products of the case company include power and automation solutions, and the largest customers are industrial manufacturing companies and industry in general. In November 2013, the case company employed approximately 150,000 people and operated in around 100 countries. In 2012, its global revenue was almost $40 billion.

The case organization of this study, is part of the case company, and is focused on manufacturing electrical motors and generators. The case organization is located in Helsinki Finland where also the products, electrical machines are manufactured. The case organization is one of ten similar production units (PU) located in the Americas, Europe and Asia. These production units collaborate with the local sales units (LSU) of the case company, which transfer the orders from customers to the factories.

In the case organization, the electrical machines manufactured are significantly tailor-made for specific usage upon each customer's requests. These machines are used as components in different applications and industrial fields such as oil and gas, marine and mining. Due to the complexity of the product and the end clients' applications, changes during the engineering and even manufacturing stages are rather common. Annually, the case organization executes over 4000 change orders when the yearly production volume is slightly over 2000 units.

Currently, the case organization products, motors and generators are used as components in larger projects such as oil refinery ramp-ups (with a lead time of several years). Due to the relatively short, 10 to 25 week lead times of the products and early orders by the customers, the scope of the delivery might often change along the motor/generator delivery and progress of the end client's project. Such a change typically starts with a chain of enquiries from the customer, which will eventually reach the motor/generator manufacturer, i.e. the case organization. The communication chain may contain various parties which include, as a minimum, the end client (oil company), subcontractor, OEM (primary customer of the case company), and finally the local sales unit (LSU) and the manufacturer in the case organization itself.

1.3 Objective, Outcome and Scope of the Study

The business problem of this study relates to the current state of the customer request process within the case organization which is insufficiently defined and lacks some key features. Due to the poorly functioning process, customer requests and the factory replies are scattered in various places which affects the effectiveness of the information flow. This leads to faults in the execution of the agreed change orders and decreased customer satisfaction which both are registered in decreased performance indicators via cost of poor quality (COPQ) and net promoters score (NPS) measurements.

Thus, the objective of this study is to develop a new customer request process model that is more transparent and agile. This would help the case organization to systematically manage customer requests and eventually develop the customer experience.

To develop the new customer request process, the study examines the current process, revealing its biggest flaws, the transparency of the information and its linkage to the other case organization IT systems and project management tools. Since the information is scattered, it requires investigating a range of tools and locations to locate the case organization's replies to the customer and the content of the quoted change orders.

The outcome of this study is a new customer request process and a supportive tool to manage the customer requests. The tool and its linkage to the existing customer documentation management system (DocStage), together with supportive training/instructions create the new process model. The features of the new process are defined and evaluated based on the data collection of this study

This Thesis aims at the implementation plan of the new customer request process in the case organization. The new customer request process and its features which enable the systematic managing of the customer requests will help the case organization increase its customer satisfaction and are expected to reduce its COPQ.

In last section of the study, the validity and reliability of the thesis results are discussed. The section also presents the managerial implications and a method to follow-up the thesis topic in future.

2 Method and Material

This section describes the research approach, design, data collection and analysis methods, as well as the validity and reliability of this study.

2.1 Research Approach

A qualitative case study is a research approach that facilitates the exploration of a phenomenon within its context using a variety of data sources. According to Yin (2003), a case study design should be considered when: (a) the focus of the study is to answer "how" and "why" questions; (b) the study cannot manipulate the behaviour of those involved in the study; (c) the study want to cover contextual conditions because believe they are relevant to the phenomenon under study; or (d) the boundaries are not clear between the phenomenon and context. (Baxter and Jack 2008: 545)

In this study, the research and the related process development is carried out for the case organization in cooperation with the project team. The project team includes participants from various company functions and they are mainly the people working with the existing customer request process. This study will answer the questions *why* the case company should improve the customer request process, and *how* this study proposes it to be done. The scope of this study is set accordingly and it focuses on the specific process at the case company.

When a case study includes specific proposals it increases the likelihood for the researcher to be able to place limits on the scope of the study and thus increase the feasibility of completing the project. The more the study contains some specific proposals, the more likely it is to stay within feasible limits. Proposals may come from the literature, personal/professional experience, theories, and/or generalizations based on empirical data. Potential data sources may include, documentation, archival records, interviews, physical artefacts, direct observations, and participant-observation. (Baxter and Jack 2008: 551-554)

In this study, the proposal is tied to the data analysis of the current process and conceptual framework which focuses on topics supporting the proposition making process. The study is eventually concluded by testing the proposal for the new customer request process and further developing it before the final release. The validity and reliability of the proposal is discussed in a later section.

2.2 Research Design

The research design of this study starts from the definition of the research objective that this study is aiming to achieve. The research design illustrated in Figure 1 below shows the phases and data collection points that are carried out in this research.

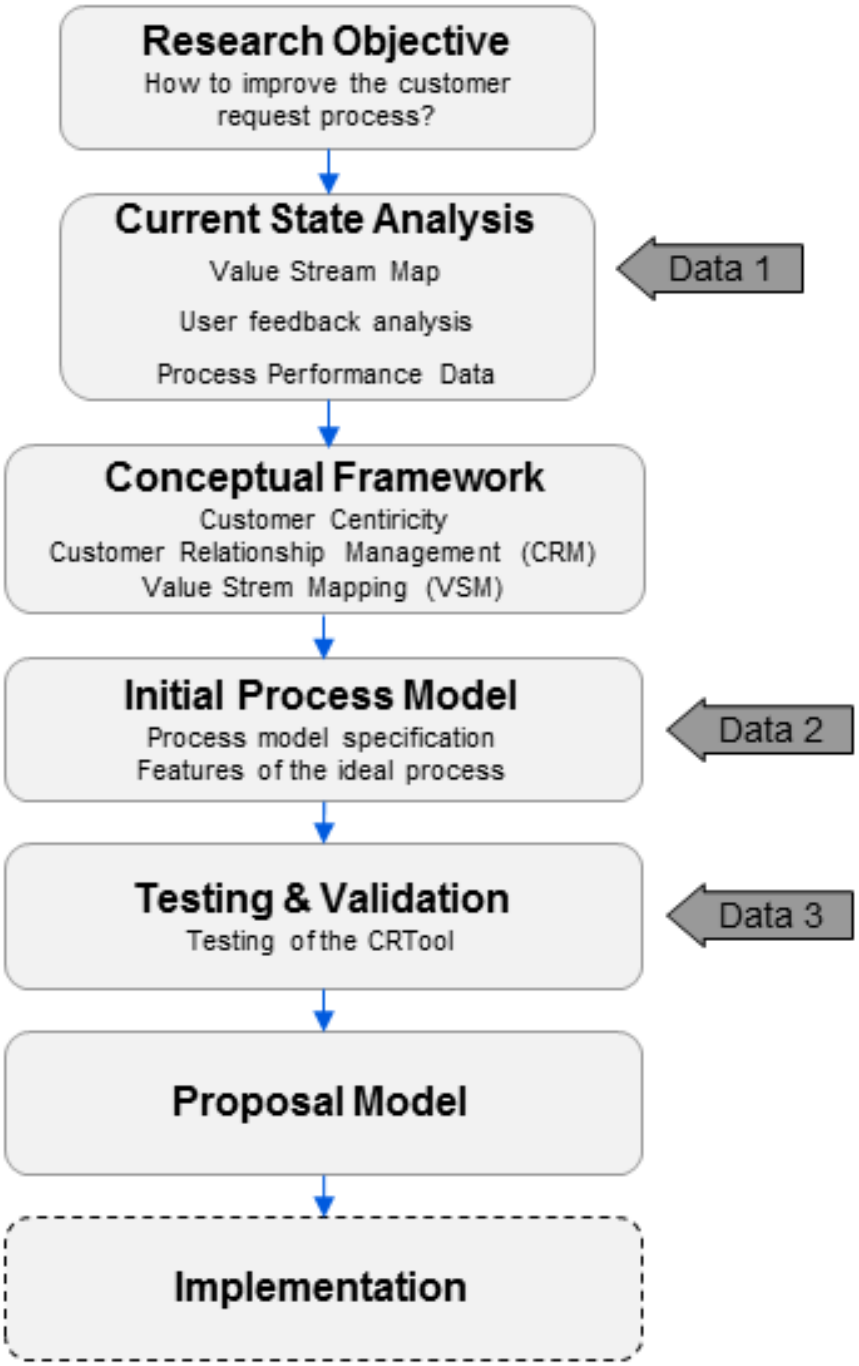

Figure 1. The research design

As seen from figure 1, the research design is carried out in several steps. First, the current state analysis is performed to identify how the customer requests are managed currently in the case organization. This is done by value stream mapping (VSM) in the current process. In addition to the VSM, the current process is evaluated through the process performance data, user feedback interviews and analysis. These inputs form Data 1 round of the study.

Before the initial process model proposal building, a search is conducted in the existing knowledge and literature to find out best practice and guidelines for customer request handling in customer relationship management (CRM) and process engineering. Additionally, discussing the current state analysis and best practice in the project team provides an input to start engineering the new process and develop the tool for managing the customer requests.

The third phase of this study presents the proposal of the new customer request process to the case organization and tests the initial process model and the tool developed by the project team. This phase also collects the data for adjustments of the plan prior to the final proposal model.

In the last phase of the study, the final process model, its implementation and follow-up plan are presented.

2.3 Data Collection and Analysis Methods

Data for this Thesis is collected from several data sources. The *primary sources* of data include the collection of interviews and statistical analysis of the current process performance metric and evaluation of the internal documents done for a) the analysis of the current state of the existing process (Data 1), b) building the proposal (Data2), and c) validating it with the experts in the case company (Data 3). This includes both the process performance data in numeric form and key stakeholder interviews. The details of data collection are shown in Table 1 below.

Table 1. Data collection

Data	Data source	Data Type	Analysis
Data 1	Company ERP system	Performance Metrics Lead time and Volume	Section 3
Data 1	Process users and key stakeholders	User feedback analysis	Section 3
Data 1	Current state VSM	Share of value addition	Section 3
Data 2	Project team meetings	Features of the ideal process	Section 5
Data 3	Project team meetings	Results of the initial process model test	Section 5

Table 1 shows the data collection points with, the steps corresponding to the data collection rounds visualized in the research design. The *quantitative* data is collected from the ERP system in numerical format, whereas the data from the process users and project team has a *qualitative* format and mainly consists of suggestions and estimations regarding different aspects influencing the existing customer request process. Finally, the *qualitative* data is collected after the testing of the initial process model. This includes the user feedback and managerial viewpoint. A team is established to collect the project team's view about the new process model and tool for managing the customer requests.

The data is analysed using thematic analysis for the interviews, discussion and the user feedback analysis. Thematic analysis includes a method for identifying, analysing, and reporting patterns (themes) within the data. It organises and describes the data set in detail which enables it to be used in coherent analysis and reports. (Braun and Clarke 2006)

The numerical results were analysed using elements of the numerical analysis (means and averages), which was done by using statistical software.

The data 2 and 3 of the thesis are collected among the project team meetings where different process stakeholders have evaluated the process in chairperson led discussions. The discussions are based on the thesis material i.e. data 1 of the thesis which are the results of the current state analysis.

2.4 Validity and Reliability Plan

The validity and reliability of research should be considered to achieve trustworthy results. Generally, the first step to increase validity and reliability is to formulate the objective of the research through planning and developing a clear and rigorous research design. This should be done in such way that occasional mistakes or errors are minimized and the researcher's bias is avoided. These principles also ensure that same results would be achieved if the same research procedure is replicated by another person using different data collection methods, or at a different point in time. (Yin 2003)

In quantitative research, data is considered *reliable* if the results are consistent over time and significant representation of the population and also the repetition of the research in a similar methodology with similar results is possible. (Golafshanj 2003)

Validity, on the other hand, relates to addressing the research question and finding precise answers to this question. In valid research, the data is accurate, correctly interpreted and answers the research question. Furthermore, valid research ensures that the results are actually measuring what they are supposed to measure. (Golafshanj 2003)

In this study, the reliability is planned to be ensured by combining the numeric data i.e. means and averages from the current state (VSM) with the qualitative data coming from user and key stakeholder feedback analysis. The qualitative data will include interviews and discussions with the project team and key personnel in the organization. The combination of both qualitative and quantitative is meant to create an objective view of the current state of the customer request process.

The validity and reliability of this Thesis will be further evaluated in Section 7, at the end of the thesis report.

3 Current State Analysis

This section discusses the results of the current state analysis of the case company change management and customer request process. These two processes are strongly linked and create significant synergy, and both are therefore reviewed. The current state analysis comprehends the process surrounding and linkages to other case company operations, process performance metrics and user feedback analysis from the process owners and users.

3.1 Case Company Processes

To understand the case company customer request process, the case company processes should be reviewed first. The following paragraph describes the key stakeholders and processes where they operate in.

The motor order-to-delivery process of the case company works on the so-called Engineered-To-Order (ETO) basis. This means that most of the machines that are sold are also engineered from scratch and are unique or replicate products each time. The ETO process also means that the material procurement is mainly done after the engineering, which means the material stocks are kept relatively minimal.

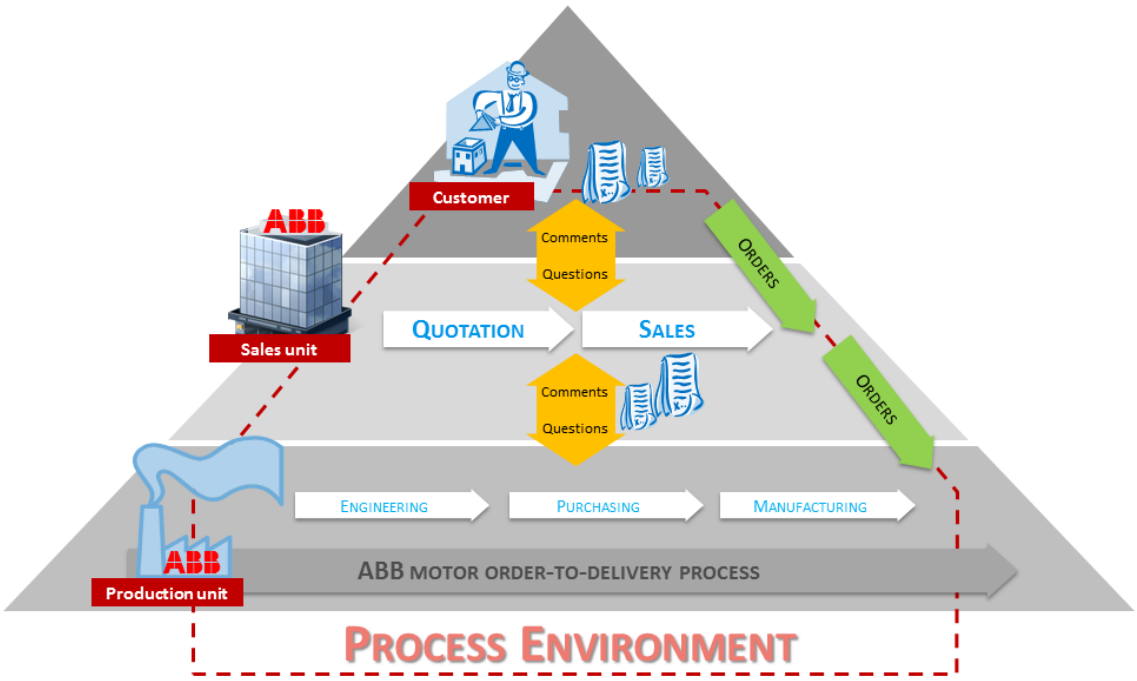

Figure 2. Case company process (ABB 2015)

Presently, in the case company motor order-to-delivery process has three major stakeholders involved: customer, the case company sales unit and the case company production unit. The case company sales unit operates as a linkage between the customer and case company production unit. The stakeholders and information flow of the case company processes are presented in figure 2 which also illustrate the case company's order-to-delivery process five main stages including quotation, sales, engineering, purchasing and manufacturing.

