Helmi Kytömäki

Content Definition of New Tendering and Ordering Tool for Case Company Product

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Abstract

Author:	Helmi Kytömäki
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The case company identified opportunities for improvement and streamlining within the tendering and ordering process through a new tool. Therefore, the objective of this thesis project was to define the content for new tendering and ordering tool for a specific product.

During the current state analysis phase, key issues within the process and essential requirements for the tool were identified. The proposal phase was then based on this analysis and a conceptual framework gathered from literature on requirements engineering.

The initial proposal provides a rough explanation of the tool content and structure. This proposal was iteratively modified through prototyping and collaboration with support team members throughout the project, culminating in a final validated proposal. Additionally, the benefits and value of the new tool for the case company were highlighted. The implementation of this tool is expected to result in time and cost savings for each stakeholder involved in this process.

Keywords: process improvement, requirements engineering

Tiivistelmä

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Kohdeyritys tunnisti tarpeen tehostaa erään tuotteen tarjous- ja tilausprosessia uuden työkalun avulla, ja siksi tämän opinnäytetyön tavoitteena oli määritellä uuden tarjous- ja tilaustyökalun sisältö tälle tietylle tuotteelle.

Nykytilan analyysivaiheessa tunnistettiin prosessin keskeiset ongelmat ja työkalun olennaisimmat vaatimukset. Ehdotusvaihe perustui tähän analyysiin ja vaatimusmäärittelyn kirjallisuudesta koottuun käsitteelliseen viitekehykseen.

Alustava ehdotus tarjoaa karkean kuvauksen työkalun sisällöstä ja rakenteesta. Tätä ehdotusta muokataan iteratiivisesti prototypoinnin ja tukitiimin jäsenten kanssa tehtävän yhteistyön avulla koko projektin ajan, päätyen lopulliseen ja validoituun ehdotukseen. Lisäksi työn lopussa tuodaan esiin uuden työkalun hyödyt ja arvo kohdeyritykselle. Työkalun käyttöönoton odotetaan tuovan aika- ja kustannussäästöjä kaikille prosessiin osallistuville sidosryhmille.

Avainsanat: prosessikehitys, vaatimusmäärittely

Contents

List of Abbreviations

SM: Supply Manager in the case company. Responsible for managing the product supply projects.

RE: Requirements Engineering

1 Introduction

In today's competitive business environment, the effectiveness of processes is critical to the success of any organization. The ability to streamline processes impacts customer satisfaction and enhances operational efficiency. This thesis focuses on the content definition of a new tendering and ordering tool for the case company product, which would streamline the tendering and ordering processes with aiming to address the specific needs and challenges faced by the organization.

The case company is a large Finnish industrial company, which operates mainly in Europe, North America, Asia, and Australia. The company is offering a wide range of different standardized products and services, as well as specially engineered products designed to meet unique customer needs. The sponsor unit of the case company for this thesis focuses on special product supply projects. The new tool is being developed for a highly project specific product that requires tailored supply, engineering, and pricing procedures, which makes its tendering and ordering processes complex.

1.1 Business Challenge, Objective and Outcome

Due to the specialty of the product, there have been issues in its tendering and ordering processes. It has been identified that there may be room for improvement and streamlining of the entire process. Therefore, the objective of this thesis project is to define the content for a new tendering and ordering tool for this specific product. The content definition will be carried out in full cooperation with the support crew members. This crew, gathered specifically for this project, includes fifteen employees from various functions within the case company. Each of the member have high expertise in this product and is involved in these processes in their daily work. Once the tool content is defined, the external tool developer can proceed with creating the tool. The developer is involved in the early phase of the project but can finalize the tool only after the content is fully defined. Consequently, the outcome of this thesis is the defined content of the tendering and ordering tool.

1.2 Scope and Outline

The scope of the thesis includes defining the tool content as well as some structures and features which are important for the case company. The tool developing, testing, creating the instructions and organizing the implementation and trainings are out of the thesis scope. Those activities are handled by the external tool developer or by the thesis worker outside of the thesis scope later.

The thesis is outlined in six sections in addition to this introduction section. Section two presents the project plan and methods used. Next, the current state of the tendering and ordering processes is described and analysed. Following that, existing literature is studied to understand the requirements engineering methods and tools, and to create a conceptual framework that can be utilized in the proposal building phase. Subsequently, the initial and final proposals are introduced in section five. Finally, the proposal is validated in section six and then the entire thesis is concluded in the seventh section.

2 Project Plan and Methods

This section describes the plan, methods and data sets of the thesis. First, it introduces an overview of the research schedule and then proceeds with explaining research design including the objective, research phases and outcomes of each phase, data sets, and final outcome of the thesis project. Next, this section introduces the content of data sets in more detail and finally ends with explaining risks, and actions needed for mitigating the risks.

2.1 Research Schedule

Figure 1 below presents the schedule of the thesis project. It illustrates the main phases and tasks of the project.

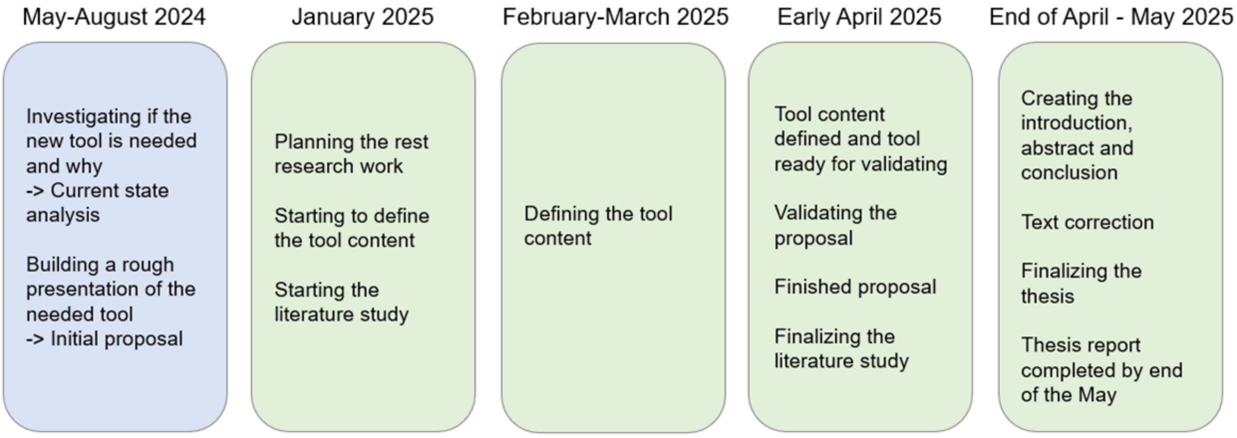

Figure 1. Research schedule

As shown in Figure 1 above, the thesis project schedule is divided into two parts. The first part coloured with blue is in the summer of 2024 for four months, and the second part with green colour is five months from the start of 2025. Scheduling is based on the case company’s wishes and resources, as well as the thesis worker’s own targets. A more detailed schedule, in the form of a Gantt chart, is provided as a separate Excel file for the case company. The chart is used to follow the schedule more closely with other stakeholders, such as the tool sponsor department.

2.2 Research Design

Figure 2 below explains the research design of the thesis project. It shows the data sets, research phases, and outcomes of each phase. In addition, objectives and outcomes of the entire thesis project are illustrated.

