Human-Centered Development of the User Experience of a Digital Sales Tool for Entrance Solutions

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ASSA ABLOY

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Abstract

As the digital work environment is growing, the demands of usability and accessibility must be met with increasingly higher standards. This project was performed in collaboration with Assa Abloy Entrance Systems, a global provider of automatic entrances. The project purpose was to evaluate and develop the user experience and usability of a sales tool by mapping and understanding the users and their needs. This sales tool focuses on generating quotes for Assa Abloy Entrane Systems. By outsourcing the quotes from internal users to external users the efficiency in the organization would increase and the workload for the internal users would decrease.

To achieve the project purpose a human-centered design approach was followed throughout the project to ensure a good work environment with proper usability when generating quotes. The users of the sales tool were identified through interviews and the target group was determined. The user experience of the current sales tool was analyzed through a heuristic evaluation and observations of the users. A project definition with a needs analysis was created to focus the scope of the project. Concepts were generated, tested and refined in three iterations to create an interface that fulfilled the project purpose.

According to the results, the project definition and all identified user needs were fulfilled by the proposed design. The project purpose of increasing the user experience and usability was therefore accomplished. From the results it was concluded that through a human-centered design approach, users experienced the program to be easy to use and felt more confident in generating their own quotes. If the final concept would be implemented and adopted, efficiency would increase since the external users would more confidently create accurate quotes without the assistance from internal users at Assa Abloy Entrance Systems.

Keywords: Assa Abloy Entrance Systems, User Experience Design, Human-Centered Design, Usability, Digital Work Environment

Sammanfattning

I takt med att den digitala arbetsmiljön växer måste kraven på användbarhet och tillgänglighet tillgodoses. Detta projekt genomfördes i samarbete med Assa Abloy Entrance Systems som är en global leverantör av automatiska entrélösningar. Projektets syfte var att utvärdera och utveckla användarupplevelsen och användbarheten av ett försäljningsverktyg genom att kartlägga och förstå användarna och deras behov. I försäljningsverktyget kan offerter för Assa Abloy Entrance Systems genereras. Genom att möjliggöra för externa användare att självständigt skapa offerter minskar arbetsbelastningen för de interna användarna och effektiviteten i organisationen ökar.

För att uppnå projektets syfte, att säkerställa en bra användarupplevelse och användbarhet vid skapandet av offerter, följdes en människocentrerad designprocess. Användarna av säljverktyget identifierades genom intervjuer och målgruppen bestämdes. Användarupplevelsen av det nuvarande försäljningsverktyget analyserades genom en heuristisk utvärdering och observationer av användarna. En projektdefinition med en behovsanalys skapades för att fokusera projektets omfattning. Koncept genererades, testades och förfinades i tre iterationer för att skapa ett gränssnitt som uppfyllde projektets syfte.

Enligt resultaten var projektdefinitionen och alla identifierade användarbehov uppfyllda av den framtagna lösningen. Projektets syfte att öka användarupplevelsen och användbarheten var därför uppfyllt. Från resultaten drogs slutsatsen att genom en människocentrerad designprocess upplevde användarna att programmet var lätt att använda och de kände sig mer självsäkra i att skapa offerter. Vid implementering av det slutgiltiga konceptet skulle effektiviteten i organisationen öka eftersom de externa användarna självständigt kan skapa offerter utan hjälp av interna användare vid Assa Abloy Entrance Systems.

Nyckelord: Assa Abloy Entrance Systems, Användarcentrerad Design, Människocentrerad Design, Användbarhet, Digital Arbetsmiljö

Acknowledgments

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1 Introduction

Digitalization has affected the condition in working life since business areas, work tasks and the requirement of competence and work organization has changed fundamentally. As the work environment is increasingly becoming a digital work environment the cognitive overload has increased significantly (Swedish Work Environment Authority, 2018). This means that the brain is working with too many impressions at the same time, which can lead to stress and the feeling of not being in control of the work tasks. If the full potential of new technology in working life is to be exploited, the demands on usability, accessibility and a good working environment has to be increased.

Human centered design is an approach aiming to make interactive systems usable and useful (ISO, 2010). By adapting the systems to the user the overall human well-being is improved and it emendates the efficiency and effectiveness. With a human centered design approach possible negative effects on human health, safety and performance can be counteracted. The approach to design and development is also creating a substantial economic and social benefit, leading to successful systems. For example, when a system is usable, the costs for support and help-desk are reduced.

According to ISO 9241-210 the systems using a human-centered design approach can improve quality for example, by:

- Increase productivity, both on individual and organizational levels
- Reducing training and support costs by the interface being intuitive
- Increasing accessibility by increasing usability for users with a wider range of capabilities.
- Improving user experience
- Reducing discomfort and stress
- Providing a competitive advantage, for example by improving brand image.
- Contributing towards sustainability objectives

A human centered design approach is improving the identification and definition of functional requirements. In all, this approach is increasing likelihood of completing a project successfully, on time, within budget and therefore meeting stakeholder requirements (ISO, 2010).

1.1 Project Purpose

This master thesis was performed in collaboration with Assa Abloy Entrance Systems that is a universal provider of automatic entrances. The project purpose is to evaluate and develop the user experience and usability of a sales tool for entrance solutions by mapping and understanding the users and their needs. By outsourcing the quotes from internal users at Assa Abloy Entrance Systems to distributors, that is external users and customers to Assa Abloy Entrance Systems, the efficiency in the organization will increase, the distributors can work more independently and the workload for the internal users will decrease.

To reach the project purpose the following parts were investigated:

- Identify the users of the sales tool, their differences and their current work situation.
- Analyze the user experience of the sales tool for the current users of the existing interface.
- Investigate what improvements can be made and determine goals for the concept that should improve the usability and user experience of the user interface.
- Develop and verify a new concept for the user interface that could improve the user experience for the users using the sales tool.

1.2 Project Limitations

The research team was informed that the sales tool was used on computers and no deference has been taken considering responsive design, which adjusts the design to different devices. The project was limited by the resources supplied, in this case the users interviewed for the project. The chosen target group and its limitations is described in 5.2.1 Defining user

group in the *Define* chapter. Another limitation is the time set for the project, which is 20 weeks. The configuration part of the sales tool is a complex feature and is a part that could not be adjusted during this project due to the time limit.

2 Background

2.1 Assa Abloy Entrance Systems

Assa Abloy is a global leading company with three different divisions called Assa Abloy Opening Solution, Assa Abloy Global Technology Solutions and Assa Abloy Entrance Systems. Assa Abloy Entrance Systems is a universal provider of automatic entrances which includes Automatic doors, Industrial doors, High-performance doors, Hangar doors and Loading dock equipment. The products can therefore be found in the entrance, back and inside buildings. The company is frequently expanding through organic growth and acquisitions to expand their range of products and expertise.