As can be seen in figure 2, the sales and quotation work is done at the case company front end sales organizations which are called local sales units (LSU). The LSUs are in direct communication with the customer and transfer the information and orders to the production units.

The case company production units engineer, purchase and manufacture the products according to the orders the case company sales units transfer to the production units. Usually the case company production units communicate only with the case company sales units, with no straight communication from the case company production unit to the end customer.

Overall, the case company organization structure is functional where every stakeholder has their own duties in the process and sub-processes. The following paragraph describes how the case company processes interact in an engineering change management situation.

Current Change Management Process in the Case Company

This paragraph is written to describe the current state of engineering change management at the case company. The change management process is strongly linked to the customer requests which usually are the inputs and initiative from customer to change something in the scope of the delivery. Successful managing of the customer requests would support the change management process in transparency and agility.

Currently, the case company has an engineering change management process in place at the production unit level shown in figure 3 below. The change management process is divided in two phases: a) *a change request* and b) *change order processes*. Currently, there is no piercing process that would manage the customer requests through the case

company processes. The piercing communication takes place via emails and phone calls.

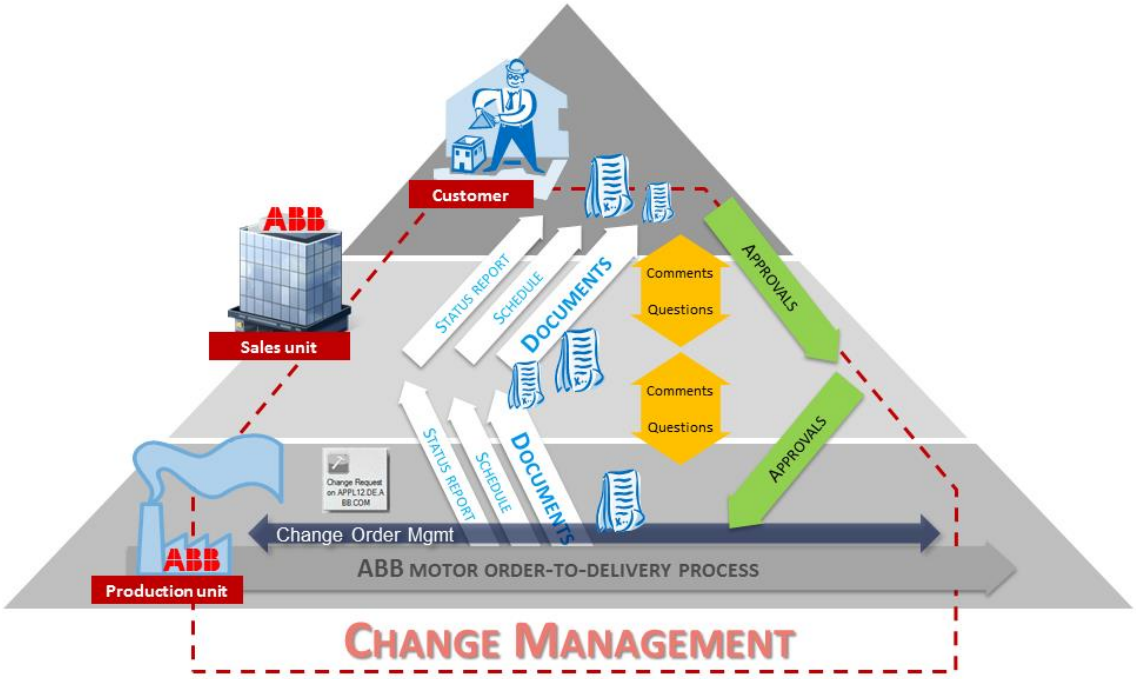

Figure 3. Case company engineering change management process (ABB 2015)

The change request process manages a situation where the feasibility of the change is evaluated and the outcome of the process is a quotation for change order to the customer. The change request process can involve the local production unit engineering, purchasing, production planning and R&D to the feasibility study. The change request process is currently managed by using a tool called Change Request which is built on Lotus Notes database. The change requests are created and handled by the local production unit organization seen in figure 4. The input information of the change request is gathered from the case company sales unit by email or phone discussions.

The change order process starts in case the customer accepts the quotation for change and issues a change order. This process is built into the production unit ERP system. Similar to the change request process, the change order process involves different functions of the order-to-delivery process, shown in figure 4, at the local production unit level. The process starts from the project management which is responsible for creating the change order. The change order is then handled by various functions like engineering, purchasing, production planning and production. Change orders are created and handled by the local production unit organization. The input information of the change order is gathered from the case company sales unit by email or phone discussions.

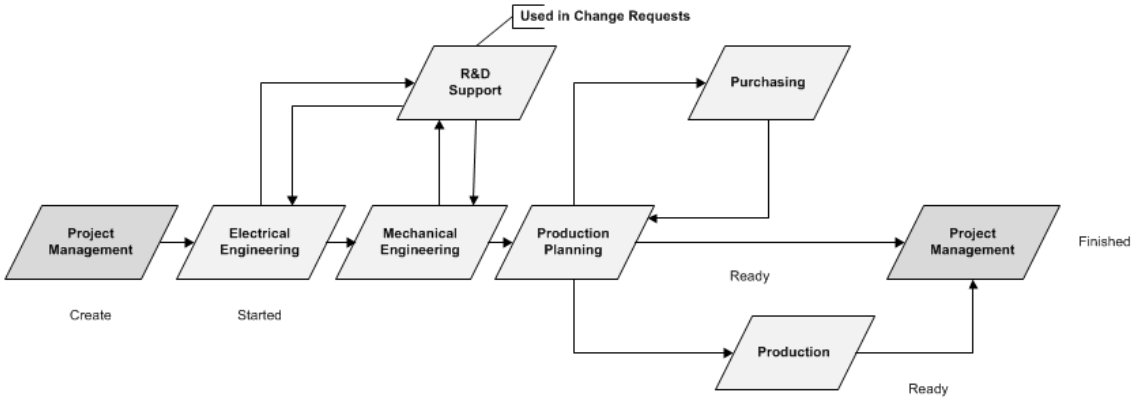

Figure 4. Participants and work sequence in change management situation at the case company production unit

The current challenge of the change management process is that there is no clear, direct link between the change request and order processes, even though the process flow is similar in them. Presently, change requests and orders for a specific sales order can only be searched manually, by using two different IT systems and combining the information. The inputs and basis of the customer change order are not collected systematically. Basically, a holistic view of the customer request handling phase is missing due to the lack of a transparent process.

Recently, the case organization of this study, i.e. the production unit has invested in the change order process which is controlled in the case organization ERP system. The change order process is robust and transparent. However, as described earlier it is not conveniently linked to the change request process. Therefore, improvement actions are now targeted at the customer change request process which would support the whole change management process of the case company.

Value Stream Map in the Current Change Request Process

Value stream mapping (VSM) is a method to examine the process interactions and magnitudes of time, information and material flow in the process. Commonly, the VSM is used for mapping the lead time and value adding time of the process. It is used for analyzing the current state and designing a future state for the series of events that take the product or service from its beginning to the delivery. (Rother and Shook 2003)

As previous sections of this study show, the change management process in the case company is relatively complex and scattered in different IT systems. At the case company production unit level there are individual IT systems to manage the change requests and orders. At the case company sales unit level there are different databases to control the information related to each specific sales order. The databases include presales information like quotations and overall project correspondence from the lifespan of the motor order-to-delivery project as shown in figure 3.

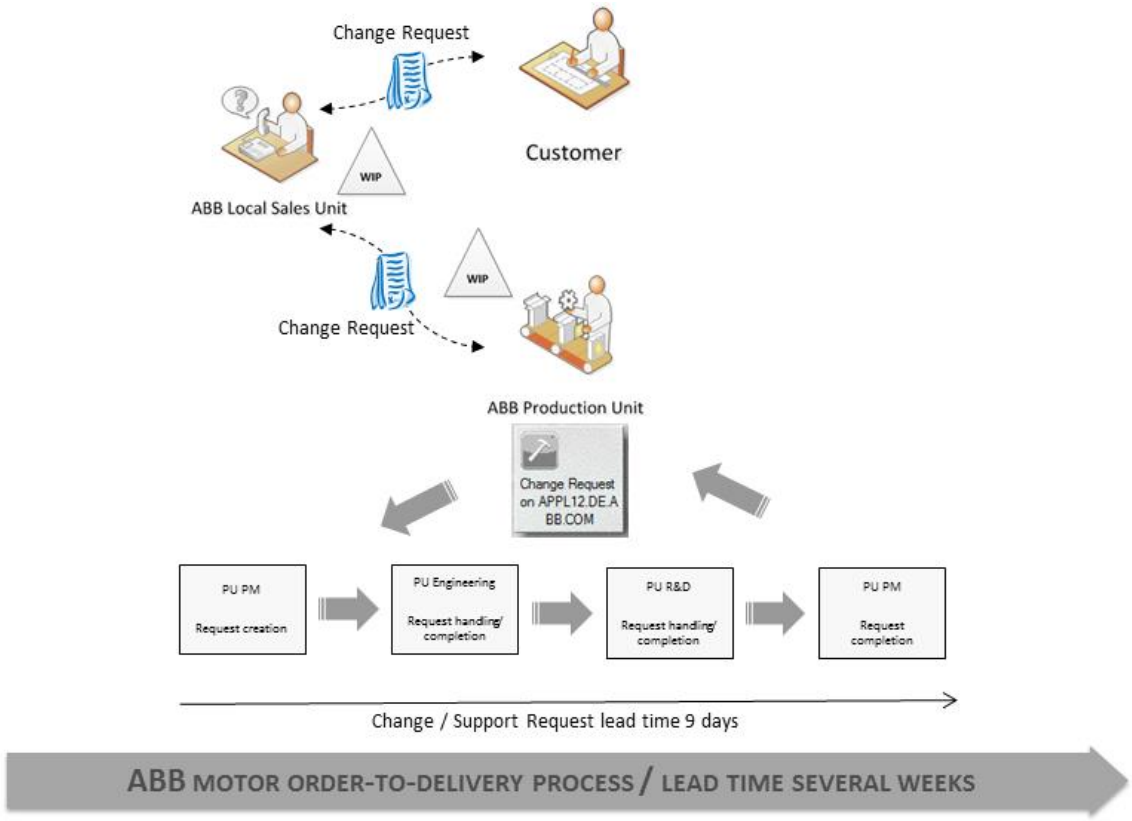

Figure 5. Value stream map of the current state customer request process

Figure 5 shows the value stream map of the communication chain in a situation where the customer issues a technical request in support or change purpose. The customer request is then handled and distributed by the case company local sales unit to the case company production unit.

A key finding in the current state value stream map of the customer request process is that the transparency of the communication chain is very limited. The tools to manage the process might change after every process step and participant. The early stage of

the process is managed by using emails and phones. This written information in the form of emails is stored in sales order specific project archive.

When the information reaches the case company production unit starts the first formal process in Change Request tool (Lotus Notes database). The process lead time at the production unit is on average six days. Other process stages in the chain between customer, sales unit and production unit are not controlled by lead time measuring or targeting. In addition, the work in progress (WIP) blurs the lead time measuring and evaluation of the process performance. Customer change requests are handled in the same way as other project related matters. The urgency depends on the case.

The actual share of non-value adding time is hard to conclude. The whole process itself does not support very accurate lead time analysis by its whole length. However, the non-value adding work phases can be identified. The transfer of the information between different interfaces and IT systems is non-value adding work.

By streamlining the process, the input information could be used in one format and it would need only one entry action. A manual copy and paste method between different IT systems increases the risk of wrong or outdated information.

3.2 Results of the Current State Analysis of the Customer Request Process

This section describes the results of the current state analysis. The results comprehend the role of the customer request process as a part of the case company change management.

Current Change Management Process Performance and Target

This section collects and analyses the numerical performance of the case company change management process. It shows the magnitude of work related to both customer requests and change orders.

The number of the change requests and orders is significant. Figure 6 below shows the statistics for the change management annual work load and performance at the case company production unit. Figure 6 also shows the sum of change requests and orders.

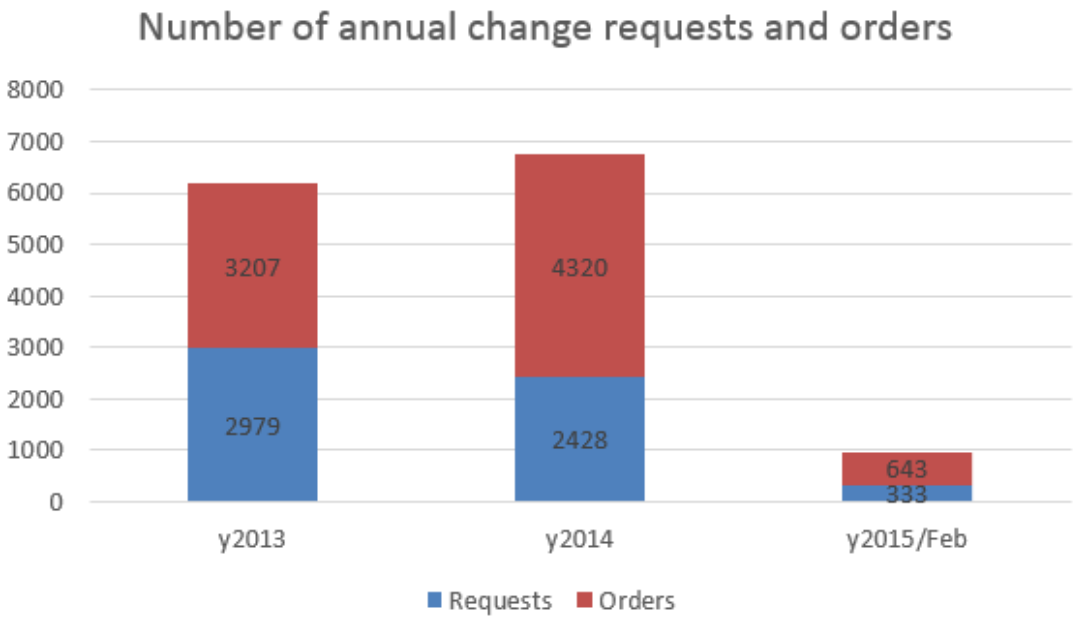

Figure 6. Number of annual customer requests and change orders in the case company production unit

As shown in Figure 6, when comparing the actual annual change/request management volume to the production volume it means there are approximately 2.5 change or support requests or orders per manufactured motor.

The trend of change management volume is slightly increasing yet the actual volume for year 2015 cannot be forecasted. The amount of changes also correlate to the sales order volume of the case company. However, the amount of the changes will most probably not decrease significantly in future. This is due to the nature of the business. The case company products, electrical motors are sold as component to complex projects where requirements and specifications define the scope of work. Recently, key customers, the OEMs have launched their own specifications and enquired the case company to comply with those. This will generate requests and change orders also in future.