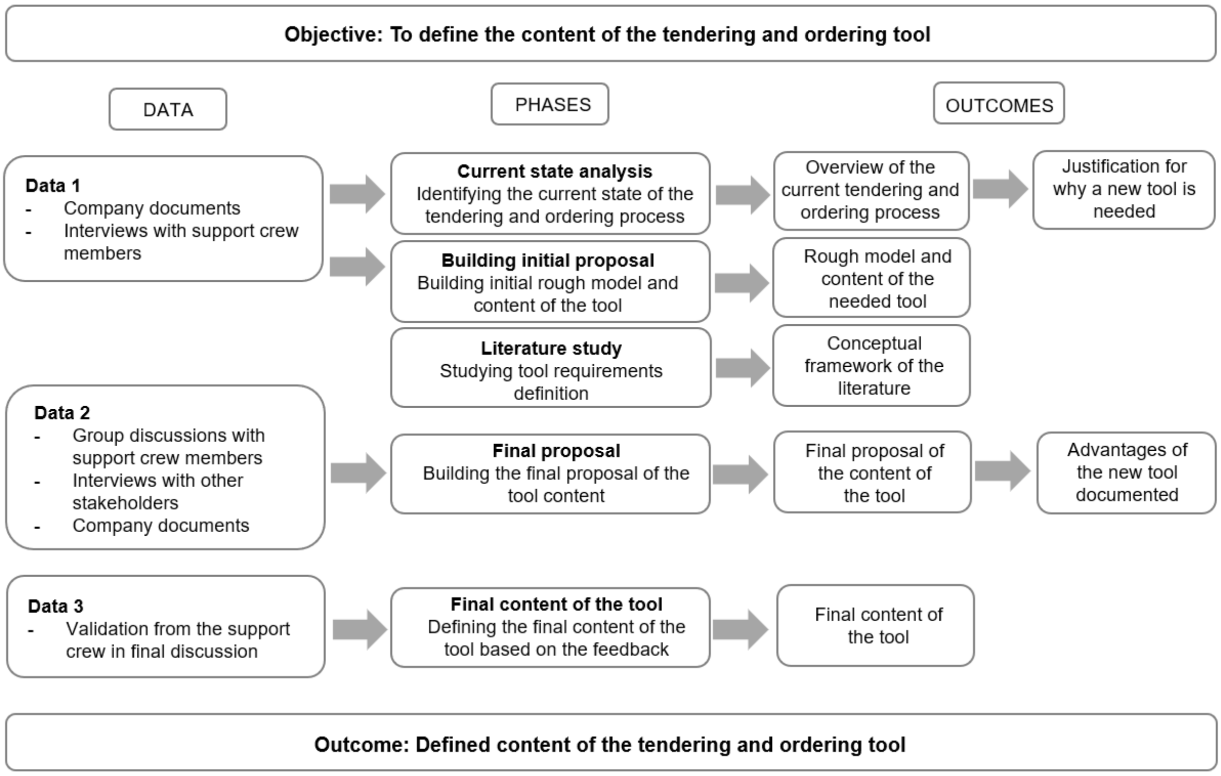

Figure 2. Research design

As shown in Figure 2, the thesis project starts with defining the current state of the tendering and ordering process. The current state analysis is conducted based on some case company documents and interviews with support crew members. In the same interviews also reasons why the new tool is needed, and content wishes for the new tool are gathered. With the help of interview data initial proposal building and current state analysing are possible. An overview of the current tendering and ordering process and justification for the new tool are the outcomes of the current state analysis, while a rough tool model and content of the tool are outcomes from the initial proposal building phase.

After creating the rough model and content of the tool, a literature study is needed for gathering understanding of the engineering requirements and methods in more detail. A conceptual framework is the outcome of this phase, and it will be used for explaining the final proposal later. For the final proposal phase the data set 2 is used as shown in Figure 2. Data 2 includes several group discussions with experts in the field as well as interviews with some other stakeholders and company documents. With the help of this data set, the final proposal of the content of the new tool is created.

Finally, Figure 2 presents Data set 3, which consists of feedback from support crew members gathered in final discussions. This data is utilized to validate the final proposal and make necessary modifications to the tool content if any, ensuring the final content of the tool is correct.

2.3 Data Collection

Below table provides a more detailed description of the data set contents which were first introduced in the Research Design section. The table includes the source, topic, month of data collection, and the documentation method used.

Table 1. Data collection

Data set	Source	Topic	When	Documentation method
Data 1	Case company documents	To understand the product and current process	May-August 2024	-
Data 1	Interviews - 16 one to one interviews with the support crew members	To understand the product and current process, and to gather needed features and content for the new tool.	May-August 2024	Recordings, transcripts, notes
Data 2	Case company documents	To add the needed documents part of the tool and to gather needed product numbers, pictures, and prices	January-April 2025	-
Data 2	Discussions - 66 discussions with 2-7 participants including thesis worker	To find out the needed content of the tool	January-April 2025	Recordings, notes
Data 2	Interviews - 3 group interviews with sales company representatives	To gather feedback of the tool and its content	April 2025	Notes
Data 3	Feedback from the support crew in final discussions	To get validation of the content for final modifications	April 2025	Notes

As explained in Table 1, Data set 1 includes case company internal documents and one to one interviews. The documents are mostly used for gathering understanding of the product and process. The interviews are unstructured as some broad questions are prepared but the interviews are more a discussion based and only the questions which are considered relevant are asked during the interviews. All the interviews are planned based on the position and profession of the interviewee, as the aim of the interviews is to understand the current state of the whole process, why the new tool is needed, and the initial content and structure of the new tool. In addition, the order of the interviews is based on the process flow of the tendering and ordering in the case company.

Data 2 includes as well internal documents and 66 discussions with support crew members and tool developer. Most of the discussions are group discussions with three to seven participants, thus the discussion is very unstructured. Only an agenda is planned for the discussions beforehand by the thesis worker. With the help of these discussions, the content of the tool is gathered as well as the features, structure, integrations, and functionality needed for the tool. The expertise of the support crew is extensively utilized to identify tool requirements, which then enables the creation of a tender and subsequent ordering, ensuring a clearer and easier process for all stakeholders.

The internal document utilized as Data 2, are for instance different installation instructions, quality and engineering documents or other documents. In addition, internal data management system is used to gather these documents as well as to gather component numbers and pictures.

As displayed in Table 1, Data 2 includes also 3 interviews with few sales company representatives, ensuring the value creation for all stakeholders through the product tendering and ordering process. Purpose of these interviews is to present the new tool and gather feedback of the user interface and content of the tool. The tool is then modified based on the feedback.

Finally, the Data set 3 is the feedback received from whole support crew after the tool presentation which is utilized for validating the whole content of the tool and for finalizing the tool. More detailed descriptions of all the interviews and discussions are listed in Appendix 1.

2.4 Risk Analysis

Risk analysis is a critical part of the thesis project as it facilitates early identification, assessment and mitigation of the risks. By addressing potential risks already in the beginning, it is possible to try to minimize the level of the risks throughout the project. In this thesis the level of the risk means the average of the probability and impact of the risk.

Table 2. Risk analysis

Risk	**Probability**	**Impact**	**Level**	**Risk mitigation**
Not able to keep in the schedule	4	4	4,5	Planning, closely following and pushing the activities and schedule
Lack of competence of the tool development and the product	4	4	4	Planning, asking questions and support from support crew
Tool content becomes too broad and complex	4	3	3,5	Constantly focusing only on the needed content, trying to exclude the new suggestions which are not in the scope

In Table 2 above the key risks and their probability, impact, level and mitigation actions are presented and rated on a scale from 1 to 5, with 1 indicating low and 5 indicating high probability, impact or level. As shown in the table, the risk levels are rather high which increases the importance of mitigation actions in early stages of the thesis project. The first risk in table 2 is the risk to not keep in the schedule, which is very likely to happen as the subject is broad and many people are involved which means that there are several opinions and hopes of the tool content. Also, different inputs from support crew members are needed, thus their own workload may prolong the actions needed for this project.

The second risk presented in Table 2 is the lack of competence of thesis worker. Due to the complexity of the product, the tool content may be challenging to understand for thesis worker. In addition, managing tool development project is new for the thesis worker, thus the project flow may not be perfect. Therefore, enough time must be allocated for planning and gathering information from the support crew and internal documents.

The third and final risk identified in the table is that the tool content may become too broad and complex due to the diverse opinions and hopes. If the content becomes too broad, it could result in exceeding the budget allocated for tool creation. To prevent this, it is important to consistently maintain focus on the scope and exclude any extra suggestions which are not relevant enough.

This completes the Project Plan and Methods section. The next section of the thesis focuses on describing and analysing the current state of the tendering and ordering process.

3 Current State Analysis of the Tendering and Ordering Process

This section describes the current state of tendering and ordering process of the case company product. It starts with an overview of the current state analysis stage and data collection used and moves to explain the current state in more detail. It aims to bring out the issues of the process and the impact on the work of various stakeholders. The section ends on a conclusion of the current state of the process and the need for the new tool.