2.2 Structure of Sales Department

Assa Abloy Entrance Systems sales department is categorized in a direct, indirect and component department. The direct sales department is selling products directly to the end customer. The indirect sales department contains business units who provides quotes with entrance solutions to distributors who then sell the products to the end customer. The indirect sales department consists of Entrematic and Assa Abloy Entrance Systems. Entrematic is divided in three business units: EM Entrematic, Ditec and Normstahl. Assa Abloy Entrance Systems indirect channel consist of the business units PDS US, IDS Export and PDS Export. All business units have Sales Administrators and a Sales Group. The different individuals in the Sales Group are responsible for an area with multiple Distributors. An overview of the structure is shown in figure 1.
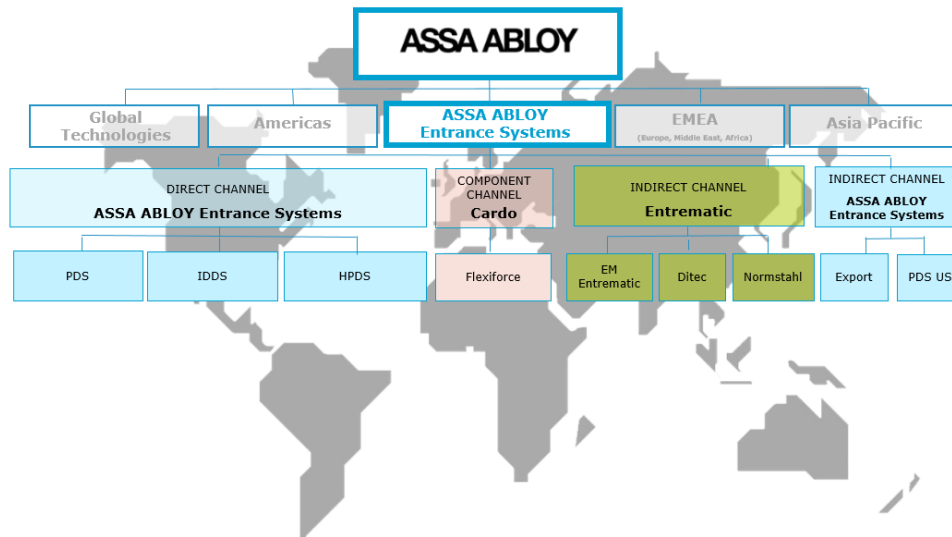
Figure 1. Assa Abloy Entrance Systems

2.3 Users

The sales tool is an internal tool used within the indirect channel in Assa Abloy Entrance Systems and distributors selling their products. In the indirect channel there are mainly two user groups, the back office and the sales department. The back office is the help administration teaching the sales department and the distributors the tool. Today most quotes are created by the back office or the sales department. The quotes are then sent to the distributors who then send it to the end customer. If the end user wishes for any changes the steps have to be reentered. An explanatory picture of the participants involved when creating a quote can be seen in figure 2.
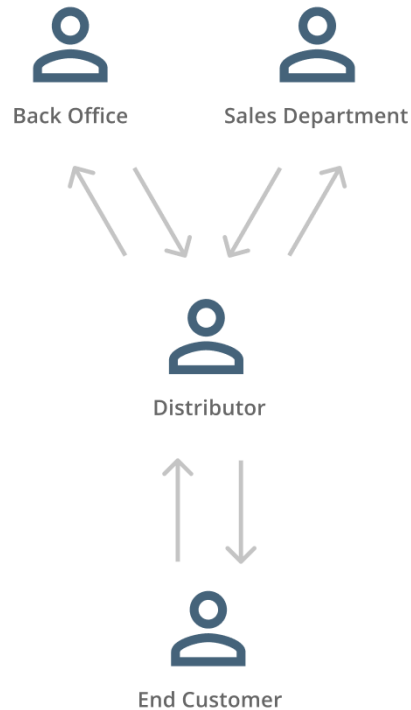
Figure 2. An explanatory picture of the participants involved when creating a quote.

2.4 The Sales Tool

The sales tool is a CPQ system containing Configuration, Pricing and Quoting. Within the configurator different parts of the entrances is combined to complete the opening solution. The customer is then given a price suggestion of the configuration in the form of a quote which can be accepted or denied by the customer. When the quote is accepted, the product list is sent to production. Quotes are often used for larger projects when the configurations are complex and the customer needs a price suggestions before accepting.

2.5 Structure of the Sales Tool

The current sales tool is a complex tool with a split workflow and information has to be entered in a specific order to complete the quote in the right way. To get an overview of the functionality and the visual layout a walk through was created. The walk through begins with the result of a finished quote to understand the goal of the walk through, an example of a finished quote is shown in figure 3.

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Price Info

Product Id	Product Name	Price per unit	Quantity	Price
1001815	ADS-H Left Opening, Reveal			
		Total Price:		

ADS-H Left Opening, Reveal

Left opening with reveal plate and frame on the non-door side

Frame Width (FW)	965
Frame Height (FH)	1925
Clear Opening Width (COW)	800
Clear Opening Height (COH)	1900
Wall Thickness	80
Door Cladding	Laminate
Laminate	Other
Radiation Protection	No Lead protection
Window	No Window
Window Width (mm)	0
Window Height in mm	0
Handle	Operated from both sides
Surface Treatment	Silver Anodized
Mechanical lock	No Mechanical Lock
Earthing Kit	No Earthing Kit
Cover	Including Cover
Cover Length (CL)	1970
Cover Backplate set	No
Linear Actuator	Not Included

Customer Info

Anna
Andersson
Testgatan 1
12345 Landskrona
Skåne
Sweden

0701234567
anna@andersson.nu

Footer text

Figure 3. Finished quote

2.5.1 The Home Page
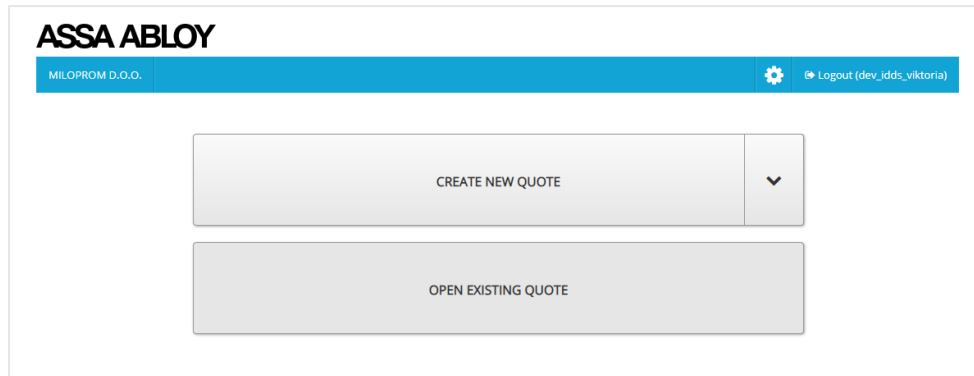
Figure 4. Frame of the home Page

The homepage is the first page the user comes in contact with. From this page a new quote can be created and there is a possibility to open existing quotes. To create a quote a template has to be made. When creating a quote for the first time, the user is redirected with a pop-up message to a template page. If the user later on want to return to the template page, this can be accessed through the setting symbol in the blue header.