Currently, the case company monitors lead time and the amount of the change orders managed in the company ERP system. The change requests are not controlled by lead time measuring or other metrics. Figure 7 presents the average lead time of change orders.

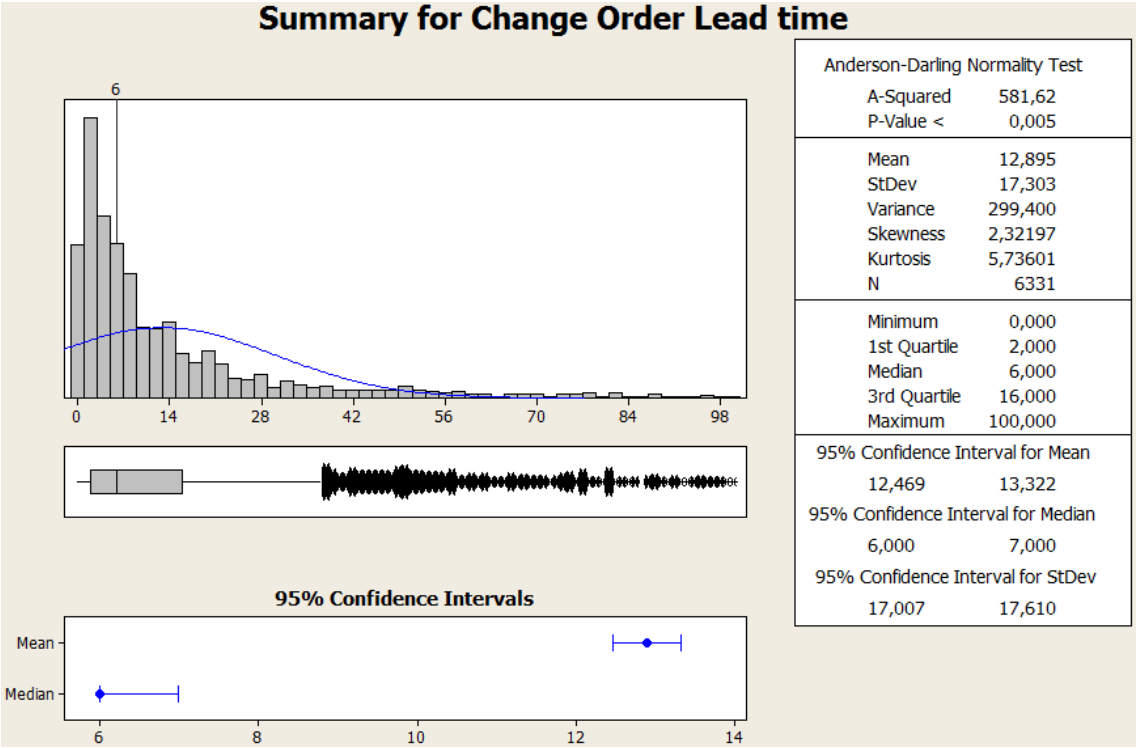

Figure 7. Change order handling lead time (days) in case company production unit.

As Figure 7 indicates, the lead time of the change order handling varies case by case and the data is not normally distributed. The deviation of the data is caused by the process model, as some of the change orders are pending longer than others due to the production scheduling or e.g. open issues in engineering. They wait until the information is clear or there is enough capacity to handle them. The process functions as a push process where the process phases follow each other. There is no parallel activity. The current customer change request process works by same principle. The lead time of the change orders is on the same scale with the customer change requests.

Normally, documentation updates are shorter in lead time than the changes related to the motor structure. Structural changes often involve the whole order-to-delivery functions like purchasing and production which is why the handling time is longer than in document updates. The share of the change types is presented in Figure 8 below.

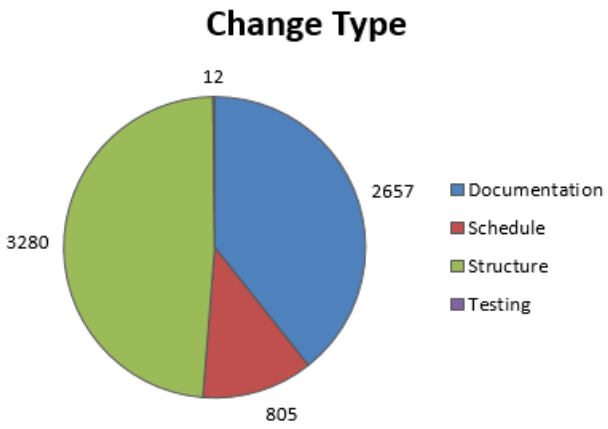

Figure 8. Share of change order change types in case company ERP system

The share of the Testing related changes is very limited due to the process difference. The majority of the Testing related changes and requests are handled within the change request process which operates in a separate IT system (Lotus Notes database).

The statistics of the process revealed that the magnitude of the work is significant. In Figure 6, it is noticeable that the share of the customer change requests have decreased after year the 2013. This is most likely due to the implementation of the change order process in the case organization (production unit) ERP. A robust change order process in the case organization ERP has cannibalized some of the customer change requests which are now handled straight as change orders. The separately handled customer request process seems to decay which is not a desirable direction for the case organization and company.

The statistics also reveal, that despite the performance indicators, there is now an actual target or control limits for the process. The change order process lead time is gathered just for reference and metrics of the customer request process do not exist at all.

Results of User Feedback Analysis

The user feedback analysis is based on interviews and discussions with the stake holders operating in the case company change management process. The change management process discussed with the interviewees contains both the request and order process phases.

The user feedback is collected into a fishbone diagram in figure 9, which indicates the problem areas in the process.

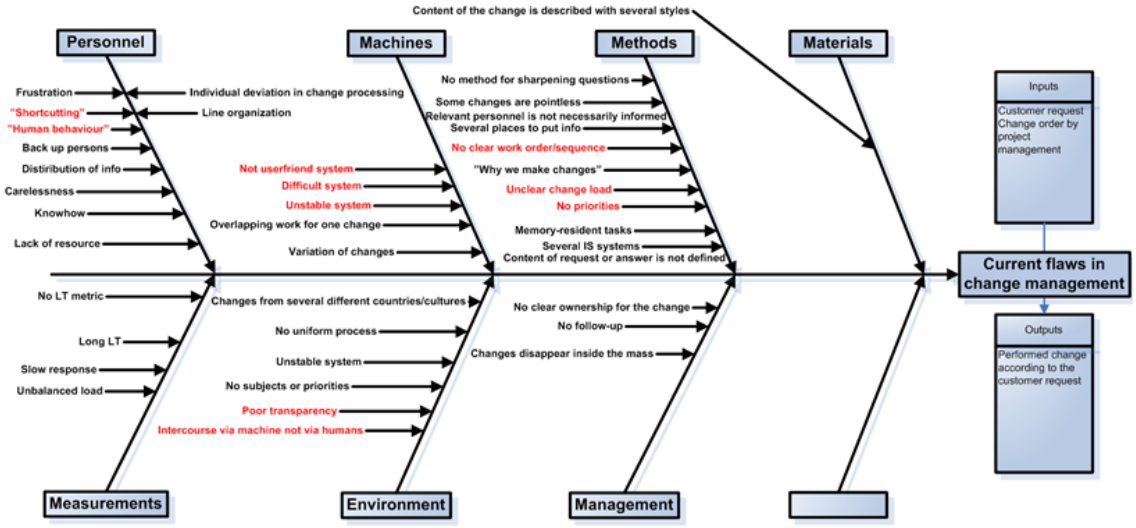

Figure 9. Problem areas in the case company change management process.

In the above fishbone diagram, the issues marked with red are the main concerns. These points kept coming up in the interviews and the process stakeholders wanted to put weight on these matters especially. First, the responses below are on agility and system functionality challenges as voiced by two respondents.

> *When the new change order process (in ERP) was implemented, I immediately understood that the Lotus Notes customer change request process will decay. It (Lotus Notes customer change request process) is completely separated from the other processes and tools we use on daily basis.*
>
> *Interviewee 1 Project Manager*

> *The customer request process is only used to manage test date reservations and R&D support requests.*
>
> *Interviewee 2 Project Engineer*

Second, regarding transparency and personnel challenges the respondents had the following to say:

> *The customer change requests are not handled in a systematic way. We do not know how many there are under work and what is the magnitude of working hours we have used and will use to solve them.*
>
> *Interviewee 3 Engineering Team Leader*

> *The content of the customer change requests does not support effective working manners. It is sometimes frustrating trying to understand what is actually needed from us. This is due to the poor and late replies reported in them (customer requests handled by the case organization)*
>
> *Interviewee 4 Production Supervisor*

> *When I replace somebody for example in vacation period, I don't know what change requests are pending. I often receive urgent emails from the sales unit and trying to read the project mail archive to understand what is ongoing and agreed.*
>
> *Interviewee 5 Project Manager*

The results from the interviews support the view of challenges in the current state of the process. A divided process in different IT systems seems to blur the transparency of the process. This generates uncertainty in the information flow. Inputs and the outcome of the change are scattered between different organizational levels. This causes uncertainty and nuisance among the process users. They feel that the customer request process is not adding value to the case company change management process, benefits and target of the customer request process are not clear.

Results of the Customer Orientation Data

The case company does a bi-annual NPS survey with its customers. Earlier the results have not been drawn to reflect some specific process. However, the customer request process is strongly related to the customer experience and communication with the customers. Therefore, it is relevant to use current state NPS score as a reference for further process improvement and its performance measurement.

The company monitors its Net Promoter Score (NPS) twice a year. The NPS is seen as an important metric and the results of the NPS survey are analyzed at each organization of the case company. Development actions following the NPS are related to the customer relationship management and fields such as customer request handling, customer experience during factory visits and on time delivery of documents, products and other agreed issues.

Currently, the case company NPS results are experiencing a slight increase of 7% from the previous measurement, which is mainly justified through on-time delivery percentage and industry specific application know-how. However, areas related to the lead time and issue resolution where in the top concerns by the customers.

The NPS concern areas can be supported by a functioning customer request process. Effective handling of the customer requests like improved quality in responses and accuracy in response rate would support the company issue resolution in an eyes of the customer. Improved customer request process would enable a further growth in case company NPS growth.

3.3 Key Findings from the Current State Analysis

To understand the current case company customer request process, the current state analysis started from reviewing the company organization structure and its overall process environment. It was discovered that the current ETO process creates certain challenges in the case organization regarding engineering, purchasing and capacity levelling. Managing the uncertainty of the unique products needs more robust processes for change management, problem solving and capacity levelling. To manage this uncertainty, the case company order-to-delivery process at the production unit level has defined a change order process and synchronized it with other local processes, with clear responsibilities. Even though the process pierces the whole communication chain from the customer to the case company sales and production unit, the customer request process lacks structure and efficiency.

Further analysis of the communication flow and processes of the case company reveal that the *change management*, especially in the front-end processes is not robust. Especially worrying is the fact that the information flow and initial inputs from the customer are not captured into a systematic process. This raises a concern since the annual volume of customer requests and orders is large and seem to have grown over the last years.

As such, the current state of the process seems to be in conflict with case company strategy which focuses on agile and high quality customer service.
Table 2 below summarizes the key findings of the current state analysis.

Table 2. Key findings of the current state analysis

What	Why
1. Large number of annual change request and orders. An average is calculated roughly 2.5 requests or changes per each manufactured motor	**1.** The annual volume is forecasted to remain the same or even increase due to the change in the case company strategy which stresses customer service.
2. The change and request management process is divided in two phases which are not linked to each other.	**2.** The separation of request and order process stage is logical. However, the linkage and transparency are not implemented into the process.
3. Share of the non-value adding time in the current process is evident.	**3.** Due to the different IT systems and poor linkage of the process phases, there is a need for manual work (copy/paste).
4. The change request process is not under any performance metric or other control.	**4.** The change request process stage is left in a “suspended” mode when the change order process stage was developed into the case company ERP system.
5. The customer request process user feedback is negative, including complains about: • Poor transparency and linkage to other tools and processes used in case company • Unknown work load of customer requests • Unstable system and unorganized data • Lack of performance metrics and process target	**5.** The process environment is complex due to different IT systems involved for different process purposes. These systems do not communicate with each other.

The findings of the current state analysis, in table 2 show that the case company change management process has been left into a “suspended” mode. It seems as if the case company has not been able to decide which is the most beneficial and effective process model for customer request and change order management. Even though, the case organization has recently developed a robust system and process for change order management, this is used only at the local production unit level. In this unit, the process is built into the case company ERP system which enables good transparency and synergy with other company operations. Changes are managed in the same place as other project related matters.

However, at the front-end side, the customer request process has been left into a separate IT system which is also used only by the case company local production unit. Other communication and correspondence with the case company sales unit, related to the customer request process, is handled elsewhere. This means that the initial input for the customer request or change is not necessarily in IT systems used by the case company local production unit.

Presently, it seems as if the whole communication chain in the customer request and customer change order case is managed using a “broken phone”. The term “broken phone” describes also the user feedback analysis of the current process environment. The process users are frustrated with the current situation and the outcome in the interviews is that the current process environment is not supporting efficient working, improved customer experience or lead time reductions which are part of the case company current strategy.

Based on this analysis, the main focus of this study is to build a new process model for the case company customer request management. The new process model would support a more agile and transparent handling of the customer requests. The results of the new process model can be measured using the current practices of the NPS scores.

4 Building Blocks of the Customer Request Process

The theoretical framework of this study focuses on the customer experience and principles of a customer oriented organization and customer relationship management system. It also includes a feature of a data based process development. This section discusses the existing knowledge and best practices which support the building of the thesis topic, the customer request process.

4.1 Customer Centricity Framework

This section discusses the key elements of the concept customer centricity which is approached through three topics including value co-creation and the role of supplier, customer focused organization and service sales/marketing. These topics discuss how customers are encountered in a modern market and are therefore relevant pieces of information for building the customer request process.

Value Co-creation and the Role of Supplier

During past decades businesses have evolved closer to the customer. The modern customer dominant logic and customer centricity methodology brings the value creation to the customer. Previously, the business logic revolved around the goods where the value generates from exchange. In goods dominant logic, the value is embedded to the product during its manufacturing phases and suppliers sell value through physical products. (Lusch et. al. 2007: 6-8)

The value co-creation model has shifted from goods to service dominant and eventually from service to customer dominant logic. Focus is not anymore on the service that the customers prefer the most. Companies try to understand what customers do with the provided service to accomplish their individual goals. Marketing should understand the customer experience and the resulting value-in-use of the service/product for the customer. Customer is in the center and the suppliers try to understand what customers need and services are then engineered and provided accordingly. (Heinonen et. al. 2010: 543-545)

The new logic that places the customers at the center is called Customer dominant logic. The Service and especially Customer dominant logic places the value and emotions in focus. Value is co-created with the customers which means that the supplier facilitates a

value proposition and the customer utilizes the proposition by him/herself. Value is created by the customer while using supplier's product. Both parties are needed to create the eventual value. (Lusch et. al. 2007: 6-8)

In customer dominant logic and accordingly built company operations, customer is close to company's employees. Customer is seeking for value and compares offerings between various companies. Human interaction is in the focus when the service is provided. To successfully manage the customer experience, company's mind-set should focus customer and operational process KPIs reflect to customer satisfaction.