3.1 Overview of the Current State Analysis Stage

The current state analysis was carried out with utilising Data set 1 interviews and internal documents as described earlier. Due to the thesis objective, the current process had to be investigated to identify the challenges which could be then solved with the new tool. Therefore, the current state was analysed based on the points raised in the interviews by the support crew members representing each stage of the process. Each interviewee was asked to describe their own position related to the product tendering or ordering process, how they are handling the process, highlight the challenges, how the new tool would help and what features and content it should have. In addition, other questions were asked based on the interviewees position and discussion flow. Next chapter describes more deeply the results of the interviews, thus the current process.

3.2 Explaining the Current State of the Process

The process of tendering and ordering the company product varies on a case-by-case basis. The product contains different components, parts, and installation tools that are highly project specific. Therefore, each product has unique specification, necessitating significant engineering effort. Additionally, some of these components and tools may be provided by the sales company, case company, or builder, making it crucial to specify responsibilities clearly and at an early stage.

The tendering process of the product typically starts with the sales company requesting the product with submitting a separate entry in final product ordering tool. The product specification may simply only indicate the need for this product during construction, but sometimes additional details are included as well. When the product specification is lacking information, the tendering seeks assistance from engineering. Engineers propose solutions and create tender layout drawings, which are then priced and offered to the sales company during tendering phase. However, the insufficiency of the product specification leads issues later in the order phase because pricing is often inaccurate due to insufficient information about supply scope, required quantities of components, material sourcing country, and component reusability. Addressing these aspects already during tendering phase would enhance efficiency and reduce errors in the product pricing.

Furthermore, during early project phases the lack of product knowledge among the sales company and the case company supply managers (SM) may complicate product sales. If sales company personnel have not previously sold the product, they may hesitate to offer it to customers due to unfamiliarity with the product. To encourage more frequent tendering and ordering of this important product, better product knowledge is essential. If the sales company cannot convincingly present the benefits and content of the product, customers may not make a purchase.

In the ordering phase, SM receives the product order and specification. Because the product specification is always incomplete, SM must investigate the necessary things such as supply scope, component reusability, specification in more detail, installation training need, and builder drawings, which consumes considerable time for supply managers, engineers, and the sales company. Unfortunately, there is no standardized list to guide SMs in checking component scopes systematically. Therefore, supply scope related challenges arise, thus it’s unclear whether certain components are provided by the case company, sales company, or builder. Without a clear checklist, components or tools may be forgotten, leading to issues on the construction site and then impacting schedules and costs. Thus, during the product installation phase, timely availability of materials in construction site is crucial to prevent delays. Customers expect the product to be ready for use at the agreed-upon time, and any delay can impact the entire construction project. To mitigate this risk, decisions related to supply scope and other specifications should be made early enough and documented clearly.

Challenges also arise during layout engineering in the product order phase. Detailed information about the needed solution is necessary for layout engineers. However, the case company often needs to separately request different specifications from the sales company, and initially, the specification may be incomplete or unclear, requiring subsequent layout revisions. Continuously updating the specification extend the process and activities, causing delays and adding stress for engineering teams. Furthermore, layout engineers often must make their own decisions and assumptions because of the incompleteness of the specification. These changes should be documented when they deviate from the sales company specification, but unfortunately, the changes are not always documented, leading to challenges later in the project.

In procurement, challenges arise during the quotation request process (RFQ process). Usually, the procurement team receives information about the product components individually, leading to a fragmented approach where they must create RQFs one by one. However, streamlining this process by providing a list of all required components at once would allow for a single RFQ. Furthermore, suppliers could optimize their preparations by ordering all materials from their own suppliers at once, resulting in cost savings.

3.3 Analysing and Concluding the Current State

As explained above, there are several challenges in the current process that the new tool could potentially address or help mitigate. The most significant challenges are related to incomplete product specifications, including supply scope, component reusability, installation training needs, and builder drawings. These issues can lead to increased time consumption and forgetting of tools or components, which both are negatively affecting the schedule of the full chain project.

In conclusion, the current tendering and ordering processes of the product is encountering several challenges that have a significant impact on the operations of various internal and external stakeholders. Recognizing these challenges, there is a need for a new tendering and ordering tool for the product. The implementation of a new tool would enhance the efficiency of these processes, resulting in time and cost savings for all parties engaged in the tendering and ordering of the product. The next section focuses on describing the literature study and conceptual framework related to tool requirements.

4 Existing Literature on Requirements Engineering

When defining the content for the new tendering and ordering tool, it is crucial to identify the requirements. Therefore, requirements engineering (RE) is an important step in the content definition project to ensure valuable results. This section will discuss RE in more detail and examine the existing literature on the subject. Finally, it will provide a conceptual framework based on the literature, which will be utilized in the final proposal building phase. Although RE is initially intended for software development it is seen valuable to utilize in this tool content definition project.

4.1 Definition and Advantages of Requirements Engineering (RE)

Requirements engineering (RE) is a crucial phase in the software development lifecycle, as it involves comprehending and documenting the needs and demands of users and stakeholders. This process sets the foundation for successful software development, influencing subsequent stages such as design, implementation, testing, operation, and maintenance. RE is iterative process, continuing throughout the lifecycle of the project, aiming to the quality development of the project through determining what the system must perform to satisfy the user needs. (Shams-ul-Arif et al. 2009: 41; Ur Rehman et al. 2013: 40-41; (Fernandes & Machado 2016: 65-67)

4.2 Requirements Engineering Process Models

Shams-ul-Arif et al. (2009: 42-44) and Ur Rehman et al. (2013: 41) discusses four different RE process models: Input/output of RE, linear RE, linear iterative RE, iterative RE and spiral process models. In addition, Fernandes & Machado (2016: 32-42), Young (2003: 74-77) and Crowder & Hoff (2022: 39, 70, 173) discuss the iterative, spiral and waterfall process models.

When gathering requirements, it is important to follow four key stages to ensure effectiveness and achieve good results. These stages include requirement elicitation and development, documentation of requirements, validation and verification of requirements, and requirement management and planning. To successfully complete these activities, the process model and requirements engineering tools can be selected based on available resources, the required lead time, and the type of information. (Ur Rehman et al. 2013: 40-41.) The next chapters present a few of the process models which are seen valuable for this thesis project.

4.2.1 Waterfall Process Model

The waterfall process model focuses a strong emphasis on finishing one stage of development before moving on to the next, thus any changes to requirements must follow a formal change mechanism. The term "waterfall" highlights the irreversibility of progressing from one phase to the next and the associated risks. Moreover, a key characteristic of this model is its high desire to adopt a top-down methodology, moving from the most abstract concepts to the most concrete ones. (Fernandes & Machado 2016: 32-42; Young 2003: 74-76)

The progression between waterfall model’s four phases, analysis, design, implementation and testing, is strictly sequential. During the analysis phase, the system's functionality is specified by identifying various requirements. To guarantee that all stakeholders have a clear understanding of the planned functionality without any misunderstandings, the specification document, which forms the foundation for later phases, should employ implementation-independent notations. (Fernandes & Machado 2016: 32-42)

Once the specification document is completed, the design phase begins, transforming the specification into an architecture. This phase is divided into two steps: architectural design and detailed design. Architectural design involves establishing the system's structure by identifying components and any limitations on their behaviour. This step is often one of the most creative tasks in the development process. Detailed design step then provides information about the components to allow the implementation. The aim of the design phase is to structure the system's architecture.