2.5.2 The Template Page
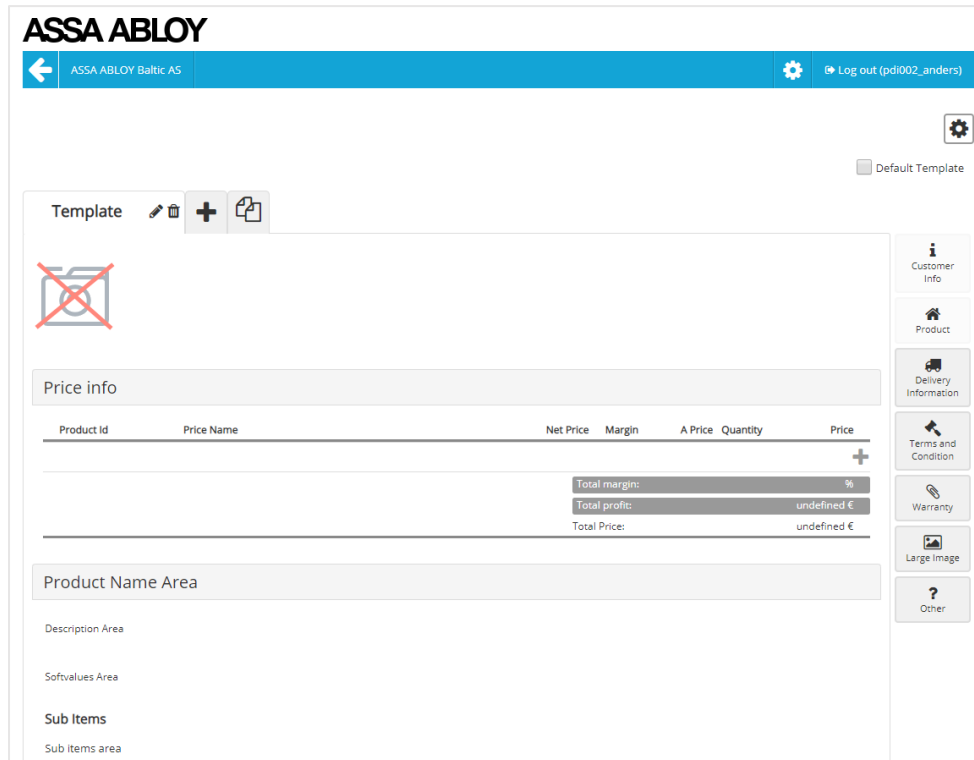
Figure 5. Frame of template page

In the template page a template can be custom made. A template is a foundation for the layout of the quote and has to be built before creating a quote. Several templates can be created with different headlines, company logos and colors. A template can also be made for specific customers. When the template is completed the arrow in the header is clicked twice to return to the home page.

2.5.3 **The Quote Page**
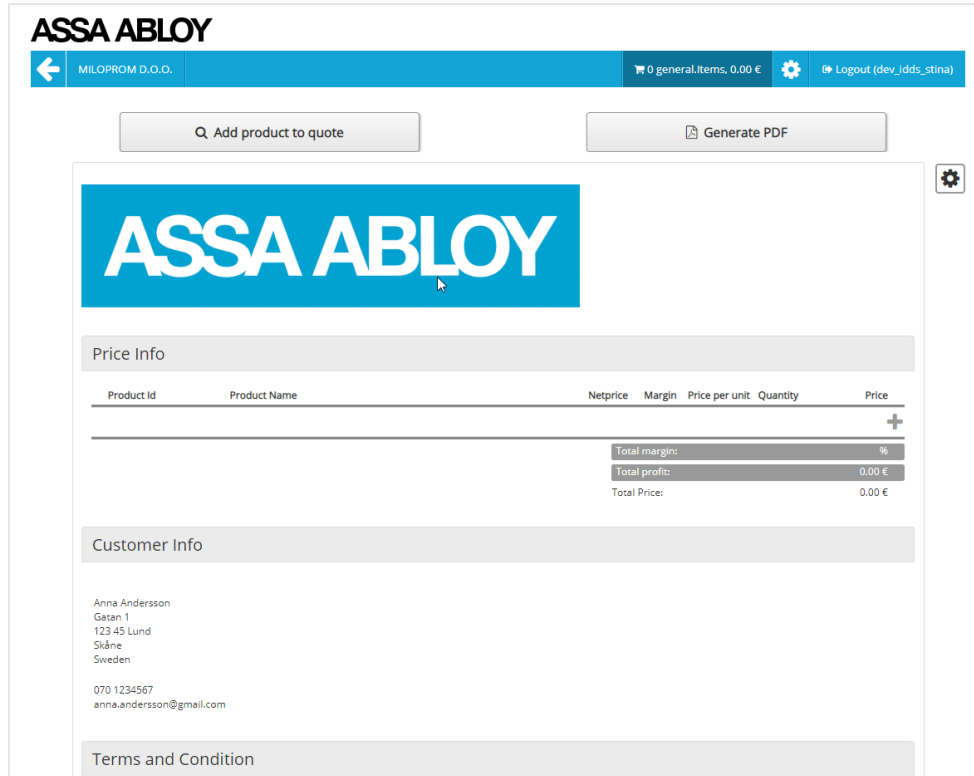
Figure 6. Frame of quote page

When entering the quote page products can be added. When clicking on the button "add products to quote" the user will be directed to the product page and products can be added. The quote is limited by the template created but some information such as text segments can be added. When the quote is finished a PDF can be generated and send to the customer.