In order to co-create with the customer, companies can provide and identify the spheres were they can touch the customer and facilitate value. The idea for customer touch points is part of customer centricity and customer experience approaches which are elements of the customer dominant logic. The customer interaction spheres exist in supplier's sphere among different stages of the product order-to-delivery chain. The interaction spheres enable direct contact to the customer through the supplier's personnel and supportive IT systems. At this point, social aspects like interaction and supplier's employee behavior towards the customer matters. (Grönroos and Voima 2013: 135-37 146-17)

After identifying the direct customer contact areas, suppliers can build interaction and engagement platforms where customers feel that additional value is being created. One example of an engagement platform is Nike+ which is an environment where customer can track and share its sport trainings. The Nike+ is a combination of simple device with capabilities of training tracking (speed, distance etc.) and website application where users can track their progress and share training data with friends. Nike has created an engagement platform where they can interact with the customer and where customers feel that additional new value is being created. (Ramaswamy 2011: 11-13)

In addition to benefitting the customers, service platforms also benefit the supplier. Platforms enable suppliers to reduce marketing costs due to well working system, positive word-of-mouth and ability to gain insight to an individual customer behavior. As a comparison, customer's better experience and new value creation in Nike+ case enables customer to save costs due to better price-experience relationship (additional value) and free training information availability. At the same time supplier and target the customer's with relevant advertisement. (Ramaswamy 2011: 15)

Customer Focused Organization

The second crucial topic that helps to understand the key elements of customer centricity relates to a customer focused organization. Satisfied and loyal customers drive growth in service business. The customer loyalty is the fundamental key for revenue and profitability growth. A customer focused organization sets its targets and functions accordingly. A customer focused organization seeks for high customer loyalty.

The service-profit chain is one structure to manage the customer satisfaction and loyalty. It establishes a relation between employee and customer satisfaction. In principle, value is created by satisfied, loyal and productive employees. These individuals deliver the resulted external service value to the customers. Improved internal service quality reflects to external service value which eventually increases customer satisfaction and loyalty. (Heskett et. al. 2008: 121-122)

Example of customer focused organization and functioning service profit chain can be drawn from airline industry, Southwest Airlines have relatively small turnover and employee capacity compared to main competitors, however they made remarkably better profit and operate with better employee productivity and customer satisfaction. Southwest airlines have identified its service-profit chain and measures performance through the employee and customer satisfaction. (Heskett et. al. 2008: 122-124)

Customer satisfaction itself is a measurable performance indicator. The net-promoter score (NPS) is a globally adopted metric to measure customer satisfaction. The NPS results tell how likely customer would recommend the company to a friend or colleague. Actual customer responses often cluster into three groups. Promoters are happy with the company, passives can easily shift to competitor and detractors are the least likely individuals to repurchase from the company. (Reichheld 2006: 73-74)

Academic studies show a correlation between an NPS result increase and company growth. The London School of Economics and a partnering company found out that a seven-point increase in the NPS result correlated to an average one-percent point increase in the growth rate. (Reichheld 2006: 73-74)

Understanding the NPS results between different customers and segments gives tools to make strategic choices. A profitable detractor can cause harm to the company by

spreading negative word-of-mouth, but targeted actions like listening and addressing the detractor can easily change them into a promoter. Based on the NPS results, the customer field can be segmented and targeted with a prioritized action plan to increase the NPS scores and enable platform for company growth. (Reichheld 2006: 75-77)

Marketing and Sales in Modern Service Business

The last topic of customer centricity is marketing and sales in modern service business. In modern business logic, the service sales are different from goods sales. Service sales are value based selling which can be defined as a proactive improvement in customer's business. It makes an alternative for products selling which addresses customer's needs and is parallel to customer's purchasing process. (Töytäri et. al 2011: 493-494)

Service sales are also challenging since services often comprehend a larger field of potential value to customer which means that the customer representative making the final purchase decision should understand the benefits on a larger scale. Purchase decision needs justification of the actual value for the customer. (Reinartz and Ulaga 2008: 96)

The key of service marketing and sales is to focus on the customer's problems rather than company's own product excellence. The company sells a solution to customer's problem by providing a service that fits the purpose. As a result, sales pricing and performance indicators can be switched to outcome oriented rather than activity based. As an example, industrial surface treatment specialist PPG earns its money from FIAT according to the number of flawlessly paint cars rather than amount of paint and other material bought. Similarly, bearing manufacturer SKF studied how its customer's bearings might fail and developed the know-how to manage those situations through bearing condition monitoring services. (Reinartz and Ulaga 2008: 96)

Service sales performance derives from the value justification. SKF has made an example by documenting the best practices they have with their customers around the world. To support the sales process, SKF sales person can easily refer to some earlier solution from same field that the customer is operating. (Reinartz and Ulaga 2008: 96)

In summary, capability to engineer and sell services is crucial to the success of product centered companies due to increased competition and saturation of installed base. Markets are filled with competitive products or company's own installed base. This and the

dominant outsourcing trend generates opportunities to differentiate and succeed in service sales. (Reinartz and Ulaga 2008: 95)

Through well managed customer request process, the case company can identify the potential to productize some of the repeating customer requests. Often customers enquire similar things, like a specific technical change in the scope of delivery. By analysing the customer requests, the case company can identify some customer requests as a potential product or the case company can change its behaviour and process to avoid certain request if they have negative influence i.e. cost.

An effective and well working customer request process is primarily a platform to create value with the customers but it can also support the case company sales and marketing activities. This would emphasize utilization of the modern business logics in the case company.

4.2 Customer Relationship Management

This section discusses the CRM parts and features which support the thesis proposal of the new customer request process. The customer relationship management structures the system based thinking for building the customer request process. The CRM establishes the framework for the technology which is selected to be utilized in the thesis proposal building.

The CRM in general is neither a concept nor a project. Instead it's a business strategy that aims to understand, anticipate, manage and personalize the organization's current and potential customers. The CRM is change-strategic process, organizational and technical change – whereby a company seeks to better manage its own enterprise around customer behaviour. (Brown and Gulycz 2002: 27)

The CRM definitions focus on the importance of knowing your customers and acting on that knowledge. The complexity of the CRM lies in putting that principle in practice. (Imhoff et. al. 2001)

In CRM, technology is the key enabler but not the executor. The CRM is often put into four company strategies: customer, channel and product, infrastructure and performance management strategy. From the four strategies, the infrastructure strategy has the most

weight on technology. The infrastructure (e.g. processes, competence and IT) will support company ability to execute according to the company customer, channel and product strategy. The latter strategies are more choices of what to sell to whom customer and which customer the company favour. (Brown and Gulycz 2002)

Successful CRM is an enterprise wide approach to customer care that involves an integration of front and back end offices. The CRM requires ability to knit various company hardware and software into an integrated multi-channel environment. Each customer interaction are used as a learning point to maintain and develop the CRM. (Brown and Gulycz 2002)

The customer centricity framework described earlier is strongly linked to the CRM. The customer centricity in company facilitates the CRM. Without a customer focused organization the benefits of the CRM are lost immediately hence without the facilitation the CRM is just a technology infrastructure without its pure core, organization and people.

CRM infrastructure

The thesis proposal will be a new process model to manage case company customer requests. To manage the requests, the case company needs a tool which is built on certain technology. Therefore the conceptual framework of this study focuses on CRM infrastructure and draws few practices from the literature as a reference for the proposal building.

The modern technology CRM infrastructure provides customer touch points to collect and store the interactions with customers. Internet based applications are now the driving force of the CRM's, they provide multiple ways to personalize offering, interact with customers and provide customer data. (Imhoff et. al. 2002) This was also present in the customer centric organization and in its tools to engage customers for value co-creation.

The information age we are currently living provides countless possibilities for companies to personalize and develop their CRMs. The interaction with customer must be exclusive and built on trust. The privacy protection of the customer data has recently growth its role, scandals about information leaks have set people and companies cautious. The customer must feel that their data and input for the company is safe and handled confidentially.

Successful CRM will deploy a technology infrastructure that will enable it to focus on the customer. The customer does not care about the technology per se; the customer cares about his or her experiences (trust) with the organization. (Imhoff et. al. 2002: 435)

For the Thesis, the CRM infrastructure provides guidelines for usability of the customer request process and tool. It is recon in the literature that CRM is not executed through technology. In CRM, the technology enables customer centricity to enlighten from the company organization. In other words, an adequate CRM infrastructure supports organization to face the customer in successful and professional way. This leaves room for customer to co-create value with the supplier in people to people contact.

As an end for the CRM infrastructure, the following section shows an example of web-based application for managing change orders in construction projects.

Case: Web-based Application for Managing Change Orders

As in the case company of this thesis, the construction industry has also a complex communication nature because of the various parties involved in the business process. The complexity can be a problem if a channel and mechanism of communication is not adequately designed. (Charoenngam et. al. 2003)

In the construction industry, change orders that authorize variation in the scope of work are common. This is similar situation as in the thesis case company industry, electrical motor manufacturing. In construction industry the direct costs of post contract design changes are significant. It is found that share of design change costs is up to 7.6% of the total project cost. A change order is complex information transfer that has to be managed carefully. Due to the voluminous amount information that either has to be sent, checked, corrected, approved, requested, clarified, transmitted or submitted the project is vulnerable to unexpected cost and time delays. (Charoenngam et. al. 2003)

To overcome this issue the construction industry in this example case has developed a web based application to manage and communicate change orders. They propose that success in this field is gained by developing and utilizing a system that supports documentation practice, communication, and integration between different team members in the change order workflow. Due to the similarities of the change management issues in construction business and thesis case company business, the construction industry practice to manage change orders is significant benchmark for this thesis. Relevancy of

the construction industry change management solution is studied in more detail in the following paragraphs.

The construction industry handles change orders in similar situations than the thesis case company. A change order might have several characteristics: a) it is written document containing authorization of the requested change, b) the change is brought through fault of the contractor, and c) the changed work is not included in the original contract and therefore it is not included in the contract price. It is stated that good communication and cooperation between the team members are two of several elements that can be used to manage change orders. (Charoenngam et. al. 2003: 199)

The construction industry started developing the change order management system on the following elements: documentation practice and good communication in time. Due to the time and communication aspect they chose the Internet technology as the communication media because the information can be accessed in a timely and accurate manner and may be accessed from different locations. To develop this application, the construction industry followed three steps: system analysis, design and implementation. (Charoenngam et. al. 2003)

The most relevant step for this thesis is the system analysis part. The construction industry comprehended the system analysis in a) understanding of the business objective and b) to model the system. The business objective of the construction industry concluded following main system requirements which are presented in table 3 below. (Charoenngam et. al. 2003)

Table 3. Objectives of the change order management system in construction industry

1. Aid for change order transaction
    a. The systems acts as a tool to facilitate better communication
    b. The systems should act as a proactive tool for the prevention of costly disputes
    c. Reduction of cost in processing the change orders

2. Offer of data storage and structure
    a. The system should be able to file change order requests (= customer requests) and change orders and all related attachments and correspondence
3. Process
    a. The system should be able to set the process to follow in change orders, thereby giving the process set procedures, and hence control and uniformity
4. Practicality of application

Based on the case described above, the change order management in construction industry is surprisingly similar to the thesis case company customer request management and engineering change management in general. Therefore it is valuable to discuss advantages and restrictions that the construction industry noticed while implementing the web-based change order management system.

The construction industry compared their web-based change order management system to a conventional method of change order – paper-based method. By developing the web-based system, the lead time of completing a change order reduced by 50%, from 12 days to 6 days. The web-based change order management system aids in prompt delivery of documents, standardized working, record keeping through common centralized database and mismanagement of documents is avoided. However, some restrictions also arise in the use of the system. In the web-based system, the change order process is not available in offline conditions, the process participants are assumed to check for new documents manually, the central document database should be trusted and program logic known, in addition the users of the system should have some know-how of document control and document code formats. (Charoenngam et. al. 2003)

The construction industry concluded that the web-based system enables significant advantages through the fast and timely delivery of information and systematic processing of change orders in a complex organization. Similar advantages are the goal of the thesis proposal. The construction industry change order management system is a valuable reference for building the thesis proposal.

4.3 Value Stream Mapping (VSM)

When the customer centricity framework and customer management system present the ideological ground of the thesis, the value stream mapping is the tool for actual process development. VSM is used in current state analysis and proposal building stages of this thesis.

Value stream mapping is a tool to evaluate the current state of the process and design the future state. A value stream itself is all the actions, i.e. both value added and non-value added actions, currently required to bring a product through the main flows essential to the product. These flows are design flow from concept to launch and production flow from raw materials into the arms of the customer. (Rother and Shook 2003: 3)

Typically concepts like value stream mapping are applied to production processes but they apply also to nonproduction and administrative processes. The challenge is to use the tools creatively. VSM can be applied also in problem solving (e.g. design work) and information management (e.g. order processing and other non-production activities). (Keyte and Locher 2004: 1)

The current state VSM draws a picture of specific processes current performance and linkages to different stakeholders and other processes. VSM usually starts by documenting the customer information and need (e.g. specific product). It then usually continues by following the steps suggested below (table 4). (Keyte and Locher 2004: 23)

Table 4. Suggested steps to complete a current state value stream map

1. Document customer information and need
2. Identify main processes to produce the customer need
3. Select process metrics
4. Perform a value stream walk-through and include data
5. Establish how each process prioritizes work
6. Calculate system summary metrics (e.g. lead time vs. process time, cost)

After the creation of the current state VSM, the assessment part and identification of waste in company processes starts. The identified waste in e.g. order processing could be unclear orders (inaccurate or pending information) and overlapping IT systems, i.e.

multiple transactions or interfaces for each order. Both wastes increase the lead time of order processing and are reflected in the quality of order handoffs. Similar things can be assessed in engineering (e.g. is the design tool appropriate and fully utilized and what kind of batch types are used in engineering, could the company be able to release design in smaller batches to ease the rest of the process flow). (Keyte and Locher 2004: 55-60)

By assessing the current state VSM and identifying the waste, the company starts to realize the potential for future improvements. The VSM process continues by designing the ideal process state, the future state value stream. Figure 10 below presents an example of an Order Entry VSM with marked improvement areas and potential of lead time reduction in the future state value stream. (Keyte and Locher 2004: 81 - 89)

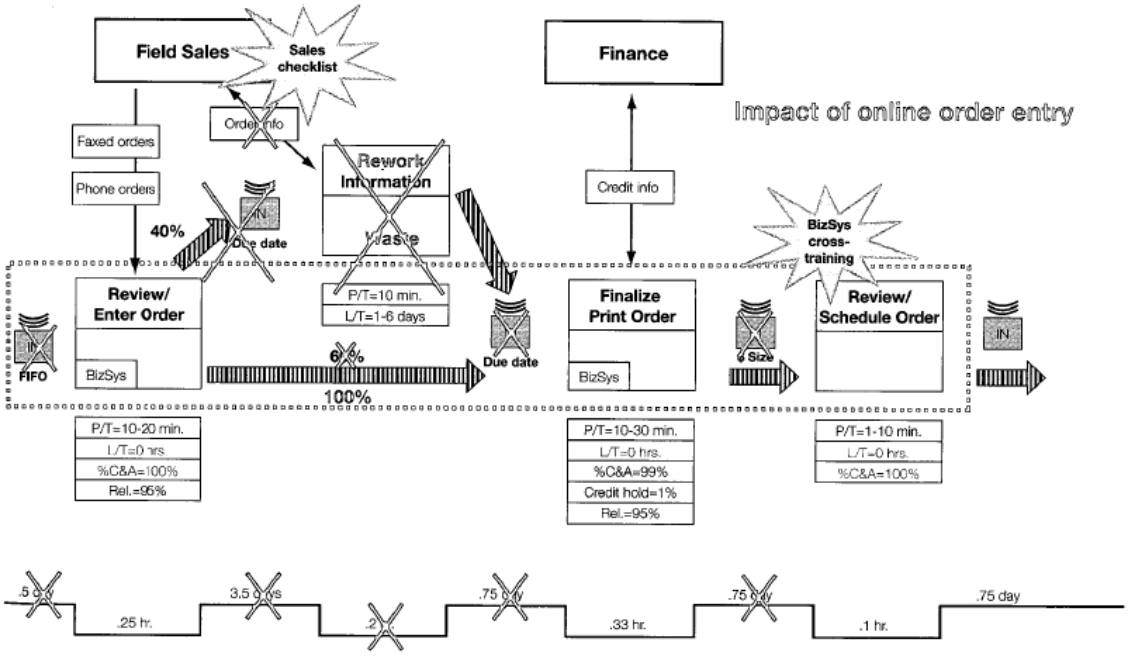

Figure 10. The current state VSM and potential improvement areas for future state value stream. (Keyte and Locher 2004: 113)

Successful implementation of the VSM supports the thesis proposal building part. The case company customer request process is analysed by using the VSM in current state analysis and proposal building.