After the most creative work has been done in the analysis and design phases, the implementation phase is a straightforward, mechanical task. The models created during the design phase are transformed into executable code during this phase. In order to guarantee that every component satisfies its specifications, this procedure involves defining the underlying mechanisms and putting them into practice using the chosen programming language. (Fernandes & Machado 2016: 34-35)

The final phase is testing which has two primary purposes: demonstrating that the system under development meets its expected functions and identifying any defects within the system. The term 'testing' covers a broad range of activities, from unit testing to client validation of the entire software system, known as acceptance testing. To clarify these activities, the terms “validation” and “verification” are used. Verification ensures that the system is built according to specified requirements, which can be done dynamically, by checking the system's run-time behaviour, or statically, by analysing and inspecting system-related documents. Validation, on the other hand, ensures that the system meets the needs and expectations of clients and users. (Fernandes & Machado 2016: 35)

Testing is traditionally carried out only at the end of the waterfall process, when the entire software code is developed. However, nowadays the testing has even its own lifecycle and is done through every phase of the waterfall process. This process is called “V process” which can be seen as a detailed waterfall model. (Fernandes & Machado 2016: 35-37)

The phases of the V process model presented by Fernandes & Machado (2016: 36) are the following: analysis, architectural design, detailed design, implementation, unit testing, component integration testing, system integration testing, and acceptance testing. These phases are very similar to the waterfall model described by Young (2003: 76), who states that the waterfall model would consist of nine phases instead of the four which Fernandes & Machado (2016: 32-42) discussed earlier. The phases are system requirements definition, software requirements analysis, preliminary design, detailed design, code and unit testing, component integration and test, integration test, system test, and delivery and maintenance software. (Young 2003: 76)

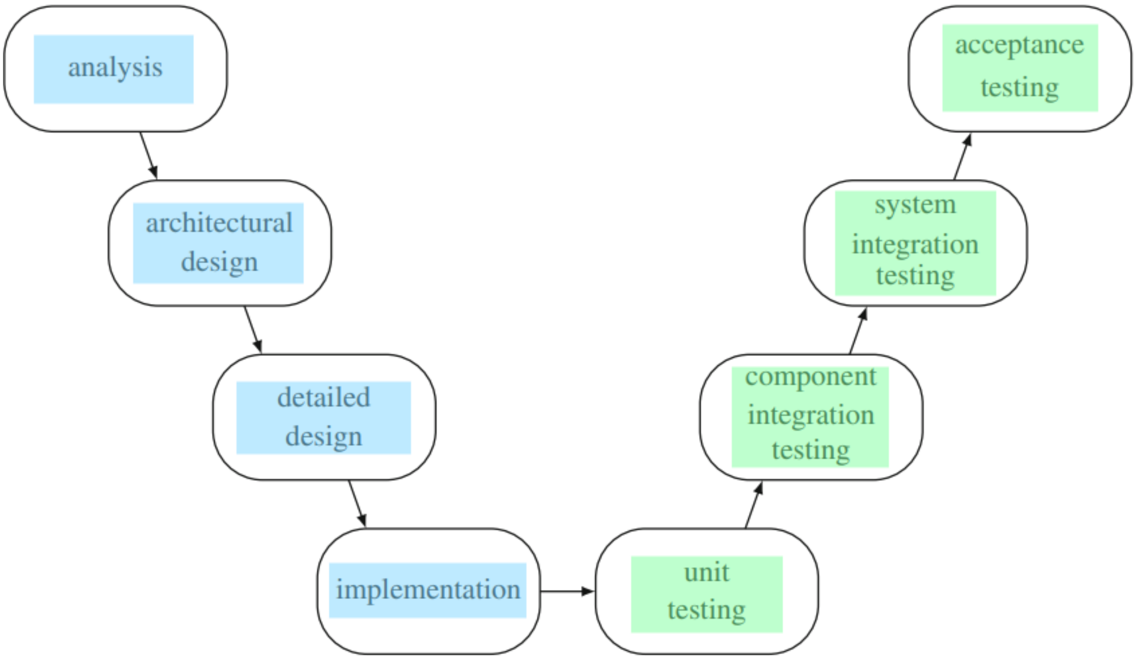

Figure 3. V process model (Fernandes & Machado 2016: 36)

Figure 3 above describes the V process model. It illustrates the process phases from left to right, starting with basic waterfall model phases coloured with light blue and mentioned earlier by Fernandes & Machado (2016: 33). The design phase is separated into two phases, architectural and detailed design phases. Then the light green-coloured phases are each for testing purposes. First the initial stage of testing, known as unit testing, occurs when individual components are developed. The goal of this phase is to ensure each component functions correctly in isolation, based on detailed design decisions. Once components pass unit tests, the next phase is component integration testing, which aims to verify that the interfaces between components behave as expected according to the architectural design. Following this, system integration testing is conducted to confirm that the entire software system meets the requirements specified during the analysis phase. Lastly, acceptance testing is performed in collaboration with users to validate that the system operates according to their expectations and contractual agreements.

In conclusion, the waterfall process model is simple for managers to comprehend because it is based on process models from various fields. Because each phase is characterized by a set of objectives, deliverables, milestones, and functions, the process is very visible and simple to monitor. Since requirements and specifications are determined already at the start, project managers can better determine resource needs and establish schedules. However, the waterfall model has a significant weakness: it does not work well in situations where requirements are not well defined at the beginning of the process, because the model progresses linearly, without revisiting the initial requirements definition phase. (Fernandes & Machado 2016: 32-37; Young 2003: 74-76)

This waterfall process model is very similar to linear requirements engineer process model which Ur Rehman et al. (2013: 41) and Shams-ul-Arif et al. (2009: 43) describe instead of the waterfall process model. The linear requirements engineering process model is primarily designed for controlling small projects with lesser complexity. This model consists of five sequential activities: concept, problem analysis, feasibility and choice of options, analysis and modelling, and requirement documentation. While this simple model is effective for smaller projects, it is not suitable for large and complex projects due to its limitations in handling extensive requirements. (Ur Rehman et al. 2013: 41; Shams-ul-Arif et al. 2009: 43)

4.2.2 Incremental and Iterative Process Model

The incremental and iterative model is based on the waterfall model, thus it has the same phases as in waterfall, but these phases are repeated in several iterations. (Fernandes & Machado 2016: 37-38; Young 2003: 74) In figure 4 below the incremental and iterative process model is illustrated.

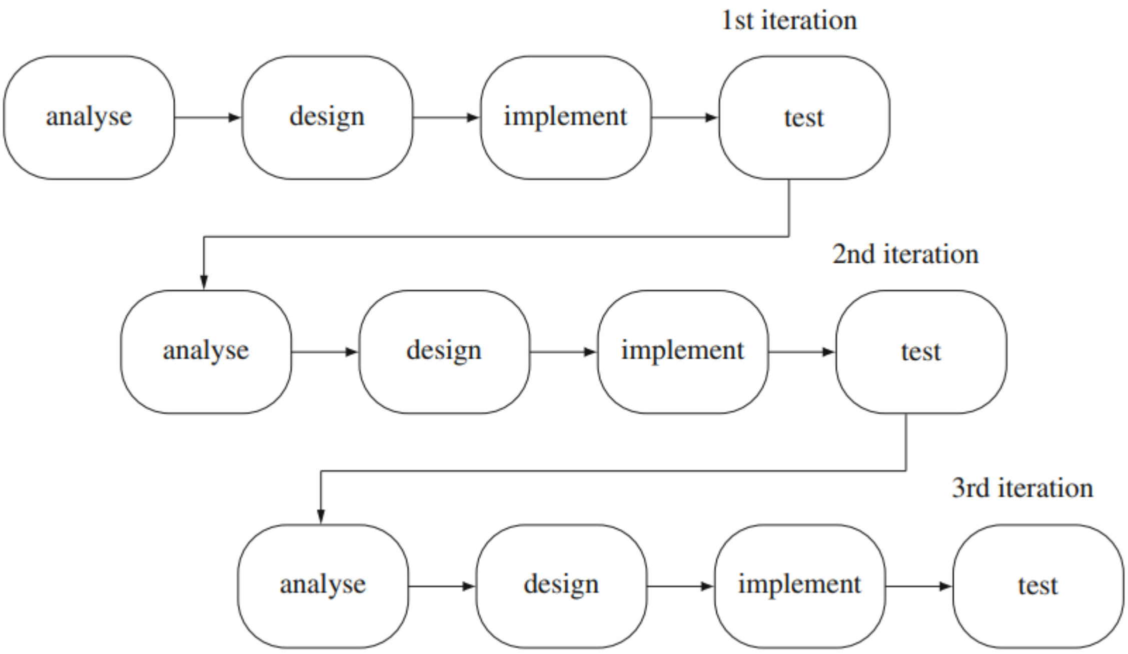

Figure 4. The incremental and iterative process model (Fernandes & Machado 2016: 38)