2.5.4 The Product Page
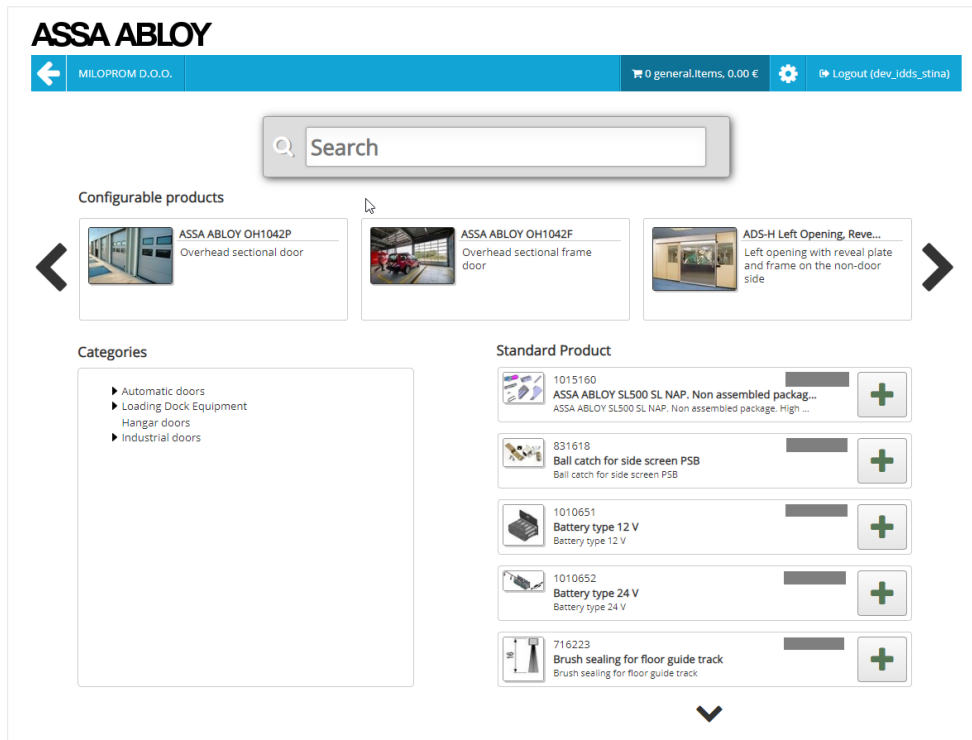
Figure 7. Frame of product page

In the product page products can be found by searching on the ID number or by using the category tree. When all products have been added the user can use the arrow or the cart icon on the headline to exit the product page and to finish the quote.

3 Theory and Process

In this chapter general theory and processes practiced in this report are presented.

3.1 Usability

Usability is a term describing how a system, product or service can be used by specific users to achieve certain goals (ISO, 2010). Usability can be described as a qualitative measurement describing how a user understand an interface. Usability can be improved by a basic and useful method called user testing. If the user understand and can easily use the interface the interface is useful (Nielsen, 2012).

3.2 User Experience Design

According to Norman and Nielsen (2019) UX design, or user experience design, encompasses the user´s overall experience when interacting with the interface of a product, system or a service. UX-design embodies the entire design process and the user-journey. To establish this the designer has to understand and meet the particular user needs (Norman & Nielsen , 2019).

3.3 Human Centered Design

Human centered design is an approach aiming to make interactive systems usable and useful through a focus on the user. This is done by examining the user needs and requirements, investigating the ergonomic situation and applying usability techniques (ISO, 2010).

According to the ISO 9241-210 (2010) a human centered design approach should follow the design principles below. These can be combined with a design process of choice.

- *The design is based upon an explicit understanding of users, tasks and environments*
  The design of the system should consider the users and the people affected by the use. The context of use should also be determined, which means the characteristics of the users, tasks and environments will be established.

- *Users are involved throughout design and development*
  This results in valuable source of knowledge regarding the context of use, tasks and the user's way of working with the system. The people involved in the process should have the knowledge, experience and capabilities which reflect the range of users the system is designed for.

- *The design is driven and refined by user-centered evaluation*
  The user feedback is a critical source of information to lead the development forward in human centered design. Concepts can be tested and evaluated at an early stage to evaluate if the system is meeting the user or organizational need.

- *The process is iterative*
  The iteration eliminates uncertainty during the development though refining the concept when new information is obtained, then repeating the sequence to achieve the required outcome. In this way, information is gathered and small changes are tested to meet the user requirements.

- *The design addresses the whole user experience*
  The whole user experience is influenced by the user and their prior experience, attitudes, skills, habits and personality. Among others it includes presentation, functionality, system performance and interactive behavior.

- *The design team includes multidisciplinary skills and perspectives*
  The team should be sufficiently diverse to collaborate over design and implementation trade off-decisions at appropriate times.

3.4 Double Diamond Process

The Double Diamond process is a design thinking method to explain and visualize the steps of the design process (Design Council, 2015). The name describes the process of convergent and divergent thinking, which creates the two diamonds seen in figure 8. The process consists of four steps, *Discover*, *Define*, *Develop* and *Deliver*. The first phase, *Discover*, is a phase of gathering insights concerning the problem area and the users. The second phase is a defining phase where information is analyzed and synthesized into a definition of what the solution should be. In the *Develop* phase, prototypes are generated, tested and refined in iterations. In *Discover* the project is finalized into a solution and the result is presented.
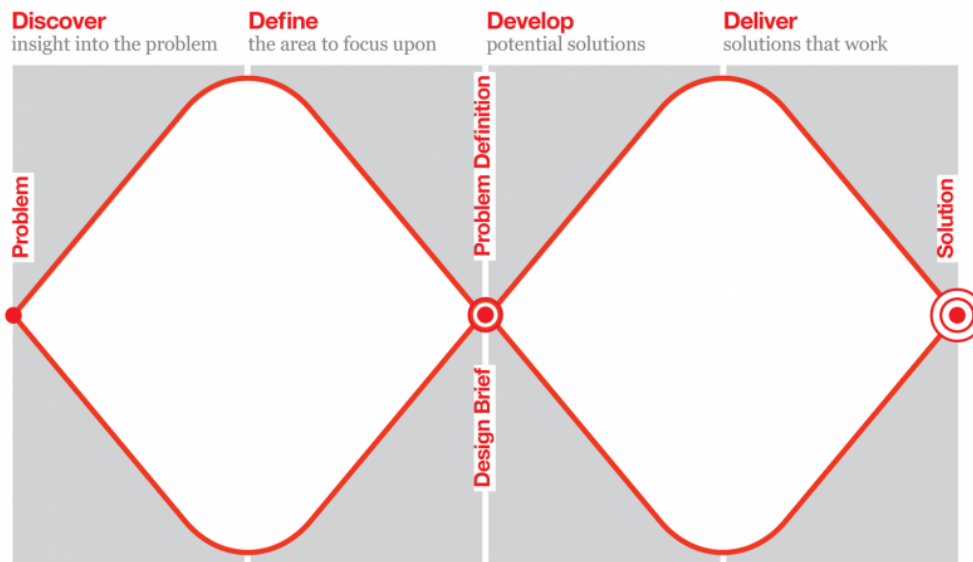
Figure 8. Double diamond process (Design Council, 2015)