4.4 Conceptual Framework

The previous sections described the key elements of the literature connected to this thesis, i.e. building of the customer request process. This section presents the summary and puts the information into a holistic frame to be used as a reference for building the new process model. Figure 11 presents the conceptual framework of this thesis.

The customer centricity part underlines the fact that key aspects in business and customer contacts are still humans and their interaction with the customer and within the supplier organization itself. Regardless of the business area, the marketing logic is shifting from the goods and products properties to value. Suppliers do not succeed by making just excellent products, suppliers must establish an environment for value co-creation with the customer. In order to succeed in this new role, the supplier must have a customer focused organization for supporting successful interaction with the customer. A customer focused organization is also a corner stone of a functioning customer request process. Even if the process might technically work just fine and customers are able to receive answers on time, the quality of the answers accumulates from the customer centricity framework and case company employees.

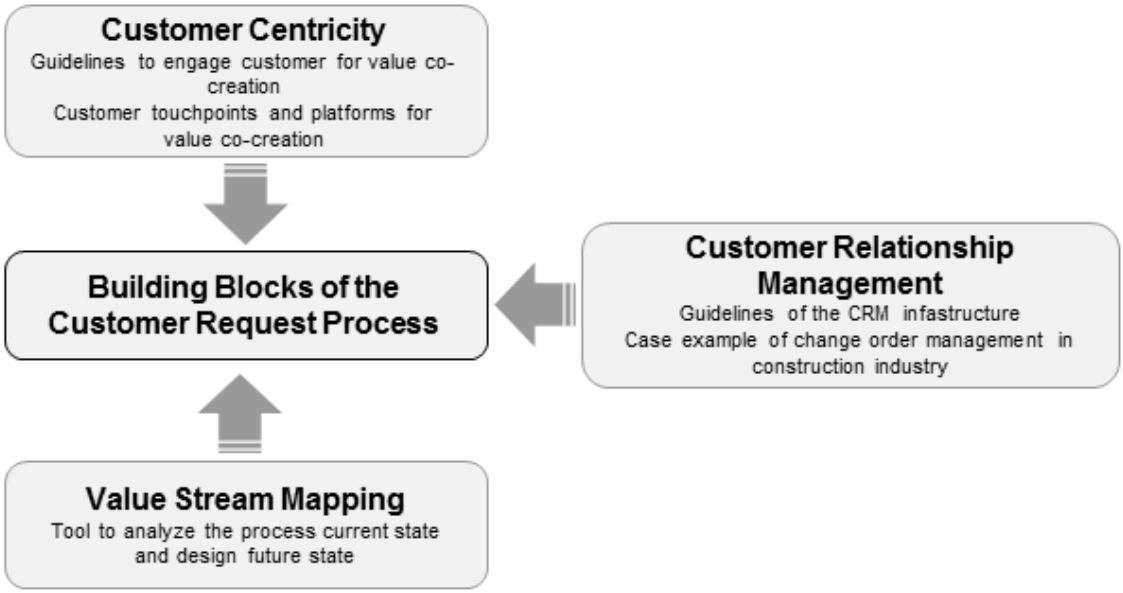

Figure 11. Conceptual framework of a new customer request process

Customer relationship management and the infrastructure part of it presents principles and example practice how a web-based change order management system works. This is a valuable reference for the thesis of building a customer request process for the case company. The customer relationship framework stresses the role of technology for building a holistic system. However it also clearly reveals the restrictions of technology. By focusing only on technology when building processes and systems, we miss the actual motor of the processes, the human interaction. However, by combining the customer centricity and customer relationship management frameworks, it is achievable to find relevant and good corner stones for building the thesis proposal.

The last part of the thesis conceptual framework is value stream mapping (VSM). The VSM is used as a practical tool for analysing the current process and designing the future customer request process in the case company. The future VSM is used in the thesis proposal stage to draft the new customer request process and to illustrate its potential for reducing the lead time of the case company customer request process.

Finally, the three parts presented above are intertwined with each other when building the new customer request process for the case company. The key findings from the thesis conceptual framework are the platform of managing the customer requests and its ability to co-create value with the customer. It is essential to establish a functioning system for managing the customer request in a systematic and effective way and keeping it still as agile as possible. The technology does not only enable a systematic working procedure and on time delivery of replies, it enables people to express their skills in customer service.

Based on the principles described in this section and findings made in the thesis current state analysis section, the new customer request process is defined and proposed in the next section of this thesis.

5 Proposal for the Customer Request Process

This section merges the results of the current state analysis (data 1) and the conceptual framework towards the building of the proposal. This section describes the specification and benefits of the new customer request process for the case company. The proposal of the new customer request process, reported in this section, is the thesis research data 2. The proposal of the CRTool is tested at the thesis validation section.

5.1 Features of an Ideal Customer Request Process

As a completion of the current state analysis (CSA), specific improvement areas were identified. By combining the CSA information (data 1) and the practices from the conceptual framework this thesis presents the proposal for a new customer request process. The initial process proposal is the thesis data 2 which is later validated and reviewed as a final proposal and thesis research data 3.

Table 2 in this thesis CSA section describes the key findings (data 1) obtained from the current process and its surroundings. The findings are mainly focused on the transparency of the communication and information sharing.

The CSA findings also underline the large number of change orders and customer requests handled in the case company. A large volume of work requires agility from the process. Currently the change management environment in the case company is scattered which comprehend also the customer requests.

Due to the relatively evident flaws in the case company current customer request process, the improvement areas are easily discovered. However, thinking merely about the opposite, the positive feature, for the flaws found will not lead to an ideal process. An ideal customer request process would fit into the purpose with cost effective investments. In other words, an ideal process is a tradeoff of best practices and cost of the investment that the case company will permit for the project of improving the current process.

As an outcome of the thesis current state analysis and conceptual framework following Table 5 describes the process features that enable the new customer request process to fit into the purpose in the case company.

Table 5. Current Flaws and Features of the ideal Customer Request Process – Data 2

The Current Flaw	How to Improve / The Ideal Feature
Poor transparency and linkage to other tools and processed used in case company	Enable the synergies of the processes and build naturally functioning linkages between each process stage and system
Unknown work load of customer request	Creation of transparency into the customer request work load by efficient search function and clear process statuses
High share of non-value adding time in the process	Enable the synergies of the processes and increase process transparency
Unstable system and unorganized data	Creation of a tool to manage the process. Utilization of already existing (=familiar) technology
Lack of performance metrics and process target	Target setting of the process. Weekly metric to monitor the process performance

The current flaws and features of the ideal customer request process were discussed in the project team meetings (data 2). The project team shared the suggestion that the key to the improvement is to improve the transparency and agility of the customer request process. Linkages to the case company ERP system (Change Order Management and other processes) and documentation control system (DocStage) were seen as key benefits and targets to achieve in the process improvement project.

Earlier in the thesis proposal building section it was discussed that the case company will invest in the improvement project of the customer request process. This thesis presents a model for the investment payback calculation. The model is significantly simplified yet feasible to illustrate the potential cost saving that the improvement and streamlining of the case company customer request process will enable. The formula for cost saving is presented below. The formula is used in the company to evaluate payback

$$Annual\ amount\ of\ customer\ requests\ \times\ total\ time\ save\ per\ customer\ request\ (h)$$
$$\times\ hourly\ labour\ rate\ \left(\frac{€}{h}\right) = Total\ annual\ cost\ save\ (€)$$

5.2 Proposal for the New Customer Request Process

The thesis data 2, the current flaws and features of the ideal process customer request process are presented in Table 5. To address these features and flaws the proposal building of a new customer request process for the case company is started by presenting the future state value stream map. Figure 12 below presents the future state value stream map of the case company customer request process.

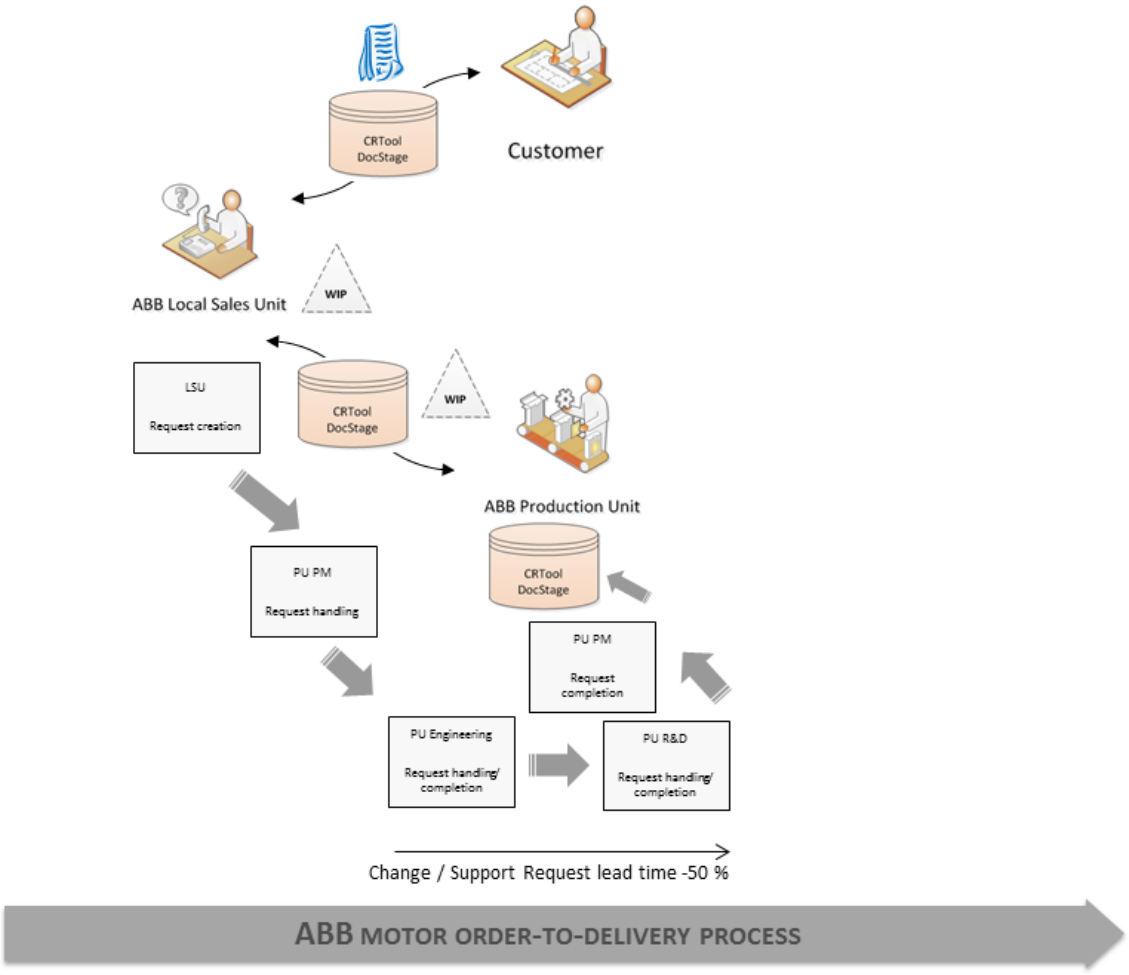

Figure 12. Value stream map of the future state customer request process.

The main change in the future state VSM, seen in Figure 12, compared to the current state VSM (Figure 5) is the work flow of the customer request process between the case company local sales unit and production unit. The actual system supported process starts much earlier in Figure 12 than compared to Figure 5. The DocStage system and customer request tool is presented in the Figure 12 as an orange database. By creating a system and tool to manage the customer request from an as early step as possible,

the process transparency increases and work in progress (WIP) is easily discovered and prioritized. In Figure 12, the system supported process is presented to start already from the customer. The new customer request process would enable customer participation either by allowing them access to the system or enabling them to give input into the system by using some other technology like emails. The email input is then processed by the case company local sales unit.

The future state VSM, shown in Figure 12, of the case company customer request process states a significant lead time reduction potential. The thesis project team meetings evaluated that a customer request process which is supported by a well performing tool, capable to increase transparency and systematic processing would make it possible to reduce the customer request process lead time by 50 percent.

The -50% lead time reduction is set as a goal for the future state case company customer request process performance. The case example of a web-based change order management system in the conceptual framework of this thesis achieved the lead time reduction of 50%. The case example supports the lead time reduction goal of the proposal of this thesis.

The lead time reduction potential is mainly seen in areas of the process transparency and share of value adding process time. The increased process transparency would mainly improve prioritizing and agile follow-up of the work. By setting up clear work queues and enabling an efficient search function for the customer request work load, the work would be done in a more efficient and correct order to meet the customer requirements. This would address also the agility topic which was seen as a main concern in the thesis CSA.

The share of the non-value adding process time would be decreased by enabling the system supported process to start earlier. This decreases the need of manual information transfer between different IT systems which is the current procedure in the case company customer request process. In addition, the new customer request process would be efficiently linked to other case company systems and tools.

Thus, by increasing the linkages and building synergy, the case company is able to build a holistic ecosystem around its key processes. The linkage of the case company cus-

tomer request process and documentation control system would keep the on time information of the latest documentation and customer requests in one place. This information is then easily accessed and shared in later process stages of the case company order-to-delivery process.

Therefore, based on Data 2 of the thesis, this study suggests that the CRTool would be an applicable and effective tool to link the customer request process into the case company documentation control system DocStage and other key processes i.e. change order management performed in the company ERP system.