In figure 4, the phases of waterfall model are placed in linear sequences in stages which are seen as iterations or increments. This process is seen more agile than the waterfall process as there are several opportunities to clarify requirements and develop the project further. (Fernandes & Machado 2016: 37-38; Young 2003: 74)

The incremental and iterative model is based on the idea that modifying an existing item is easier than starting from scratch and that it is easier to design a simple object than a complicated one. The first focus is on integrating the most important and well-understood components rather than building the full system in a single cycle. The system is gradually expanded with new features and functionalities until it is finished. A portion of the system's functionality is represented by each increment. This model utilizes linear development sequences in a phased style, thus adding iterations to the classic waterfall model. (Fernandes & Machado 2016: 37-39)

In a software development project where this process model is in use, the objective is to deliver a new version or release of the system at the end of each iteration. This version or release should be executable, function correctly, and provide value to the customer. Each iteration encompasses all necessary tasks to integrate new functionalities, including analysis, design, implementation, testing, and documentation. At the conclusion of each iteration, the team reassesses the requirements, allowing to find out the needed changes. Additionally, the priority of each requirement can be adjusted. This ongoing re-evaluation ensures that the requirements can be effectively modified throughout the project, thereby enhancing the value for stakeholders. (Fernandes & Machado 2016: 37-39)

However, the incremental and iterative process model also has weaknesses. It can be challenging to manage the project effectively, as it is difficult to determine the stage at which all requirements are fully specified. Additionally, this model may facilitate the pushing of problems to next iterations, rather than addressing them immediately. (Young 2003: 74-76)

4.2.3 Spiral Process Model

Fernandes & Machado (2016: 41-42) state that the spiral process model adopts a risk-driven approach rather than focusing on code or documents. In this context, a risk refers to a potentially adverse circumstance that can negatively impact the development process and the final quality of the system. It measures the uncertainty in achieving objectives or meeting requirements. The spiral model prioritizes identifying and eliminating high-risk problems, and according to Young (2003: 74) it is dividing system development into four fundamental activities: planning, risk analysis, engineering, and evaluation. Within each loop of the spiral, risks are identified and mitigated before proceeding to the engineering phase. Fernandes & Machado (2016: 41) divide the spiral model slightly differently with different terms but still following the same logic: determining objectives, identifying and solving risks, developing and testing, and planning the next iteration. Figure 5 below presents the spiral model of Fernandes & Machado (2016: 41).

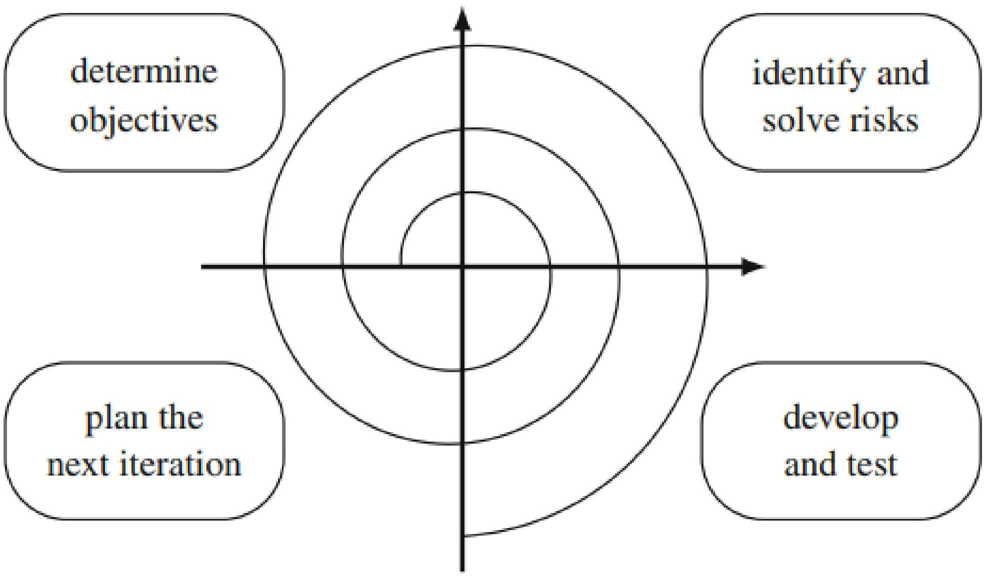

Figure 5. Spiral process model (Fernandes & Machado 2016: 41)

Each cycle of the spiral consists of four main tasks, represented by quadrants in the diagram as seen in figure 5. The radius of the spiral indicates progress in the project, while the angular dimension represents the accumulated cost. In the first phase of the spiral, determining objectives, such as performance, functionality, and ease of modification are determined, along with alternative implementation methods and necessary constraints. The second phase involves evaluating these alternatives against the objectives and constraints, often identifying potential sources of risk through utilizing tools like prototyping, benchmarking, simulation, or questionnaires. The third phase focuses on developing and reviewing the system for the next cycle, following a risk-oriented strategy. Finally, the fourth phase reviews the results and plans the next spiral cycle, if applicable.

According to Shams-ul-Arif et al. (2009: 44) and Ur Rehman et al. (2013: 41) the spiral model effectively handles risks that can increase project costs and compromise quality, such as specification delays, requirements changes, and low return on investment. By addressing these risks, the model aims to prevent negative effects on the project's cost, schedule, and quality. However, the spiral model also has a weakness according to Young (2003: 74). It lacks clear procedural guidelines for identifying objectives, constraints, and alternatives.

4.3 Tools for Requirements Engineering

The other main element in requirements engineering is the utilization of tools for finding out the requirements. The tools are such as interview, survey, task analysis, group-work, card sorting, prototyping, and repository grids. These tools are usually used together so that complete requirements are find out. (Shams-ul-Arif et al. 2009: 41; Ur Rehman et al. 2013: 41) Also Fernandes & Machado (2016: 67-73) highlight the prototyping, surveys and interviews as well as manuals, reports, focus groups, scenarios, and goal modelling as the tools for requirements engineering. The chapter below focuses on describing only the most relevant tools for this thesis project which are interviews, and prototyping.

4.3.1 Interviews

According to Fernandes & Machado (2016: 95-96) interviews are a well-known tool used for gathering requirements from various stakeholders. When starting to conduct an interview, it is important to first identify who are the interviewees, which usually are at least the customers and future users of the system. Then the interview should be carefully prepared before conducting and concluding it.

The interview can be prepared to be for instance structured or unstructured interview. Mueller & Segal (2015: 1) state that the unstructured interview is a conversation that flows naturally between the interviewer and the interviewee. The interviewer has not predetermined guidelines for the questions or level of discussion, thus there are several opportunities to collect broad information of the interviewee's experiences. As opposed to the unstructured interview, the structured interview which follows a set of standardized questions in a consistent order.

4.3.2 Prototyping

Fernandes & Machado (2016: 106-108) claim that prototyping is a reasonable tool choice for gathering system requirements when the details of how the system should work are not known by the customer. According to Camburn et al. (2017: 1) and Fernandes & Machado (2016: 107) prototyping means creation of a representation of the system or part of it before implementation. It is an easy way to present the system in production to the stakeholders and modify severally according to the feedback.

Prototyping needs to be conducted iteratively, first gathering the requirements, then creating or updating the prototype and then testing and validating it before proceeding again with the first step. After the iterations, the prototypes are typically abandoned and actual system development started as soon as it seems that the client's requirements are understood. (Fernandes & Machado 2016: 106-108)

4.4 Conceptual Framework

The existing literature studied earlier in chapter 3 concludes that requirement engineering is a highly important step in various software and system development project to create maximum value for stakeholders. The existing literature is summarized into the conceptual framework in Table 3 below.