3.5 Method Practiced in this Report

For this project, the two methods Human-centered Design and Double Diamond were combined. The two methods were combined to create a clear workflow suitable for this project. The four phases *Discover*, *Define*, *Develop* and *Deliver* are divided into four chapters. The methods used in each

phase is described in the specific chapter. The process practiced in this report is visualized in figure 9.
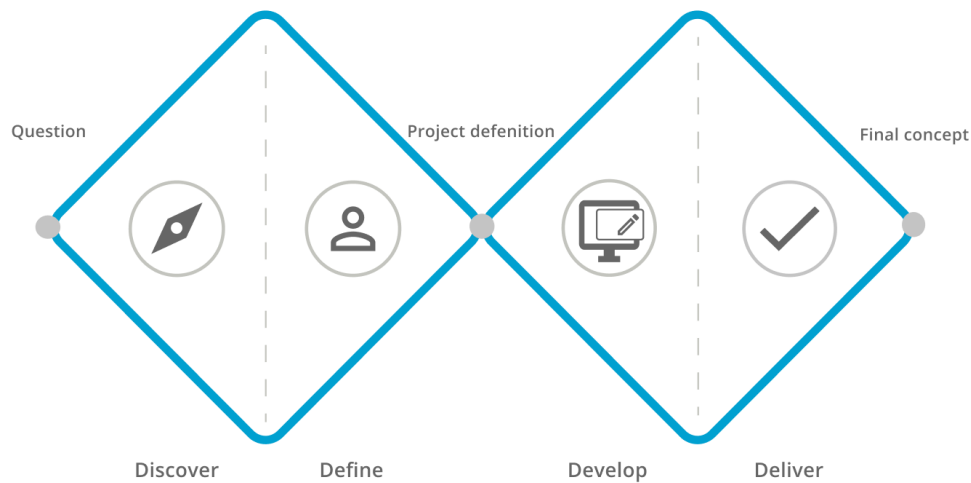
Figure 9. Process of this project

3.5.1 **Discover**

The *Discover* phase is an information gathering phase where the understanding of the users, tasks and environment are established. This chapter includes descriptions of how and why data was gathered in both methods and process.

3.5.2 **Define**

In the *Define* phase data collected in the *Discover* phase are evaluated and analyzed. The methods used and the process followed are described. A needs analysis and a project definition is created. During the *Define* phase the communication with stakeholders are of utmost importance.

3.5.3 **Develop**

During the *Develop* phase concepts and prototypes are crated, evaluated, tested and redesigned through an iterative process to fulfill the user needs established in the project definition. The users are involved throughout the iterations and the design is driven and refined by user-centered evaluations.

Both high fidelity and low fidelity prototypes are created in the *Develop* phase. The results of the iterations are presented in this phase.

3.5.4 **Deliver**

In the *Deliver* phase the final prototype of the project is presented.

4 Discover

In the Discover chapter the methods, process and results are presented. This chapter contain the evaluation of the sales tool, user interviews and observation to understand the project and the purpose. The evaluation of the data gathered in the Discover phase will be analyzed in the Define phase.

4.1 Methods

4.1.1 Heuristic Evaluation

Heuristic evaluation is a method used for evaluating user interface design (Nielsen, 1994). Evaluators review the interface by using recognized usability principles. The evaluators are experts in interaction design and have no previous experience of the interface. Heuristic evaluation is suitable to do early in the development cycle to prevent usability issues at an early stage. An important factor is that the evaluators have different skill sets to discover different kinds of usability issues (Nielsen, 1994). The evaluators have to perform the heuristic evaluation individually and they are not allowed to communicate during the evaluation to avoid being biased.

Firstly, the chosen evaluators are given a brief regarding the product and the interface. The evaluation is then divided into three phases. The first phase is an observation phase where the evaluator gets to know the interface and choose focus areas for phase two (Wong, 2019). During the second evaluation phase the evaluator will go through the interface focusing on the ten heuristics presented below. The heuristics are graded on a scale from one to five based on the severity (Nielsen, 1994).

1. *Visibility of system status*
   The system inform users regarding actions with appropriate feedback.

2. *Match between system and the real world*

The language of the system should be adapted to the user with words, concepts and phrases.

3. *User control and freedom*
   The system should be forgiving and the user should be able to undo and redo.

4. *Consistency and standards*
   There should be consistency in words, situations and actions

5. *Error prevention*
   There should be a careful system design to prevent problems from occurring.

6. *Recognition rather than recall*
   Objects, actions and options should be visualized to minimize the user's memory load. Instructions should be available whenever necessary.

7. *Flexibility and efficiency of use*
   Accelerators should be available for the experienced user to speed up the use for the expert.

8. *Aesthetic and minimalist design*
   Information rarely used should not be visible or the user.

9. *Help users recognize, diagnose, and recover from errors*
   Error messages should be clear and should constructively suggest a solution.

10. *Help and documentation*
    Information and help should be easily accessible.

The third evaluation phase is a debriefing session where all evaluators discuss their findings and creates a list of solutions (Wong, 2019)**.**

Heuristic Evaluation was chosen to evaluate the sales tool. Specific usability issues could be identified before getting too familiar with the tool. Heuristic Evaluation seemed suiting to reflect a first time user's view in a concrete way.

4.1.2 User Interviews

Interviews are meetings with users with the purpose of understanding the user's experiences, opinions, motivations, attitudes and behavior concerning products and services. Interviews can be performed at any point during the design process with different intentions. Before the interviews an interview guide is conducted (Wikberg Nilsson, et al., 2015). The guide can be structured, unstructured or semi-structured. A semi-structured guide is flexible and contains areas and a few defined questions but allows the interviewee to talk more freely.

The user interview method is common when working in a human-centered way. This method was chosen to get the user opinion and to understand the current situation.

4.1.3 Observations

An observation is a research method where the user is observed when using the product. This to understand the usability and user experience of the product (Fox, 1998). The purpose is to discover how the product is used and potential usability issues.

A method which can be combined with observation is Thinking Aloud (Nielsen, 1993). This is a very powerful user testing method where the user is describing their thoughts when using the product. The observer is therefore getting a better understanding of the user experience.

Observations was chosen since it is suitable to understand the user experience, the user needs and what to prioritize during the project.

4.2 Process and Results

4.2.1 Initial Research

Initial research was collected to understand the structure of the company and the context of the sales tool. The initial research was also necessary to map the users. The research included meetings, studying the Assa Abloy Entrance Systems internal information. Meetings were held with several employees

such as the System developer in the IT department, the program manager of the sales solution and the CIO.

The result of the initial research is analyzed and presented in 5.2.1 Defining user group and 5.2.2 Defining test group in the *Define* chapter.

4.2.2 **Heuristic Evaluation**

The evaluation group consisted of the project team and one external designer with expertise within interaction design. This to deliver a thorough evaluation with multiple perspectives to discover as many usability issues as possible. Due to confidentiality in the sales tool all evaluators had to work at Assa Abloy Entrance Systems.

The evaluation started with the first phase performed by the project team. The external evaluator then performed the first phase and was observed by the project team. Notes from each observation were compiled into three separate documents. These documents were the material for phase two and were categorized in the ten heuristic evaluation categories presented in the method. For the second phase an observation focusing on the heuristics was performed individually by the three evaluators. New findings were added to the compiled documents. During the last phase of the heuristic evaluation all evaluators were gathered discussing their findings and a compiled list of usability issues was created.