5.3 DocStage

Before presenting the planned features of the CRTool it is valuable to understand the intended surrounding for the tool. The surrounding of the CRTool is a DocStage system which is an online database to store and publish documentation for the case company customers. This documentation is mainly technical drawings, specifications, test reports and other product related material. Figure 13 below presents an overview of the stakeholders and information flow in the case company DocStage system. The DocStage system was implemented at the case company in autumn 2014. (ABB Intranet 2014)

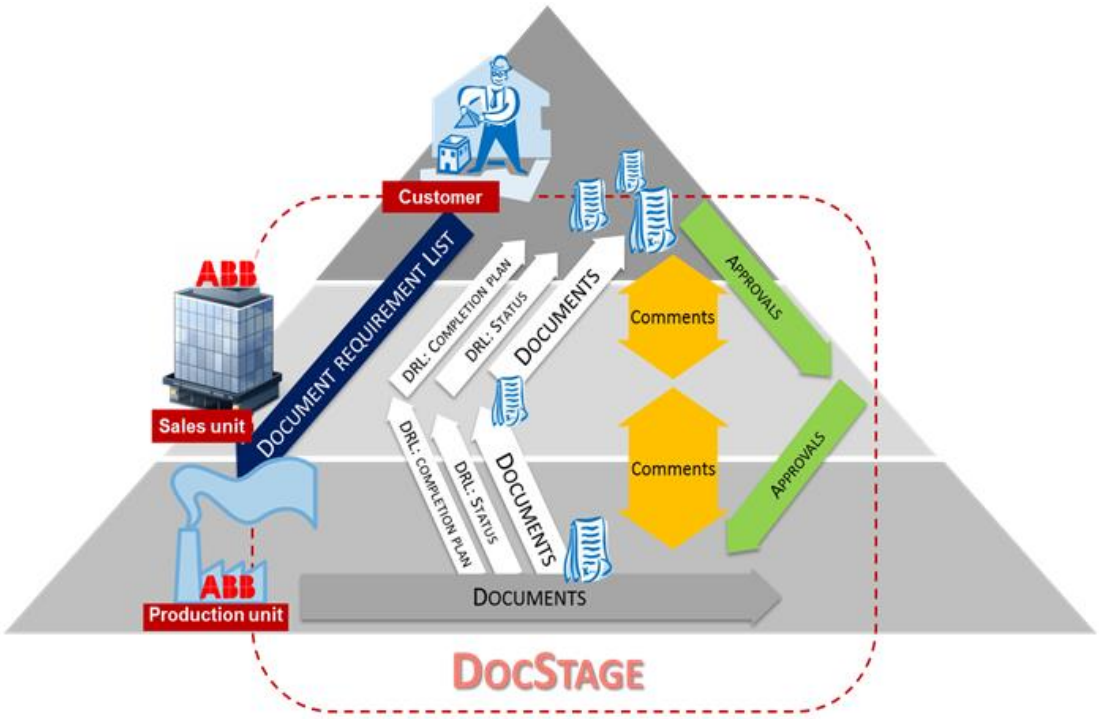

Figure 13. The DocStage overview (ABB Intranet 2014)

The DocStage system is built into Microsoft Sharepoint technology and it enables access rights to case company external parties like customers. The case company project related documentation send out, approval and commenting features are handled within the DocStage system. The system enables an efficient search tool to search and manage documents and their status in specific projects or at a general level.

5.4 CRTool

To address the thesis research Data 2, the ideal features of the process and the future state value stream (Figure 12) of the case company customer request process, this section describes the specification of the CRTool, developed to manage the customer requests. Along the DocStage system, shown in Figure 13, there is currently an existing feature to comment on drawings and other documents distributed in the DocStage. The comment feature enables customers and case company local sales units to give comments on published project documentation.

A significant share of the published documents are also commented on by the customers at some stage of the project. Depending on the stage, where the customer gives a comment on the documentation, the comment is an input for the case company to change something in the documentation or the scope of delivery. The above described comments are also known as customer requests. The customer requests are strongly linked to the case company change management as a feasibility study prior to the actual change order.

The existing comment feature in the DocStage system does not support the case company customer request nor change management processes. The processes are too complex to be handled with the DocStage default comment setting. This problem is addressed by developing a CRTool (customer request tool) to manage the customer requests and feasibility studies of the change orders. The following paragraphs present the key features of the CRTool.

Features of the CRTool

The CRTool establishes a concept of Microsoft Sharepoint forms to be used as a basis of information transfer between the case company local sales unit and different functions of the case company production units. The content of the forms are customized to fit into the case company terminology and processes (Figure 14).

The principle of the proposed case company customer request process is that the local sales unit issues the customer request on a specific form to the case company production unit which provides the answer straight or handles the request (form) within its internal functions (i.e. engineering). When the case company production unit replies to the local sales unit, the reply is already highly formalized and can be easily forwarded to the customer.

These requests can be searched and organized within the DocStage system. The DocStage search function is developed to support a work queue setting based on the statuses of the customer request handling. The following Figure 14 presents the information content of a CRTool customer request form.

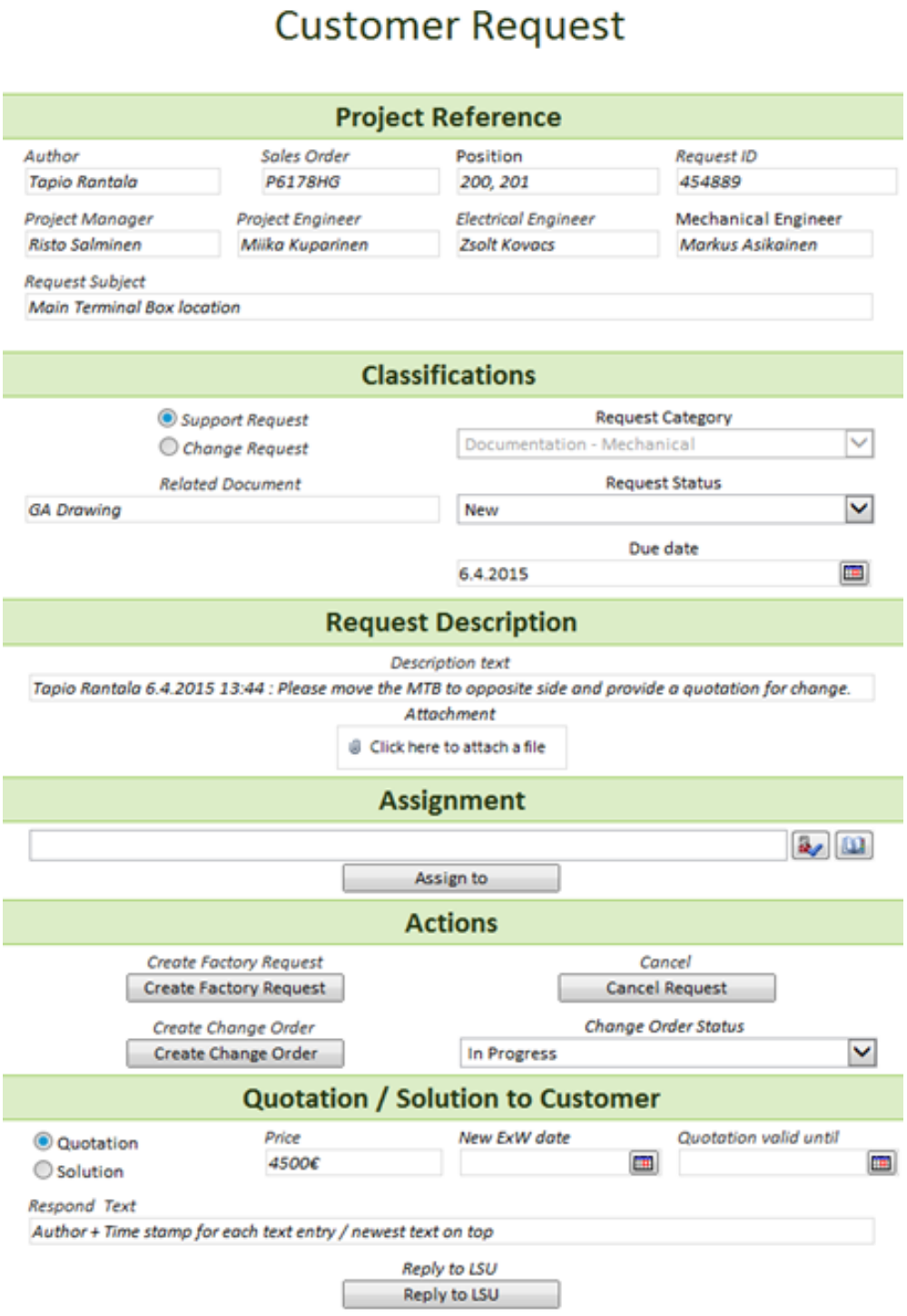

Figure 14. The CRTool customer request form

The above Figure 14 presents the CRTool customer request form and its data content. The data content is divided in sections which are project reference, classifications, request description, assignment, actions and quotation/solution. The project reference field identifies the customer request belongs to a certain case company project and its key

stakeholders, i.e. project management and engineers. The classification sets the customer request into a sortable category and indicates its status and urgency.

The request description and assignment fields are used to indicate the type of work needed and the responsible person to perform it. By assigning the customer request to someone, the system will send a separate email notification indicating the customer request needs attention and handling. The actions field enables the creation of a change order into the company ERP system. The system generates a link between the initial customer request and related change order. This enables the case company change management processes (change request and order) to create better synergy than before. It also provides the information of the whole change process to be seen in one logical place.

The last section of the CRTool customer request form is the Quotation/Solution to Customer field which formulates the case company reply to the customer request. The field is structured in a way which describes a clear indication of the cost and schedule impact that the customer change request generates. Or in a customer support case, it enables the case company to formulate its reply in one field ready to be published for an external view. The internal handling of the customer request is done by generating a Factory Request.

The CRTool Factory Request copies the data content into a form which enables internal handling of the customer requests. The customer requests can be assigned and processed by multiple case company production unit internal functions like engineering or purchasing and eventually they can be replied to the case company local sales unit where the reply copies into the initial customer request form by the case company production unit user.

In other words, the same customer request can be handled in several layers of the case company without sharing the draft status information to the whole case company organization. The customer requests are managed and published to certain organization layers by using the action commands of the form, as seen in Figure 14, and authorizing certain user categories to view certain data contents.

The actions in customer request processing are supported by email workflow which notifies certain personnel of an assigned or completed task. In addition, the customer requests are easily accessed through the Microsoft Sharepoint search function. The CRTool will include a customized search function to be used for a fast and agile search of the customer requests. The search function enables clear work queues for the case company to process the customer requests.

5.5 Conclusion of the Customer Request Process Proposal

This study proposes that by developing and implementing the CRTool and its designed features, the case company establishes a holistic system to manage its customer requests and often closely related change orders. The piercing process, CRTool and its linkage to the case company Change Order management system is presented in Figure 15 below.

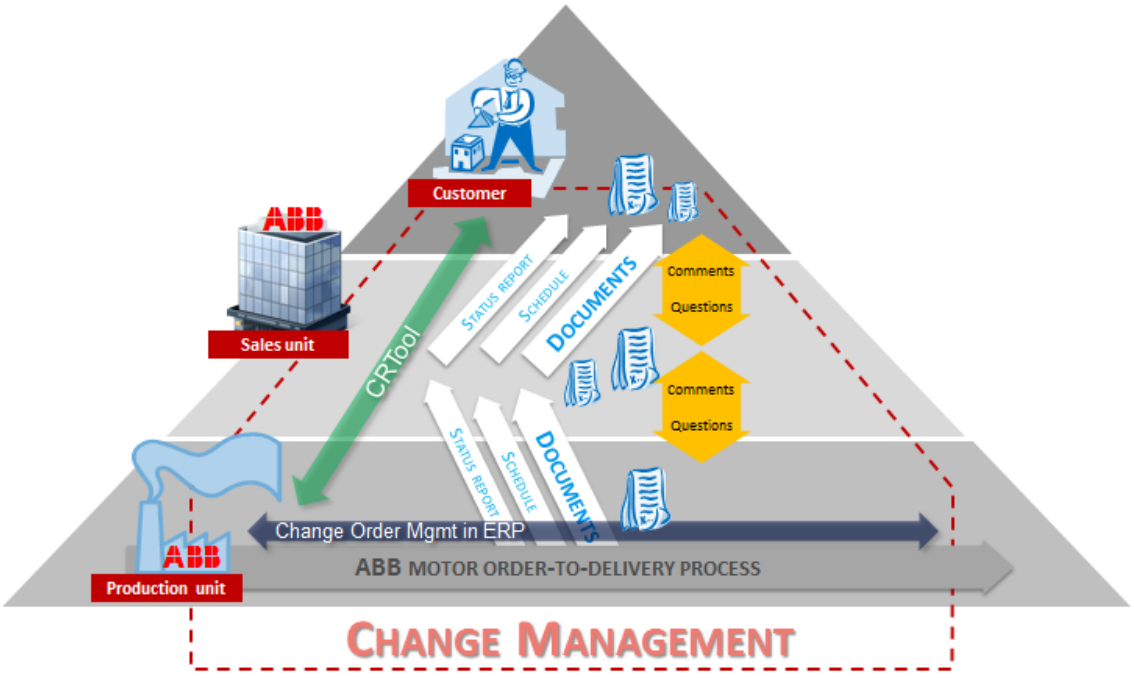

Figure 15. Case company change management process after implementation of the CRTool.

The CRTool will increase the performance of the case company DocStage system by creating significant synergy by linking the documentation management system and customer request processes together. This and the linkage to the case company ERP system in change order management would create an effective dashboard and environment

for the case company project management to operate in, as described in Figure 15 below. Documentation distribution, requests and changes would be managed in one environment which enables access also from out of office environments and remote working.

The new customer request process proposal is built to address the process flaws acknowledged in the thesis CSA section (data 1) and the ideal process features reported in this section (data 2). The proposal also leans on the practice found from the conceptual framework and CRM infrastructure. The case example of web-based change order management in a conceptual framework encourages to further implement and test the customer request process proposal.

This study suggests, that by implementing the new customer request process, the case company creates a customer touch point where they can collect data and interact with the customer. The interaction aims for a closer and more effective cooperation of the case company production unit, local sales unit and end customer.

Due to the improved interaction channel and efficiently organized working manners, the value co-creation of customer, case company local sales unit and production unit is more transparent. The resolutions of the customer requests can be monitored and handled in a more systematic manner. This improves the quality of the case company customer service which can be measured in NPS scores. The new customer request process acts as a foundation for a positive movement towards improved customer service and value co-creation.

The proposal for new customer request process will be validated in project team meetings and testing/demo sessions which form Data 3 of the thesis. The outcome of the final proposal and implementation plan is presented in the next section.

6 Validation of the Proposal for Customer Request Process

This section discusses the findings and results of the customer request process proposal testing. It analyses the results which form the thesis research Data 3, builds the final process model proposal and establishes an action plan for the customer request process implementation.

6.1 Findings of the Proposal Testing

The proposal for the new customer request process described in section 5 was tested among the project team and other process stakeholders from the case organization. The testing was done by presenting the proposal of the new customer request process to the selected audience including 8 persons from each case company function.

While testing, the demonstration of the process was done by showing on paper how the process would work in different situations and what the benefits and possible restrictions of it would be. The participants were able to understand how the process would work and which kind of Microsoft Sharepoint forms would be in use to communicate the customer requests at different organizational levels. The findings were discussed in a few one-hour meetings with the group and the results are summarized in the following Table 6.

Table 6. Findings of the customer request proposal testing – Data 3

What	Why
Multi-Assignment	To ensure a fast and agile processing of the customer requests, the system should enable simultaneous assignment to several people
Structure of the Internal Reply / Solution	The reply text field should be structured to ensure more efficient legibility. Materials, labour hours and other costs of the i.e. change should be clearly presented.