Table 3. Conceptual framework

Addressed topic from literature	Reference in section	How is the literature source used?
Overview of the requirements engineering	3 Literature study 3.1 Definition and Advantages of Requirements Engineering (RE)	To explain the basis of the subject
Waterfall process model	3.2.1 Waterfall Process Model	To understand the RE process models and choose the most suitable model for the thesis
Incremental and iterative process model	3.2.2 Incremental and Iterative Process Model	To understand the RE process models and choose the most suitable model for the thesis
Spiral process model	3.2.3 Spiral Process Model	To understand the RE process models and choose the most suitable model for the thesis
Interviews	3.3.1 Interviews	To understand the utilized RE tool
Prototyping	3.3.2 Prototyping	To understand the utilized RE tool

As shown in Table 3 above, the conceptual framework consists of six topics from the literature study, which are the overview of the requirements engineering, waterfall, incremental and iterative, and spiral process model, as well as RE tools: interviews and prototyping. All the literature has been studied to facilitate the thesis proposal, as the requirement engineering plays a significant role in the thesis subject and objective. Therefore, this conceptual framework is utilized later on in the final proposal building phase.

This completes the Literature Study section. The next chapter will further explain how the new tool would help to solve the challenges identified during the current state analysis along with the explanation of the initial and final proposals where the conceptual framework is utilized.

5 Building the Proposal to Define Content for the New Tendering and Ordering Tool

The objective of this thesis is to define the content for a new tendering and ordering tool. This section explains both the initial and final proposals for the tool's content. It begins with an overview of the proposal building stage and then explains the advantages of implementing the new tool for the case company. Next, the initial proposal is presented in detail, which acts as an input for the external tool developer, and as a base for the thesis worker to define the tool content in more detail. Finally, the chapter concludes with an explanation of the final proposal supported by the conceptual framework.

5.1 Overview of the Proposal Building Stage and Data Sets

In this section, first Data set 1 is utilized again to conclude all the advantages for the case company of implementing the new tool. Following that, the initial proposal is created based on Data set 1 and presented in written form. Lastly, the final proposal is developed based on Data set 2 with utilizing conceptual framework as well. The initial proposal serves as the foundation for the final proposal, and it is iteratively refined throughout the project to culminate in the final proposal. Thus, each discussion of the data set 2 discusses of the tool and its content, features and structure in an iterative way. The discussions vary, some focus on specific small details within the content, while others address broader structural elements or needed features.

5.2 Advantages of Implementing the New Tool

This tool would facilitate defining the product specifications, component reusability, installation training need, and supply scope and thus impacting positively on the product tendering and ordering process, benefiting most stakeholders. The tool would provide a structured form for all needed product related details, divided in two parts: tendering and ordering. During the tendering phase, the tool could present a set of clear questions for the case company to seek answers from the sales company. The sales company could fill out the tendering phase part of the form, and if they lack a clear understanding of the product, the tool could offer visual aids such as photos and links to relevant information. This would enhance sales company's comprehension of the product they are offering and ordering for the customer. With complete information in the tool, tendering team could create more precise and efficient tenders. Later in the order phase it is also easy for SM to identify what items are already considered in the tender phase.

Accurate pricing during tendering is crucial because, during the order phase, the case company cannot necessarily request additional funds, and some specifications cannot be changed anymore. To obtain accurate pricing, it is also important to address the component reusability aspect already during the tendering phase. This is particularly important given the high cost associated with some components.

Once the sales company places the order, they would fill in the order phase part of the form and when it is completed, all the needed information is clearly documented. Clear documentation ensures that everyone understands the order specifications, quantities, and responsibilities. A well-defined product specification streamlines subsequent tasks, including for instance layout design, engineering, supply management, and procurement. Supply managers don't need to spend excessive time investigating all the necessary details when the sales company fills the form themselves. For layout engineers, it is also more convenient and timesaving to create layout drawings when all necessary information is readily available. This minimizes the need for additional clarifications which prolong activities and reduces the amount of needed layout revisions. In addition, if there will be any changes to the order, it is easy to create a new revision of the form and supply managers are able to follow the changes. Also finally, it is affecting procurement as suppliers benefit from knowing all requirements early, allowing them to plan better and schedule lead times effectively.

5.3 Initial Proposal of the Content of the New Tool

This explanation of the content assumes that the tool will be an Excel form. The purpose of this explanation is to provide an understanding and an overview of the tool and its contents.

The tool is meant for tendering and ordering the product, and it is divided into two sections based on this purpose. While the tool is designed for a single product, if a project involves multiple same products, the sales company should complete as many of these tool forms as necessary. The primary objective is to create a user-friendly tool that slightly guides the sales company’s choices and provides helpful information. This tool functions similarly to order forms used by the case company for other products, and the sales company should fill it in two phases: during the tendering phase and then during the ordering phase. The information required during the tender phase will be color-coded differently from the information needed during the ordering phase. However, it is highly recommended to fill all the information known already in the tendering phase even it is not required.

The process involves sending the form to the sales company by the case company. The sales company can fill out the form and upload it to the data management system. This approach streamlines the specification review process for the case company as the information is always complete and in a clear format. If revisions are necessary, creating a copy of the initial tool version allows the sales company to update it, and the new version can be uploaded to the data management system. These versions allow easy comparison by the SM to track any changes made, ensuring proper documentation throughout the process. In addition, the tool could include some comparison feature which would make the process even easier.

The tool would include seven sheets in one Excel file, such as “Instructions”, “Main sheet”, “Builder drawings”, “Installation training info”, “Logistics plan”, “Reusability info”, and one sheet for product installation plan. The “Instructions” sheet is the first sheet the sales company should go through. It outlines the proper usage of the tool and includes links to relevant information about the product, especially for the sales companies who may not be familiar with the product. The “Main sheet” should be filled next by the sales company by starting with entering essential project data, including for example the project name and numbers. The above-mentioned basic information is colour coded with blue, thus the information needs to be filled in the tendering phase.

After this basic information, the tool provides a list of components needed in the product installation or use. Each component requires a specification, supply scope definition, or reusability selection which all have own columns. Components in the list are color-coded: blue for tendering phase and red for ordering phase information.

The specification column cells would have a dropdown list or a free-text field for the sales company’s specifications. The supply scope column would consist of three sub columns: “Case company”, “Sales company”, and “Builder”. The sales company can select and check the appropriate option for supplying the component. Initially, these sub columns would have default values on how the supplying usually goes. The “Reusability” column would have also dropdown lists with options for “Yes” or “No”. If FL wants further information on reusability, they can refer to the “Reusability info” sheet. The “Pictures” column would display images of individual components. On the right side of that column would be an image of the entire product and arrows from the component pictures to the whole product, so that it is easy for the sales company and SM to understand what the components are. In addition to these columns shown in the above table, there could be two columns, “Optional costs” and “Supply notes”. “Optional costs” would have information regarding the costs if the component is supplied by the case company. The “Supply notes” column would allow supply managers to add their own comments and notes to the sheet.

The fourth part of the “Main sheet” would be about the need for installation training and it is needed to fill in the ordering phase. If the sales company has not previously installed the product, they can select the training package that suits their needs. For that, there would be a list of available training packages and checkboxes for choosing one of them. In addition, the sales company could seek more detailed information about the packages and prices from the sheet “Installation training info”.

After the installation training part, in the “Main sheet” would be additional questions for the sales company. The tool clarifies whether, in projects with multiple products, the sales company prefers those components to be painted in different colours, thus it would be easier to handle the materials at the construction site. Additionally, there would be a question if the sales company is open to engineers adjusting the specifications if a more effective approach is identified. These two above-mentioned questions are for the ordering phase. Lastly, there is a question for the tendering phase about the country of origin of the components, and if the sales company has any preferences in this regard, they can contact the SM of the project.

The “Builder drawings” sheet contains details regarding the specific type of builder drawings or images that the case company requires in the ordering phase. The sales company should provide the corresponding document links to these drawings or pictures on the sheet. On the product installation plan sheet for the ordering phase, there are two possible approaches. First, the sheet could include a standardized template and instructions for the product installation plan, facilitating the sales company’s creation of the plan and ensuring the case company’s understanding of it. Alternatively, the sales company could simply add a link to product installation plan on the sheet, directing to a separate file they have created within the data management system.