The results of the heuristic evaluation was partly similar illuminating usability issues with the sales tool from the experts of view. All findings gathered during the evaluation is analyzed and presented in the *Define* chapter.

4.2.3 **Interviews**

In the beginning of the *Discover* phase initial interviews were held. The interviews were held to create an understanding of how the tool could be used and what the goal of the development was. A standardized interview guide was created based on the semi-structured guide described in the method. The interview began with the research team presenting themselves and the project. The interviewee was informed that all personal data from the interview would be kept anonymous. The interviewees were employees at

Assa Abloy Entrance Systems working in the departments described in the background: PDS Export, IDS Export, Normstahl and Entrematic.

The results gathered during the interviews varied. Some interviews were very helpful and gave data regarding the project and helped defining the user group. Other interviews gave less information and therefor the interviews varied in length and content. The interviews helped understanding the test group and the persons suitable for observations. The result of the interviews are analyzed and presented in 5.2.2 Defining test group in the *Define* chapter.

4.2.4 **Observations**

Observations were performed with a test group from the business unit. The purpose of the observations was to understand the user experience of the sales tool. Tasks were prepared for the user to perform in the sales tool and all users got the same task but with a product specific to their field. The user was directed to think aloud during the observations, according to the Thinking Aloud method. The information observed and questions asked were noted by the observer. If guiding questions were needed these were also noted. Questions and answers were carefully compiled to avoid misinterpretations.

The results from the observations were partly similar illuminating usability issues from the user's point of view with the sales tool. The users had varying levels of knowledge regarding the sales tool. The different users needed different amount of guidance. The usability issues noted during the observation varied and the users perceived different usability issues from multiple perspectives. The observation results gave a good representation of different user needs and usability issues were determined.

The results from the observation is analyzed and presented in the 5.2.3 Affinity diagram presented in the *Define* chapter.

4.3 Summary

In the *Discover* phase data regarding the project area, the sales tool and the users were collected. This was done through research, heuristic evaluation, interviews and observations. The results found are analyzed in the *Define* chapter.

5 Define

The Define phase is a converging phase where data from the Discover phase is analyzed. The aim is to determine the user group, the user needs and Define the project to understand what the users want from the solution in order for it to be more usable.

5.1 Method

5.1.1 7 Fundamentals of Design

The seven fundamentals of design by Don Norman (2013) was created to categorize and pinpoint usability issues.

- *Discoverability*
  How to discover what actions are possible to do and understand the state of the system.

- *Feedback*
  Feedback is information as results of actions. Feedback gives the current system status in an easy way after making an action.

- *Conceptual model*
  A good conceptual model leads to understanding of the system and feeling of control. It enhances both discoverability and evaluation of results.

- *Affordances*
  Affordances exists to make the desired actions possible.

- *Signifiers*
  Good signifiers ensure discoverability and feedback which is easy to understand.

- *Mappings*
  Relationship between controls and their actions.

- *Constraints*
  Providing constraints guides actions and makes it easier to understand.

This method was chosen since it was a suitable way to categorize the data from the heuristic evaluation.

5.1.2 **Affinity Diagram**

The Affinity Diagram is a method suitable for compiling and organizing big amounts of data (Dam & Siang, 2019). This is done by grouping similar findings based on the natural relationship and to create connections between groups. This method is helpful to define the problem and potential solutions.

The process of the method can be summarized in the steps below (Dam & Siang, 2019).

- Each data is written on a post-it note or card
- The notes are compared to each other and clustered into groups
- The groups are named based on their contents and rated based on priority

This method was chosen to get an overview of the areas with the most usability issues. Also to create a voice of the customers in our evaluation.

5.1.3 **Needs Analysis**

A need is defined as a user's goal-oriented behavior and way of acting. The needs analysis is used to develop an understanding for the user needs (Wikberg Nilsson, et al., 2015). All information gathered during interviews, observations, focus groups, workshops etc. is structured and compiled into needs. It is important to seek the need and not the solution. This to not limit the process to the immediate solution. To establish user needs it is important to meet the user in their context. The user data is collected and if the user expresses solutions, these must be converted into needs.

A needs analysis was created to transform the collected data given in the affinity diagram into needs. The needs analysis was generated to create a clear view of the user needs.

5.2 Process and Results

5.2.1 Defining User Group

Data regarding users was collected during the interviews with the sales department, development department and the back office. During the data collection, the different departments had varying thoughts on who the user of the tool was supposed to be. The development team expressed that they had gotten directions to create the sales tool. The back office expressed insecurity in who the users of the tool was, them, the sales department or the distributors.

From the information gathering a problem was defined. The sales tool was created without a clear vision of the user since there was no product owner of the sales tool. After the data was collected the departments agreed that the tool would be more effective for the organization with the distributors as a target group. As seen in figure 3 the steps of involving the back office and sales department could be minimized if the distributors independently could create quotes. The workload for the back office and sales department would then be decreased.

5.2.2 Defining Test Group

The test group for the project was the main source of information to lead the project forward. A test group should reflect the user group and give feedback on created concepts to refine the design and bring the iterative design process forward.

Data regarding users was collected during the interviews with the sales department, development department and the back office. The data was compiled and the test group was defined and divided into three segments, back office, sales department and distributors. The collected data showed that the back office was the only active users and was therefore chosen as the

primary test group. The mapping implied that the sales department had plans on starting to use the sales tool and was therefore designated as secondary test group. The distributors were defined as the target group, but it was not defined when in the future they would start using the tool or to what extent they would use it. The research team then choose to make a delimitation of not testing on the distributors.

5.2.3 Affinity Diagram

The data collected from interviews and observations were compiled. The usability issues were then written on post-it notes and the notes were sorted into eight categories. The categories were created based on discussions within the project team and were named based on the content. The eight categories were then prioritized based on the extent of the group and the importance of each usability issue within the group. A summary of the affinity diagram can be found in table 1 and all ingoing data in the affinity diagram can be found in Appendix C