Structure of the Request Description	The CRTool could enable collation of several different requests topics under the same case company sales order and one request form. The agility of the system must still remain.
Engineering Labour Hour Records in Customer Request Processing	The system should support recording of the spent engineering labour hours into the case company ERP system.
Magnitude of the Email Workflow	The customer request process should not create spam.
The Three Different Customer Request Form Contents	While the customer requests are handled at case company sales unit, production unit and R&D level, the processing should happen in specific forms (three different) designed for the purpose. The forms are linked to each other to ensure proper 'legibility' of the process.

The proposal testing revealed that the overall concept for the new customer request process is feasible and a need for development exists. The proposal testing focused in detail on some of the features in the customer request process proposal. The findings of the testing are summarized in the Table 6 above and described in more detail below.

The project team and other process stakeholders felt that the customer request forms used for the communication would need more structuring in order to keep the legibility of the information as easy as possible. Figure 16 presents the factory request form where the internal comments section is structured to clearly state the material, schedule and cost impact of the customer request.

Another significant feature is the form and its agility to communicate multiple request topics with the same form. Currently, this has been a challenge in the case company change order management system. Multiple change topics on the same change order will evidently increase the lead time of the change order processing since every function will process topics one by one at their own 'turn'.

So far, this challenge is handled by increasing the training and awareness of the process users. The training focuses on situations of how and when it is feasible to collate change topics on the same change order and when it is feasible to create multiple individual change orders. The common practice of the process users in the case company change order processing will affect the customer request process as well. There needs to be a study of what will eventually be the best way to communicate customer request and change orders. The multi-assignment feature presented in the Table 6 will partly address this challenge.

Other features found in the proposal testing are the engineering labour hour recording and email workflow of the customer request process. A common practice in the case company is to record the amount of spent engineering labour hours to some specific sales order. The feature is also feasible in the customer request process, the engineering hours spent for handling a customer request could be recorded in the future but not necessarily in the first version of the customer request process due to the limitations of the budget and schedule allocated for the project.

The email workflow of the new customer request process is planned to be as light as possible. The DocStage environment and customized search function will support the accessibility to the customer requests. Therefore the email workflow is only used to support this feature and it is primarily used for notifications and remainders. In the previous case company customer request application, the email workflow was seen as a spam generator rather than a valuable aid.

The last item in Table 6 is the content of the customer request forms used in the production unit internally and within the production unit R&D. The handling of these forms is separated due to function specific needs in the case company. By processing the customer request on one generic form within all the case company functions is not convenient for the process ‘legibility’.

6.2 Final Proposal for Customer Request Process

The final proposal for the new customer request process is presented through process charts and the forms used to communicate the customer request in different organization layers of the case company. The process chart and forms are also presented in the appendix of the thesis. The final proposal leans on the Data 3 results of the thesis which were presented in Table 6.

The study suggests that by using three different form templates, the customer request can be processed efficiently in different case company organizational levels at local sales unit, production unit project management, production unit engineering and other operative functions i.e. purchasing and at the case company R&D. The customer request can be processed in every organization presented above or it can be processed in just one of them. The customer request process enables process users to assign the request into the organization level they need and want. A complex customer request could need evaluation also from the case company R&D where the specific R&D request form enables the right classification, assignment and result reporting.

On the other hand, the customer request forms do not need initial input from the customer or case company local sales unit. The process can be started from the case company production unit or R&D if needed. This feature enables the customer request process to be used also in case company internal matters which do not necessarily accumulate from a customer input. This supports a full utilization of the customer request process as an effective project management tool.

In addition to the forms which will be the basis of a structured communication in the customer request process. The process would not work as intended without a search function. The search function will be constructed into the DocStage system. The search function enables clear work queues for the customer request processing. The search will illustrate the status of the customer request and the user and case company function who is currently responsible for handling it.

The search function also establishes the base for process metrics. By exporting the process data from the search view and importing it to Excel, the case company can build a metrics to monitor the performance of the customer request process. The metrics enable the case company to follow-up lead time and the amount of work in progress in the customer request process.

The email workflow and structuring of the customer request form internal reply field presented in Table 6 are included in the final proposal. However, the recording of the engineering labor hours used for processing the customer requests is left for consideration and later release. This is primarily due to the scope of the work which is needed to be narrowed down for faster budgeting and implementation of the CRTool.

The following Figures 16 and 17, present the Factory Customer Request and R&D Request forms which have not yet been introduced as Figures in this thesis.

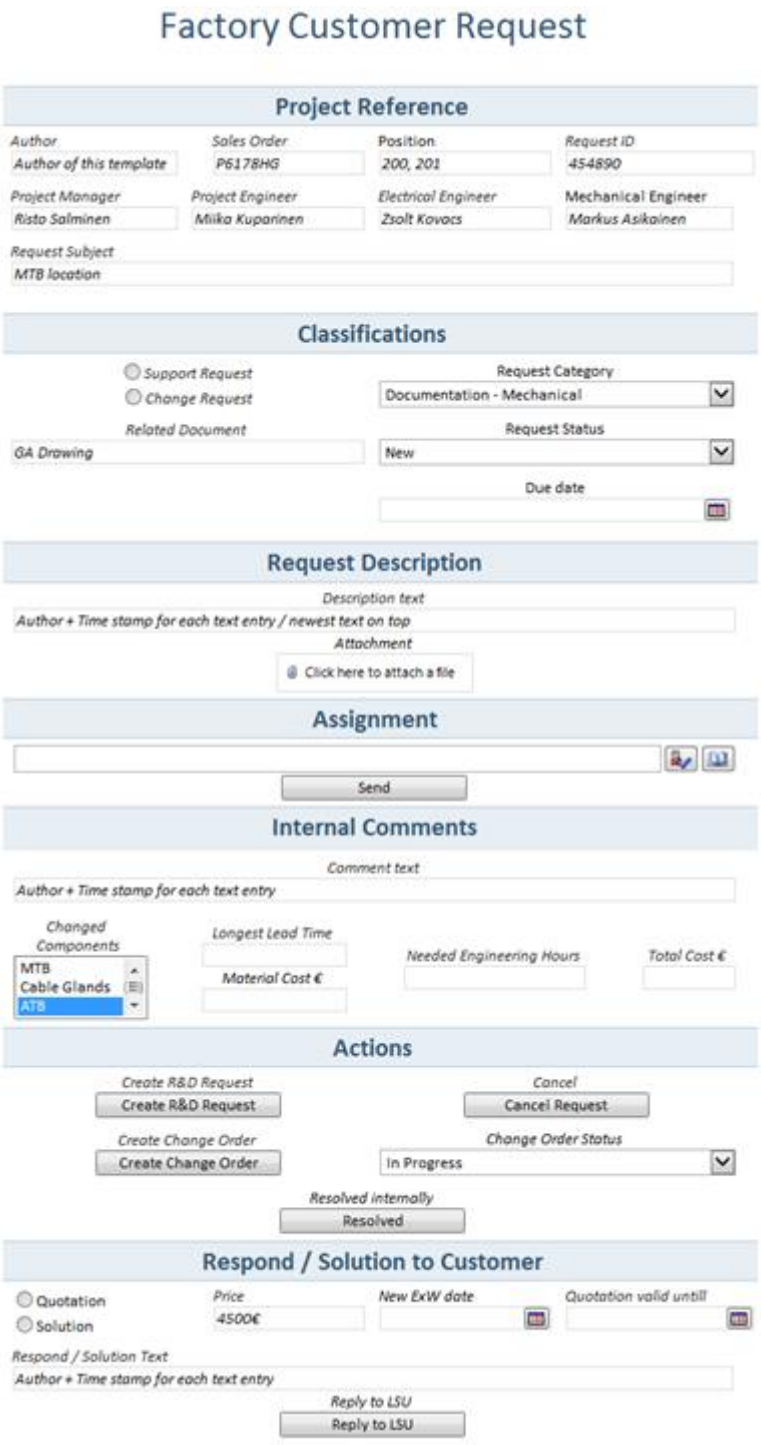

Figure 16. The CRTool Factory Customer Request form

The Figure 16 presents the Factory Customer Request form which is used to process the customer requests within the case company production unit. As a difference to the

Customer Request form (Figure 14) presented earlier, the factory form utilizes space for the case company production unit internal communication. The internal comments section structures the evaluation of the customer request impact for possible material costs, lead time and labour hour costs. The Respond /Solution to Customer section on the form is authorized to be used only by the case company project management and local sales unit personnel. The Respond /Solution to Customer structures the final reply to the customer request which includes a possible quotation for a change order.

The Figure 17 below presents the R&D request form which can be also used in the processing of a customer request. In case the customer request is technically complex it might need case company R&D to evaluate its feasibility. As a difference to the Customer Request and Factory Customer Request form presented earlier, the R&D Request form is a bit lighter and it emphasizes the free text fields which are used to explain detailed technical answers i.e. results of the mechanical finite element analysis.

Figure 17. The CRTool R&D Request form

As described earlier, all the three forms are linked to each other if they are needed in the processing of a specific customer request. The process user can drill down from the DocStage system to see and process different customer request forms. Figure 18 below presents the DocStage project page which is the view where the requests and documentation are seen and editable.

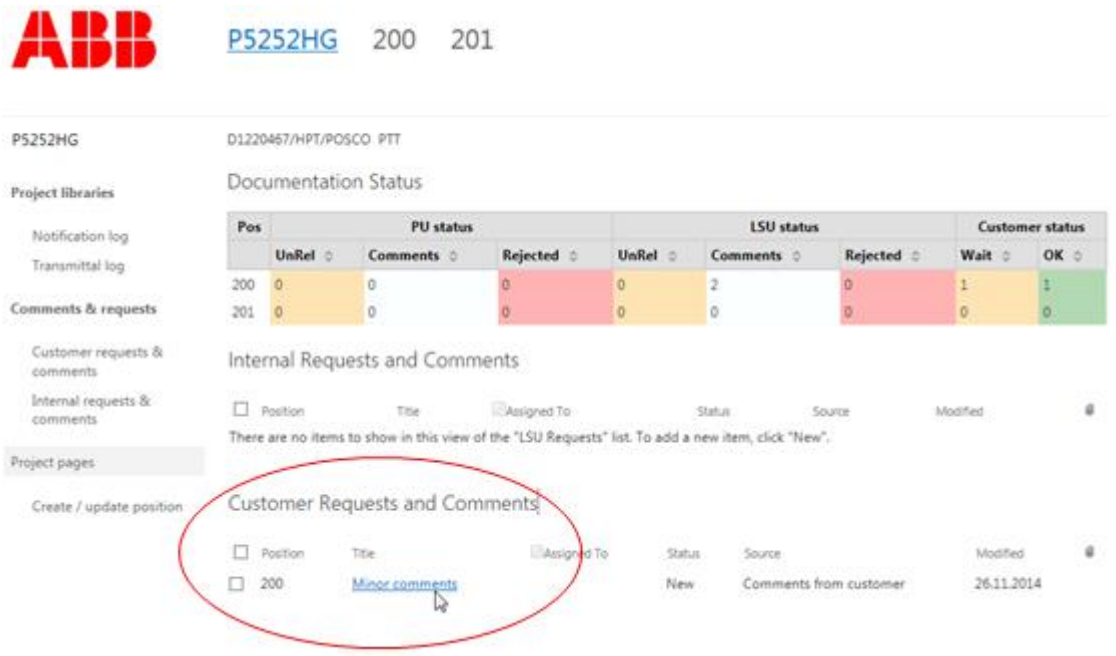

Figure 18. The DocStage project page and Customer Request section

The overall process chart of the customer request process is presented in the Appendix one. The three different forms can be followed and identified by the colors which are the same in Figures 14, 16, 17 and Appendix one.

The following sections describe the action plan for the implementation of the new customer request process.

6.3 Action Plan for the Implementation of the Customer Request Process

This section suggests an action plan for the implementation of the new customer request process. The action plan sets content for each step and it can be followed in a chronological order.

Technical Specification of the Customer Request Process

The technical specification of the customer request process is completed as an outcome of this thesis. However, the specification needs 'spell checking' in order to make it as clear and legible as possible. The actual coding of the system will be done by a third party organization and the outcome leans on the specification which is made by the case company organization.

The specification is also used in the bidding stage of the project. The third party system architects will base their quotation on the specification which will mean that some of the features in the system should be evaluated as default and some optional. The case company can evaluate if some of the features are left for later stage development.

Testing of the System and Process Training before the Release

The process and functionalities of the CRTool should be tested in a testing environment before their release. Rigorous testing is necessary in order to ensure proper implementation. Defects in the usability of the system could drive the whole implementation and release of the system in jeopardy.

The testing should cover the basic designed functionalities of the system and abnormal situations. The testing of the system gives good input for process instructions and training material. The testing of abnormal process situations gives confidence for troubleshooting situations which often occur in the first stages of the implementation.

For the training it is planned that there is one nominated key user in every function. This will ease up the implementation, since there is a person in every function who can assist the users. The training itself is based on the instructions that are going to be established in the process testing stage. The instructions are PowerPoint presentations and process charts which are divided into different themes. This instruction set would walk the user through the whole process or some relevant parts of it

Go Live – Release and Follow-up of the Process

The release of the process is planned to be carried out at time when most of the organization is present at work. A release during the vacation period would prolong the implementation by several weeks or even months. A part of the implementation plan is that the nominated process key users will follow-up the process in the first few months. The process key users are available to give assistance for the process users when needed and it is their responsibility to react in case troubleshooting is needed.

After the release, the process metric will reveal how well the process is being implemented. While the case company implemented the change order management system in the case company ERP system, the most describing metric was the amount of opened and closed change orders per week. A large share of on time closed change orders proved that the process was successfully implemented and defined.

During the follow-up of the process it is beneficial to communicate that process development ideas are already collected and that there is a plan to maintain and develop the process on a regular basis. This and proper training would commit the process users to adopt the process as it is and the approach would ease up possible change resistance that organizations often show in IT system implementations.

The next section of the thesis concludes the outcome of the thesis and presents the managerial implications and steps forward.

7 Discussion and Conclusions

This section discusses the summary of the thesis and presents the evaluation of the thesis outcome through managerial implications, reliability and validity study. This is the last section of the thesis.

7.1 Summary of the Thesis

This Thesis focuses on the development of a new process model for more systematic management of customer requests in the case company. Presently, the manufacturing industry is focusing more and more on the customers. In modern markets, a customer oriented organization and agile processes are seen as necessary steps for building competitive advantage. Therefore, improving the customer request process is seen as a key step towards improved customer experience.

The research study of this thesis, presented in Figure 1, structures the thesis stages. The framework of the thesis includes the final and tested proposal model for the new case company customer request process and introduces a plan for the implementation of the process. The process follow-up part which is included in the research design is not included in the thesis due to scheduling reasons.

The current state analysis section presented the case company business problem in the existing customer request process. Table 2 in the CSA section concludes the findings which clearly point out the current weaknesses in the process. The current case company customer request process suffers from a lack of transparency, agility and synergy with other case company key processes. The CSA also presents the strong linkage of the case company engineering change management process and customer requests. This emphasizes the current flaws in the customer request process. A large and increasing magnitude of the customer change orders require a robust customer request process for systematic collection of customer data and input for other case company processes i.e. to the change order process.

The conceptual framework of the thesis collects building blocks of the new customer request process from the literature covered. The conceptual framework is divided in parts which the first handle customer centricity framework. The customer centricity is a fundamental mind-set change in employee thinking and it is a necessary part of an efficient

customer request process. The process itself could function technically well but the actual value co-creation with the customer accumulates from a human behaviour. The other parts of the conceptual framework, the CRM and VSM part present the tools for actual process development. The Customer Relationship Management part describes a valuable example and practice of a web-based change order management system in the construction industry and Value Stream Mapping introduces the tool which is used in defining the future state of the process.