The “Logistics plan” sheet for the ordering phase would include questions related to logistics. The tool could have a feature which takes all the components from the “Main sheet” which are set for the case company scope and paste those to “Logistics plan” sheet. Thus, in this sheet the sales company could specify the logistic issues for the components which the case company will deliver. For instance, there could be a question if the sales company has any site-specific issues that the case company needs to consider, as well as if there is a need for specifying the material package locations on the site.

Finally, the “Reusability info” sheet provides an explanation of what reusability means with the product, outlines available options, and may include relevant links for additional details. The tool could have a feature which takes all the components from the “Main sheet” which the sales company has chosen to reuse later in the product lifecycle and paste those to “Reusability info” sheet. Thus, on this sheet SM could easily look through the components and make sure that those are not ordered twice in a later phase of the project.

5.4 Final Proposal of the Content of the New Tool

Based on Data set 2 and the outcomes of phases related to Data set 1, the final proposal is created. The volume of discussions surrounding Data set 2 was substantial, but necessary to determine the precise details, features, structures and presentation methods for the tool content. It was not seen important to delve deeper into the discussion contents, as all discussions were iterative and complex, involving considerable back-and-forth deliberation and debate among the support crew members.

The discussions initially centred around the initial proposal, which was iteratively reviewed, making significant additions, removals, and changes. Additionally, the external tool developer was involved from the beginning of the final proposal development stage, participating in a few discussions, particularly those concerning the technical aspects of the tool, although these are out of the scope of this thesis.

The conceptual framework was also employed at this stage, leveraging requirements engineering knowledge. The most beneficial components were the incremental and iterative process model, along with interviews and prototyping as RE tools, which were utilized during the proposal building phase. The tool developer began creating prototypes at the start of the final proposal stage, and these prototypes served as the basis for several discussions. They were iteratively refined throughout the final proposal stage, in accordance with the conceptual framework's guidelines. In addition, parts of the incremental and iterative and waterfall process models were utilized in this stage. Upon the conclusion of all discussions, the final proposal was completed and is presented below in written format.

The final proposal is divided into two tools: one for the sales company and one for the case company. The content, structure, and features of the sales company tool fall entirely within the scope of this thesis. However, the case company tool, primarily a pricing tool for the product, is mainly within the tool developer's scope due to its technical complexity. The sales company tool operates on the same principles and with same process as the initial proposal, but the case company tool is a nearly entirely new addition after the initial proposal. All the details in both these tools are provided to the case company but are not deemed necessary to describe in this thesis, as the details are specific and include a lot of professional terms of this industry. Thus, only overviews of the tools are presented below.

5.4.1 Sales Company Tool

This tool, or more an order form, is meant for tendering and ordering the product. It is only for one product, thus if the project includes several products, the company should fill as many forms as needed. It aims to collect all the needed information from the sales company of the product needed, thus, the idea is that the sales company representative fills a part of this form first in the tendering phase of the project and then the rest of the form in the ordering phase.

The form includes eight sheets, beginning with the “Instructions” sheet, which outlines the tool and its usage guidelines. Next, the “Main Sheet” contains essential project data such as the project name and numbers, along with basic product specifications. The next section of this sheet presents the product-specific components and their scope, providing information to the sales company through document links and images. Subsequently, the next section presents the optional components of the product, including component numbers, options, and related documents. In this section, the case company can decide whether they require these optional components and select the specific types they need. The following section addresses reusability, allowing the case company to choose whether to reuse certain components later in the product lifecycle or only during the installation phase. This sheet concludes with additional questions and remarks sections, where the case company can specify any special requests. This whole sheet should be filled in the tendering phase.

The next sheet, “Tool information”, acts only as an informative package for the sales company, detailing all the important tools and accessories required for the product installation. The sales company can then order these items from another organization within the case company or supply them locally.

The fourth sheet is for one specific component of the product, providing relevant information, pictures and document links for the sales company. In this sheet, the sales company should specify the location of these components and provide required drawing links, and it should be filled during the ordering phase.

The fifth sheet contains information of the product installation procedure and guidelines, along with instructions for the next two sheets. These sheets should be used only by the sales company representatives who have enough competence in the product installation methods and have some requirements for the installation. The sixth sheet serves as an example of how the template in the seventh sheet should be completed. Both the sixth and seventh sheets are intended for installation planning and include also instructions and informative images. The template on the seventh sheet should be filled out during the ordering phase.

The final sheet, titled “Installation Training”, provides information on the installation trainings and packages offered by the case company to the sales company. The sales company should select their preferred package in this sheet during the tendering phase.

The idea of this order form is that the case company can upload the information straight from this sales company form to the case company tool, which is presented in the next subchapter.

5.4.2 Case Company Tool

As mentioned earlier, the tool for the case company is highly complex and technical and partly integrated to the internal pricing tool. Therefore, this thesis only describes the main content and working principles of the tool which are on the thesis scope. The main sheet of the tool includes the basic specifications of the product, and the optional components needed, which are uploaded directly from the sales company form. The tool then automatically generates a more detailed specification of the components and provides pricing for the product. This component specification can be modified by the tender specialist, if necessary, with prices updating automatically accordingly. The final prices are calculated based on two different pricing strategies, from which the tender specialist can select. All components, component numbers, and some of the prices required for the tender are defined during the thesis project, along with the necessary elements to create a tender letter.

The tender letter can be sent to the sales company when the tender is ready. It includes the basic specifications of the product, freight and engineering costs, reused components, links to relevant documents and component numbers, and a scope document that outlines the responsibilities for providing each component. This ends the tool content explanation and the proposal chapter. The next chapter will further explain how the new tool content was validated in the thesis project.

6 Validating the Final Proposal of the Content of the New Tool

In this chapter, the validation process of the final proposal is shortly explained. The validation was conducted during the final discussions with the experts as the volume of discussions surrounding Data set 2 was substantial. Thus, the Data set 3 included the final discussions with the support crew members regarding the tool content. The consensus among field experts was that the final proposal presented in the previous chapter is correct and sufficient.

At the end of the whole project when the final tools are ready, those will be tested and validated with a test case and in a presentation event, but it is out of the thesis scope. The following section concludes and evaluates the whole thesis project.

7 Conclusion

In this section, the thesis project is put together first by summarizing it and next evaluating its validity, reliability and credibility. In the last subchapter, the thesis is finalized with closing words.

7.1 Executive Summary

The case company identified a business challenge related to the inefficiency of the tendering and ordering process for their product. Consequently, the objective of this thesis was to define the content for a new tendering and ordering tool, which was seen to enhance the effectiveness of the process. To achieve this objective, the thesis began with project planning, followed by the current state analysis. Subsequently, a review of relevant literature and the development of a conceptual framework were completed, and finally the initial and final proposals were formulated and validated.

The current state of the tendering and ordering process was described and analysed, mainly based on the interviews with the support crew. Following that, the literature study reviewed requirements engineering process models and tools, gathering them into the conceptual framework. These were deemed highly beneficial for this thesis, as the objective was to define the requirements for the new tool.

The proposal building phase consisted of initial and final proposals, along with presenting the advantages these proposals could offer to the case company. The initial proposal was created based on the first set of interviews. The final proposal was developed by iteratively modifying the initial proposal through several discussions with support crew members and by referencing the conceptual framework. The final proposal was then validated by a portion of the support crew members, resulting in the defined content for the new tendering and ordering tool.

The new tool will help enhance the tendering and ordering process for the case company's product, resulting in time and cost savings for the company. It will help streamline the entire process and positively impact all stakeholders involved.

7.2 Self-Evaluation of the Project

Project planning was a crucial aspect of the thesis work. However, it was a wise decision not to schedule it too precisely due to the complexity of the topic, which necessitated extensive discussions with various individuals. Additionally, numerous iterations and considerable back-and-forth deliberation were required throughout the project.

The validity of the thesis was ensured by strictly following the research design and project plan, and by following each suggestion of the support crew members. The entire content for the tool was gathered from support crew members who possess strong expertise in the product. This approach guaranteed that the tool's content was both correct and accurate.

Preparing for interviews and discussions and using appropriate data-gathering techniques and following careful documentation procedures, such as note-taking and recording, helped ensure credibility. The credibility was further enhanced by combining information from various sources to develop a conceptual framework. Clearly marked source references also increased the transparency of the thesis. Additionally, the substantial volume of discussions increased both credibility and validity.