Table 1. Summary of Affinity Diagram

Category	Priority	Description
Orient	1	The workflow of the sales tool was unclear and created an uncertainty for the user. Several users claimed that it was hard to understand how to finalize and go to the next step and wished for clear starts and end of tasks. Users also expressed an uncertainty regarding the template page. They found it hard to understand where in the process of creating a quote they were and one user frequently tried to add products to the template. The user could not navigate properly within the tool and therefore, orient was chosen as the first priority.
Feedback	2	Insufficient feedback made the user unsettled. When creating a quote for the first time an error message occurred telling the user that a template had to be made. Several users pointed out that error messages occurred without telling the user what could be done to fix the problem. One user claimed "I want feedback on what is expected of me as a user to feel more secure with the tool" The system did not allow trial and error since selections could not be undone and feedback was therefore chosen as the second priority.
Save	3	Save had a connection to both orient and feedback but was given a separate category due to its influence of the user. Not being able to save made the user uncertain. Several users were worried about going back or moving forward in the tool since they did not know if the work were saved. Saving is a natural way to end a workflow and gives the user control over the tool, therefore save was chosen as the third priority.
Create template	4	Functions in the template needed to be more accessible to the user. Several users asked what the difference was between the template page and the quote page. One user asked why a template had to be created in the first place and tried to create a quote without creating a template. Users found it hard to understand how the template was created, how changes were made and what content to include in the template.
Edit quote	5	The users were uncertain regarding what settings could, and should, be made. The user found it hard to understand the difference between edit template and edit quote. Some users tried to make template changes when they edited their quote and did not understand why it was not possible.
Symbols	6	Several symbols confused the user instead of clarifying and visualizing a function. Several users commented on the camera with a cross in the template page. When clicking on the symbol a logo could be added but most users thought that no photo could be added on that page or that it was not allowed. The user requested consequent and clear symbols.

Settings in quote	7	The setting symbol in quote were not visible to the user and the content was unstructured and unclear to the user. Several users missed that settings could be made. One user who has seen the tool before claimed "I have learnt from my user manual what settings should be changed to create a good quote but I don't understand why. One should not have to understand hieroglyphics to be able to change the header color."
Quote overview	8	The sales tool provided the user with an insufficient overview. Several users wanted to see an overview of the quote before saving the quote as a pdf and sending it to the customer.

5.2.4 Categorizing Heuristic Evaluation in 7 Fundamentals of Design

The data gathered in the heuristic evaluation was compiled in an attempt to display the most important usability issues found. This was done by compiling the usability issues rated with severity 4 or 5. The usability issues were sorted in the categories of 7 fundamentals of design to organize similar usability issues in main groups. The result is shown in table 2.

Table 2. Categorization of usability issues with severity 4 and 5.

Fundamentals of design	Severity	Usability issues	Number of users
Discoverability	4	When a product is configured and put on the quote, the user found it hard to find the reconfigure button and originally thought this couldn't be done.	2
	4	When creating a template (for the first time) the user don't immediately understand they have to click the plus sign to create a new template.	2
Affordances	4	When the user wants to add a specific product to the quote the user does not understand how to use the search tool to find the product asked for.	1
Signifiers	5	When creating a template or changing a current template there is no save button since the template is automatically saved. The user do not get feedback that their changes have been saved.	3
	4	The template is not giving an indication that you can enter information in the blank space between headlines.	1
	4	The user misunderstood the icon for the "two steps" in the configuration, it could be clearer with a redesign.	1
	4	The user finds it confusing that the same setting symbols occurs in several places but has different meanings.	1
Mapping	4	When creating a new quote it is easy to accidentally use the default template without knowing.	1
	4	When creating a quote some choices are colored orange. The user does not understand the meaning of that and there is no explanation regarding the color.	2
	4	When adding products to the quote the category products is not visible to the user. It is hard for the user to realize that the standard products and the configurable products are connected to the categories. The user have to try to click it to notice but no signifiers are given to do that.	2
	4	Sometimes the white arrow back means go one step back and sometimes it means that you are going to the home page.	1
Constraints	4	For the inexperienced user there are no pre-settings or ways to quicker come to the end in the configuration. They have to make numerous decisions before the configuration is done.	2

Feedback	4	When clicking on "create a new quote" the quote is automatically saved in the system. The user gets no feedback regarding this. The user can accidentally create several versions without knowing.	3
	5	When creating a template or changing a current template there is no save button because the template is automatically saved. The user do not get feedback that their changes have been saved. This can make the user believe their changes will not be saved.	3
	4	When adding standard products to the quote the user do not get feedback the product has been added to quote.	1
	5	Sometimes an error message pops up when the user is doing something wrong but it is not telling the user what error they made.	1
Conceptual model	4	When creating a quote for the first time a sign appears telling the user to create a new template. This creates confusion to the user indicating they have done something wrong.	2
	5	The user have to learn two different ways of altering the look of the quote. First you are creating a template and deciding what you want on it. If you decide you don't want a specific header on a single quote you can't delete it when you are in create a quote mode. The way of adjusting the looks of the quote alters from the different modes.	3

5.2.5 **Needs Analysis**

Needs were defined from the highest prioritized categories from the Affinity Diagram. Due to the extent of the project limitations had to be done, and the lowest prioritized categories were disregarded. Data from the highest prioritized categories were compiled and overall needs were created which covered all major usability issues.

A need analysis were performed to divide the functions in necessary (N) and desirable (D) needs. Since the sales tool is an existing product the main function was already set. There were no unnecessary functions since the lowest prioritized categories were disregarded.

The need analysis is shown in table 3.

Table 3. Needs Analysis created to reflect all usability issues

| Rating	Need statement
N	Provides easy navigation, both back and forth
N	Provides guidance
N	Provides tasks with a clear start and end
D	Provides an overview of the template
N	Provides clarification between quoting mode and template mode
D	Provides a preview of the template
N	Provides clearer workflow
N	Provides continuous feedback during the workflow
N	Provides feedback when performing specific tasks
N	Provides clarified error messages
N	Enables trial and error
N	Enable options to save
D	Clarifies what settings can be made
N	Clarifies what information can be added to quote and template
N	Clarifies how the template should be used
D	Provides an overview of added products

5.2.6 Project Definition

Since the target group is not currently using the tool the project is aiming to create an experience which is easy and quick to learn for new users. This is done by fulfilling the needs statements above. The project team strive to create a clear and secure experience in the sales tool to emulate the experience of talking to one of the Assa Abloy Entrance Systems employees.

If these goals are achieved in the final concept, the project purpose of increasing the user experience and usability and therefor increase the efficiency and structure in the organization will be accomplished.

6 Develop

In the Develop phase the concept generation starts. The concepts are generated, tested, evaluated and redesigned in three iterations. The last re-design will be the final concept presented in the Deliver phase.
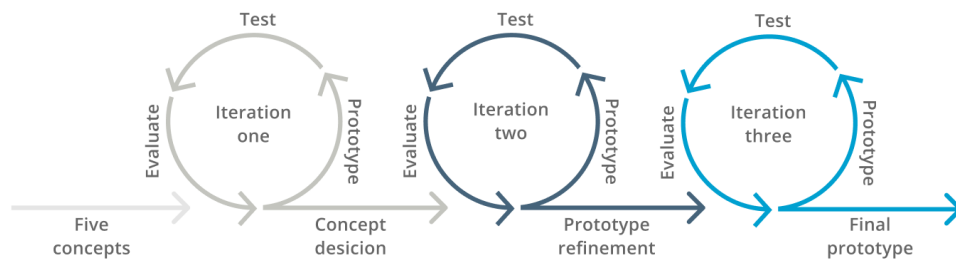
Figure 10. Process of *Develop* phase

6.1 Methods

6.1.1 Ideation

In the ideation phase ideas and solutions are generated and prototyped (Dam & Siang, 2018). Ideation can be described as the fuel when creating innovating solutions by prototyping and sketching (Hasso Plattner Institute of Design at Stanford, 2010). In the beginning of the design process ideation is used to create a wide range of ideas.