The last part of the thesis sets up the proposal for the new case company customer request process. The initial process proposal is based on the thesis CSA, conceptual framework and work of the project team at the case company. Inputs for the process development are mainly drawn from the interviews made during the current state analysis, development and implementation experience of the case company engineering change order management process and from the literature example of a web-based change order management system.

The final process proposal part introduces the findings of the testing made to the initial process proposal and it describes the final features of the case company new customer request process and CRTool in detail. The thesis outcome is the specification for a new case company customer request process and a plan for the implementation of it.

7.2 Managerial Implications from the Thesis

There are several managerial implications from this thesis for the case company organization. The first one emphasizes the need for customer request process development in the case company. The base where the customer request process is built on, the DocStage system is currently being implemented among case company local sales units and production units. The latest plan is to widen and continue the implementation of the DocStage system in other case company business units as well. These business units produce different products using a different production methodology (i.e. Assembly to Order) than the thesis case organization.

The new customer request process and CRTool should address the challenge of adopting different needs from different case company business units. This means that the CRTool should be as agile and generic as possible. Even though there is a possibility to customize some of the features in the CRTool the general appearance should be the

same as it remains the same in the base technology in DocStage. Even though a wide ‘market’ for the CRTool and DocStage exists, a managerial implication from this thesis is that it should not delay the implementation schedule of the CRTool. The first version release of the CRTool should be executed within the year 2015 in order to keep the momentum of the development actions in the case company.

Another managerial implication focuses on the specification which is the final outcome of this thesis. It is emphasized that the specification needs work to be clearly interpreted by the system architects which will do the actual coding work. A clear specification will significantly mitigate the cost control, communication and testing at the coding stage. The best practice of the specification format is currently in search and the specification will be completed when the thesis is released.

The last managerial implication is communication prior to implementation and during the implementation. The change will need grounding in order to mitigate possible change resistance in the organization. The grounding can be made by presenting the concept in meetings, case company intranet and managerial presentations. It is valuable for the implementation that the organization knows what is expected to happen and when. The nominated key users of the customer request process should also support the communication and make the ground fruitful at their own functions. The process key users should be also easily available to support process users at the early stage of the implementation.

7.3 Evaluation of the Thesis

The research objective of this thesis is to identify a way to improve the current case company customer request process. The current state analysis section of the thesis presents the current challenges which are drawn both from the numerical process performance data and process user interviews. Due to the lack of performance data for the current case company customer request process, the CSA implies that the change order process lead time is feasible to be used as a reference for the further evaluation of the customer request process lead time reduction. Due to the similar workflow of the case company customer request and change order process, it is reliable enough to use the change order process lead time as a reference for targeting the customer request process lead time.

Due to significant and clear CSA findings the latter part of the thesis, the proposal building is built to follow a similar logic. The process improvements described in the proposal draw a clear counter pattern to the CSA findings. The process improvements are selected to affect the most significant flaws in the current process. On the other hand, the proposal is built to be feasible within the budget allocated for the project. The payback model presented in the thesis can be used to address the cost saving potential of the case company customer request process improvement project.

The conceptual framework of the thesis is relevant to the project. It supports the thesis by describing the tool for process development, i.e. value stream mapping. The conceptual framework also provides a supportive case example from the literature, where a web-based application is successfully utilized in change order management in the construction industry.

The conceptual framework also emphasizes the role of customer centricity in the organization for successful utilization of the customer request process. However, the role of practical implications for customer centricity in the thesis are slightly lacking. This is mainly due to proposal building which focuses more on technical process development. The customer centricity implementation is suggested to be covered after the implementation of the new case company customer request process. The new customer request process would enable the case company to build a platform for value co-creation with the customer and a platform to collect significant customer data.

The new customer request process and DocStage system enables the case company to further productize its engineering change management. An analysis to the customer request data collected through the new CRTool would easily show the repeating requests which could be productized and built to meet some target prices and lead times that the customer request process data reveals.

Thus, it can be considered that the thesis outcomes are in line with the research objective and the thesis sets a logical pattern to follow in case further studies for customer value co-creation are made in the case company. The following section of the thesis presents the reliability and validity of the thesis results.

7.4 Reliability and Validity of the Thesis

This section discusses the reliability and validity of the results achieved in the thesis. As described in the thesis evaluation section, some hypothesis had to be made in the process lead time analysis and target setting. The case company customer request process lead time reduction target of -50% will be based on the current case company change order process lead time. However, the process workflows are quite similar and the finite goal of the thesis is not just to gain a -50% lead time reduction, it also strongly emphasizes the transparency and usability of the customer request process compared to the current situation.

Another meaningful step in the thesis proposal building is the interviews collected from the current customer request process stakeholders. In interviews, there is often a concealed agenda presented by the interviewee. By listening to the interviewees from just one case company function would optimize the results to please this specific function. In this thesis, the results of the interviews are collated into one fishbone diagram (Figure 9) which allocates the answers under neutral themes. By analyzing the fishbone diagram, the most significant and repeating themes can be selected for improvement.

Finally, the thesis proposal is built on relatively rich data which is also supported by the conceptual framework and a successful case example from the literature. The proposal is validated in the project team evaluation meetings where participants are selected from various case company functions. In the evaluation meetings, the participants have acknowledged how the new customer request would work and what the actions at different process stages and case company functions would be. By assessing the proposal, the process stakeholders have ensured that the process would fit into case company purpose without optimizing or jeopardizing any process stage. The customer request process proposal would serve equally serve the purpose.

By following the research design presented in Figure 1, a similar result to this thesis would be most likely replicable by another researcher. The rich data and using both quantitative and qualitative research method support the validity and reliability of this thesis. By implementing the CRTool, the case company takes a step forward for improved customer centricity and establishes an effective structure to productize its agility in handling the customer requests. The repeating customer requests can be seen as future merchandise.

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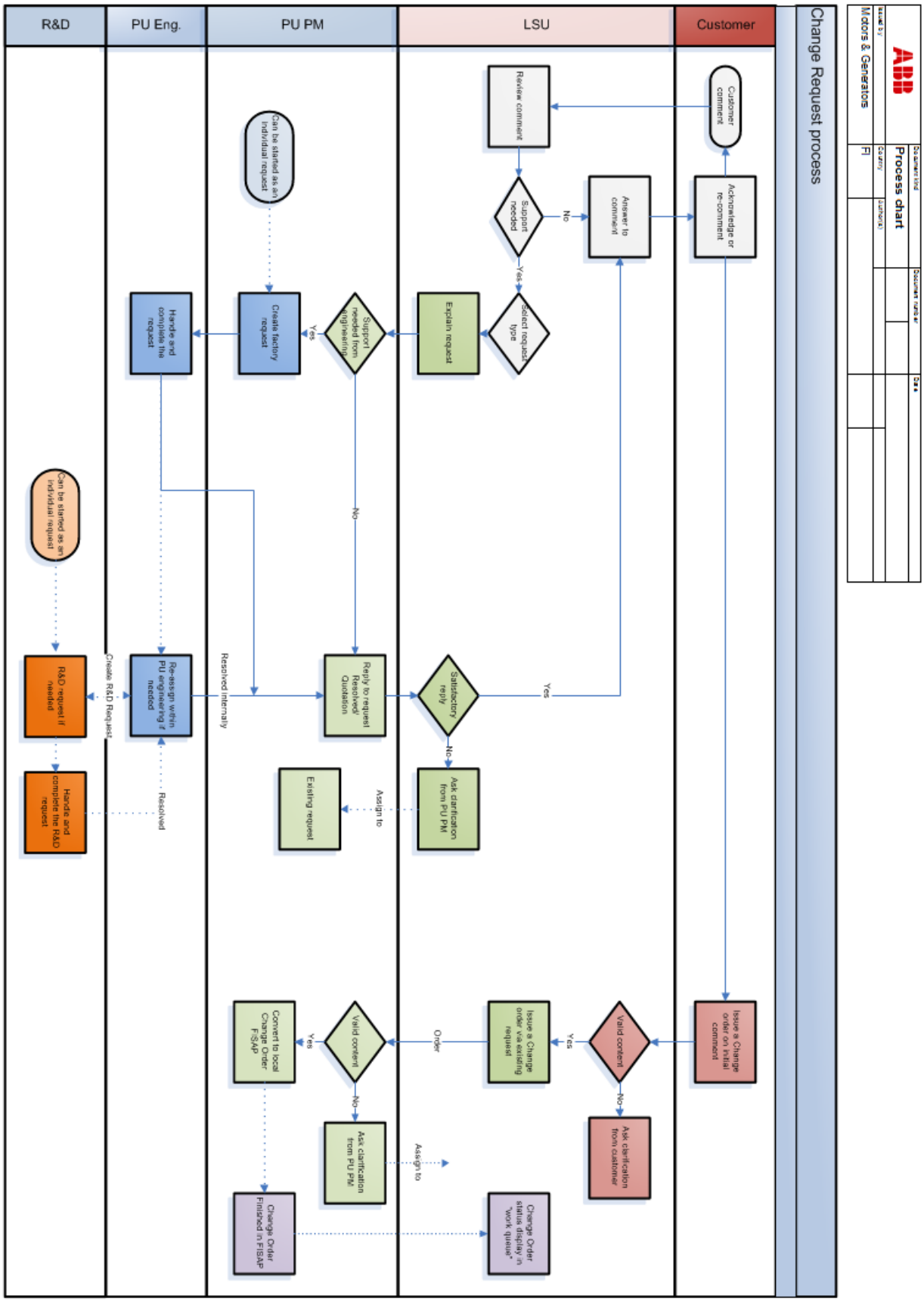
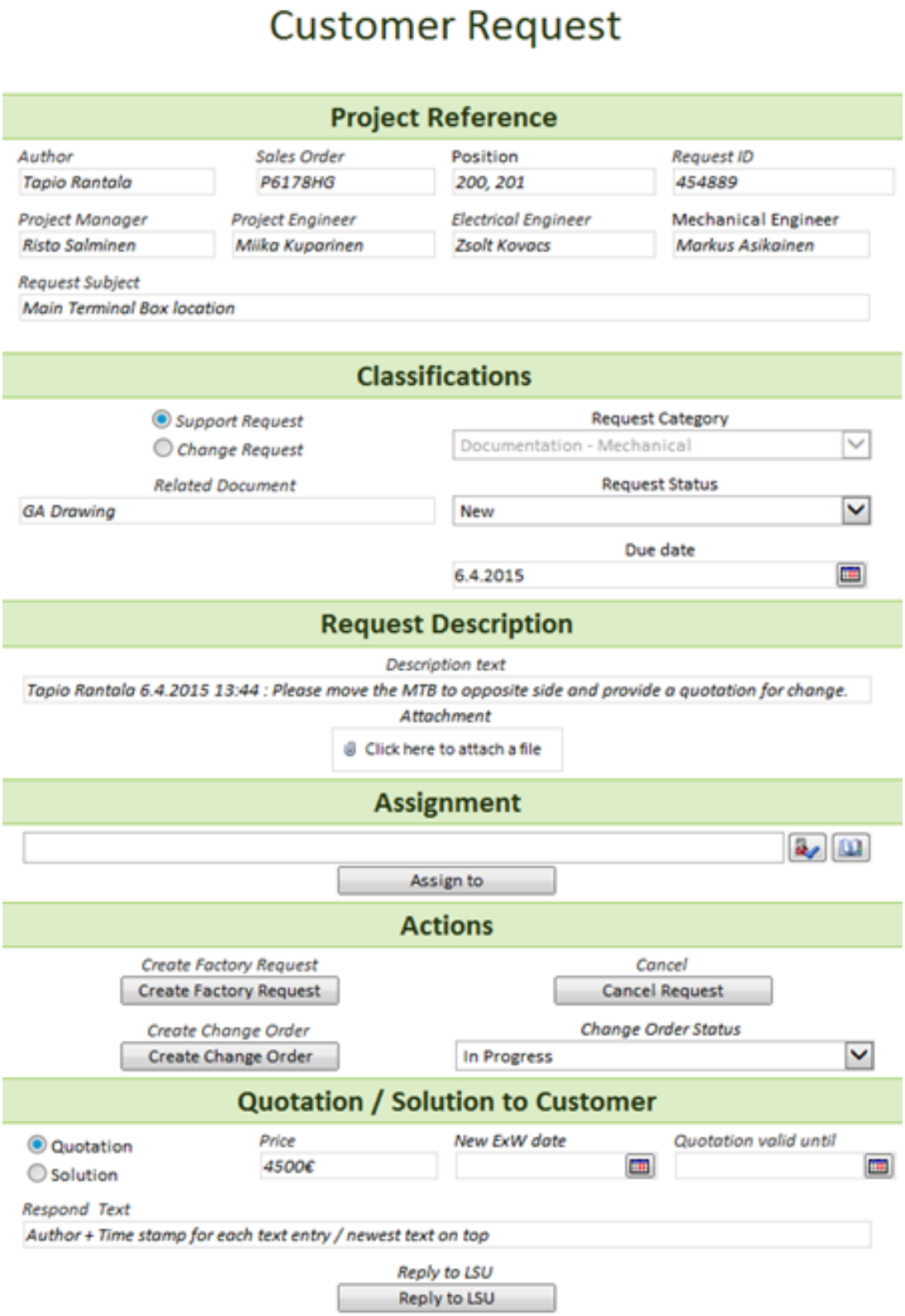
The Customer Request Process Chart



The CRTool Customer Request Forms



Factory Customer Request

Project Reference

Author	Sales Order	Position	Request ID
Author of this template	P6178HG	200, 201	454890

Project Manager	Project Engineer	Electrical Engineer	Mechanical Engineer
Risto Salminen	Miika Kuparinen	Zsolt Kovacs	Markus Asikainen

Request Subject
MTB location

Classifications

- Support Request
- Change Request

Request Category: Documentation - Mechanical

Related Document: GA Drawing

Request Status: New

Due date

Request Description

Description text
Author + Time stamp for each text entry / newest text on top

Attachment
Click here to attach a file

Assignment

Send

Internal Comments

Comment text
Author + Time stamp for each text entry

Changed Components: MTB, Cable Glands, ATB

Longest Lead Time

Material Cost €

Needed Engineering Hours

Total Cost €

Actions

Create R&D Request: Create R&D Request

Cancel: Cancel Request

Create Change Order: Create Change Order

Change Order Status: In Progress

Resolved internally: Resolved

Respond / Solution to Customer

- Quotation
- Solution

Price: 4500€

New ExW date

Quotation valid until

Respond / Solution Text
Author + Time stamp for each text entry

Reply to LSU: Reply to LSU

R&D Request

Project reference

Author	Sales Order	Position	Request ID
Author of this template	P6178HG	200, 201	454889

Project Manager	Project Engineer	Electrical Engineer	Mechanical Engineer
Risto Salminen	Miika Kuparinen	Zsolt Kovacs	Markus Asikainen

Request Subject
MTB location

Classifications

Support Request
Change Request

Request Category: Documentation - Mechanical

Related Document: GA Drawing

R&D Request Category: Mechanical FEM

Due Date

R&D Request Status: Open

Request Description

Description text
Author + Time stamp for each text entry

Attachment

Assignment

Assign to

Internal comments

Comment text
Author + Time stamp for each text entry

Actions

Reply to Factory: Resolved

Cancel: Cancel Request