Reflecting on the project, although the end result is deemed correct, the journey could have been more efficient. Clarifying the tool content further before involving the tool developer would have saved the developer's time. Additionally, the project was significantly larger and more time-consuming than initially estimated, leading to scheduling and estimating issues of the discussions needed.

In addition, the thesis worker's product knowledge and competence were quite limited. If the thesis worker had possessed more knowledge, the project would have been more efficient, as fewer clarifications and misunderstandings would have occurred. However, this limitation only affected the speed of the process, not the quality, as the support crew members consistently provided answers and expertise, enabling the correct final proposal.

7.3 Closing Words

The thesis has highlighted the importance of evaluating existing processes to identify opportunities for improvement. By implementing changes and incorporating new tools, it is possible to achieve significant time and cost savings. Ultimately, enhancing these processes enables the company to work more efficiently towards its goals and succeed in the markets.

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Appendix 1: Detailed Data Collection

Table 4 below contains all the interviews and discussions arranged during the thesis project.

Table 4. Detailed Data Collection

Participants	Discussion type	Topic	Date	Duration (min)	Documentation
Data 1					
Offering Manager	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	28.5.2024	60	Recording, transcript
Senior Tender Specialist	Unstructured interview	Tendering process of the product, need for the new tool, content of the new tool	29.5.2024	60	Recording, transcript
Senior Engineer	Unstructured interview	Tendering process of the product, need for the new tool, content of the new tool	30.5.2024	20	Recording, transcript
Supply Manager	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	4.6.2024	60	Recording, transcript
Project Chief Engineer	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	4.6.2024	60	Recording, transcript
Senior Engineer	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	5.6.2024	40	Recording, transcript
Supply Manager	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	6.6.2024	40	Recording, transcript
Product Owner	Discussion	Product features	6.6.2024	60	Recording, notes

Senior Tender Specialist	Unstructured interview	Tendering process of the product, need for the new tool, content of the new tool	10.6.2024	60	Recording, transcript
Installation Development Manager	Unstructured interview	Tendering process of the product, need for the new tool, content of the new tool	10.6.2024	40	Recording, transcript
Senior Engineer	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	13.6.2024	15	Recording, transcript
Senior Engineer	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	13.6.2024	20	Recording, transcript
Engineer	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	17.6.2024	30	Recording, transcript
Quality Manager	Unstructured interview	Tendering and ordering process of the product, need for the new tool, content of the new tool	17.6.2024	40	Recording, transcript
Procurement Manager	Unstructured interview	Ordering process of the product, need for the new tool, content of the new tool	19.6.2024	45	Recording, transcript
Technical Documentation Expert	Discussion	Need for the new tool, content of the new tool	24.6.2024	70	Recording, transcript
Case Company Thesis Supervisor, Support Crew members	Presentation and discussion	Presenting the rough model of the tool and justification for the new tool	20.8.2024	60	Notes
Offering Manager	Presentation and discussion	Presenting the rough model of the tool and justification for the new tool	23.8.2024	30	Notes
Data 2 & 3					
Senior Tender Specialists, Tool Developer	Discussion	Tool content	8.1.2025	75	Recording, notes
Product Owner, Tool Developer	Discussion	Tool content	9.1.2025	60	Recording, notes

Installation Development Manager, Tool Developer	Discussion	Tool content	10.1.2025	20	Recording, notes
Pricing Engineer, Tool Developer	Discussion	Tool integrations	13.1.2025	30	Notes
Installation Development Manager, Tool Developer	Presentation and discussion	Tool content	16.1.2025	50	Recording, notes
Senior Tender Specialists, Tool Developer	Discussion	Tool content	16.1.2025	30	Recording, notes
Senior Tender Specialists, Senior Solution Engineer	Discussion	Tool content	20.1.2025	80	Recording, notes
Senior Tender Specialists, Tool Developer, Pricing Engineers	Discussion	Tool integrations	21.1.2025	30	Notes
Senior Tender Specialist, Tool Developer	Discussion	Tool content	27.1.2025	30	Notes
Four Senior Engineers, Project Chief Engineer	Discussion	Tool content	28.1.2025	90	Recording, notes
Senior Tender Specialists, Senior Solution Engineer, Tool Developer	Discussion	Tool content	30.1.2025	60	Recording, notes
Senior Tender Specialist, Tool Developer	Discussion	Tool content	31.1.2025	20	Notes
Project Chief Engineer, Senior Engineer, Product Owner, Tool Developer	Discussion	Tool content	7.2.2025	70	Notes

Senior Tender Specialist, Tool Developer, Pricing Engineer, Senior Solution Engineer	Discussion	Tool integrations	10.2.2025	40	Notes
Senior Tender Specialists, Tool Developer	Discussion	Tool content	14.2.2025	60	Notes
Project Chief Engineer, Senior Engineer, Product Owner, Tool Developer	Discussion	Tool content	14.2.2025	70	Notes
Supply Managers, Tool Developer	Discussion	Tool content	17.2.2025	60	Notes
Project Chief Engineer	Discussion	Tool content	21.2.2025	45	Notes
Case Company Thesis Supervisor, Offering Manager	Presentation and discussion	Tool content, tool project status	24.2.2025	30	Notes
Senior Engineer	Discussion	Tool content	24.2.2025	30	Notes
Two Logistics Specialists	Discussion	Tool content	24.2.2025	20	Notes
Senior Tender Specialist, Product Owner, two Senior Engineers	Discussion	Tool content	25.2.2025	70	Notes
Logistics Manager	Discussion	Tool content	26.2.2025	20	Notes
Senior Tender Specialist, Product Owner, Senior Engineer	Discussion	Tool content	27.2.2025	80	Notes
Senior Engineer, Tool Developer	Discussion	Tool integrations	3.3.2025	30	Notes

Installation Development Manager, Senior Tender Specialist	Discussion	Tool content	3.3.2025	30	Notes
Senior Tender Specialist	Discussion	Tool content	4.3.2025	30	Notes
Case Company Thesis Supervisor, Offering Manager	Presentation and discussion	Tool content, tool project status	4.3.2025	30	Notes
Installation Development Manager, Senior Tender Specialist	Discussion	Tool content	5.3.2025	30	Notes
Two Logistics Specialists	Discussion	Tool content	5.3.2025	20	Notes
Senior Tender Specialist, Tool Developer	Discussion	Tool content	6.3.2025	60	Notes
Senior Engineer	Discussion	Tool content	10.3.2025	30	Notes
Installation Development Manager, Senior Tender Specialist	Discussion	Tool content	10.3.2025	40	Notes
Case Company Thesis Supervisor, Offering Manager	Discussion	Tool content, tool project status	11.3.2025	20	Notes
Senior Tender Specialist, Tool Developer, Pricing Engineer	Discussion	Tool integrations	13.3.2025	50	Notes
Product Owner, Offering Manager	Discussion	Tool content, tool project status	21.3.2025	30	Notes
Installation Development Manager	Discussion	Tool content	25.3.2025	15	Notes
Product Owner	Discussion	Tool content	3.4.2025	45	Notes

Product Owner, Senior Tender Specialist, Tool Developer	Discussion	Tool content, tool integrations	4.4.2025	45	Notes
Pricing Engineer, Tool Developer	Discussion	Tool integrations	7.4.2025	40	Notes
Sales company personnel	Discussion	Tool content and appearance	8.4.2025	40	Notes
Sales company personnel	Discussion	Tool content and appearance	8.4.2025	40	Notes
Sales company personnel	Discussion	Tool content and appearance	8.4.2025	40	Notes
Senior Layout Engineers	Discussion	Tool content	14.4.2025	30	Notes
Tool Developer, Senior Tender Specialist, Product Owner	Discussion	Tool content	16.4.2025	75	Notes
Tool Developer, Senior Tender Specialist, Product Owner	Discussion	Tool content and integrations	17.4.2025	60	Notes
Tool Developer, Senior Tender Specialist, Product Owner, Pricing Engineer	Discussion	Tool integrations	23.4.2025	60	Notes