6.1.1.1 Sketchstorm

Sketchstorm is an ideation technique where simple and rough sketches are created to generate ideas (Dam & Siang, 2019). The technique encourage quantity instead of quality which prevents the creator to be too attached to an idea. During the sketchstorm all ideas should be raised, questioned and encouraged to help the team to move forward in the process and to be able to choose an idea.

6.1.2 **Prototyping**

Designers use prototyping as a method to produce easy and scaled down versions of the intended product to test the design solution. The purpose of prototyping is to discover problems with the design at an early stage of the design process, but also to investigate and bring new ideas to life (Dam & Siang, 2018). It is important to create prototypes with the user in mind and to focus on user needs and the issue the design is supposed to solve. There are different fidelity levels, low-fidelity prototype and high-fidelity prototype, which are used during different stages of the design process.

6.1.2.1 Low Fidelity Prototyping

A low fidelity prototype is a quick and inexpensive prototype which allows the designer to do instant changes during user testing (Dam & Siang, 2018). A low fidelity prototype signalize roughness, and when testing a low fidelity prototype, users are more likely to express negative critique since the user feel less pressure.

6.1.2.2 High Fidelity Prototyping

A high-fidelity prototype is of higher quality than a low fidelity prototype. The design vision is realized in a way closer to the imagined finished product in means of interactions and terms of visualization (Dam & Siang, 2018). This allows the stakeholders to judge the prototype and decide whether the prototype meets the expectation. A high-fidelity prototype is carefully developed with details and interactions, evaluations from user tests are therefore of high quality and credibility.

6.1.3 **User Testing**

6.1.3.1 How to perform a user test

User test or usability test is a method used to identify problems and to establish that the product meets the usability requirements (Rubin & Chisnell, 2008). It is also used to discover further improvements with the product.

During a user test there should be one test leader (Rubin & Chisnell, 2008). The test leader should focus on the test person and be careful with answering questions. During a user test the test person should think independently as much as possible and should not be disturbed by the test leader. It is also important not jump to conclusions.

If a test person tests different parts of a system and these parts have the same or similar interface, the test person will gradually learn how the interface works. This leads to the test person doing better on the parts that are tested later, which can give misleading results. This is called the *Transfer of Learning Effect* and can be avoided by testing the concepts in different orders with different test persons (Rubin & Chisnell, 2008).

Before the user test a test plan should be created (Rubin & Chisnell, 2008). A test plan acts as an outline for a correct implementation and facilitates the consistency of all tests. A test plan includes a purpose, questions formulations, test template, test group, specification of test environment and roles of test leaders. Within the test plan the question formulations are the most important part. The question formulations are based on the purpose of the test and should be answered after the tests. The test template is a guide for the test person to follow during the test and can be found in appendix B.2 Test Template. The test plan created for iteration three can be found in appendix B.1 Test Plan.

6.1.3.2 Test group

If the goal of a user test is to map problems the test group can consist of 4-5 persons (Rubin & Chisnell, 2008). If the goal is to test the solution and receive a result with higher statistical security the test group should be 10-12 people.

6.1.3.3 Data Collection

Every single question should be answered with the support of at least one, preferably several, types of collected data. There are four types of data to collect: qualitative, quantitative, preference and performance data (Rubin & Chisnell, 2008). A description can be found in figure 11.
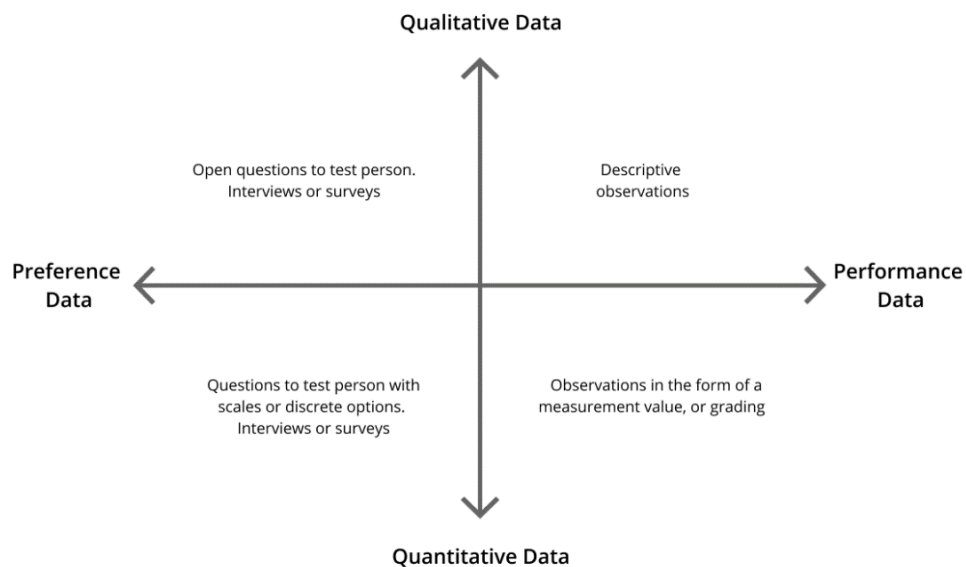

Figure 11. Four different types of data collection

6.2 Iteration One

6.2.1 **Goals**

The goal of the first iteration was to generate a set of concepts and evaluate these with low fidelity prototypes to establish which interface the users appreciated the most. After the first iteration one or several concepts should be chosen to be combined and further developed into a high fidelity prototype.

6.2.2 **Process**

6.2.2.1 *Low Fidelity Prototyping*

The first iteration began with individual ideation through Sketchstorm. The first sketches had a wide range, both of concepts and details. The ideas were then presented within the research team. Feedback were given and new ideas were created. Several iterations were made and after the last sketching phase, five concepts were selected. The concepts were selected based on the need analysis. Wireframes were then created based on the rough sketches and were used during user tests. A wireframe is a schematic page layout. The scale of the wireframes were 1:2 and contained the initial flow of creating a quote. All three concepts had the same functionality and focused on the start page, potential template page and on the quote page when adding a customer to quote.

The five chosen concepts is shown in figure 12-16. All five concepts are based on the interaction of creating a quote. All five concepts have the same functions but visually presented and therefor used in different ways. The pictures shown in figure 12-16 are overviews of the concepts and details are therefore not visible. The main page in each concept is marked with a red outline.
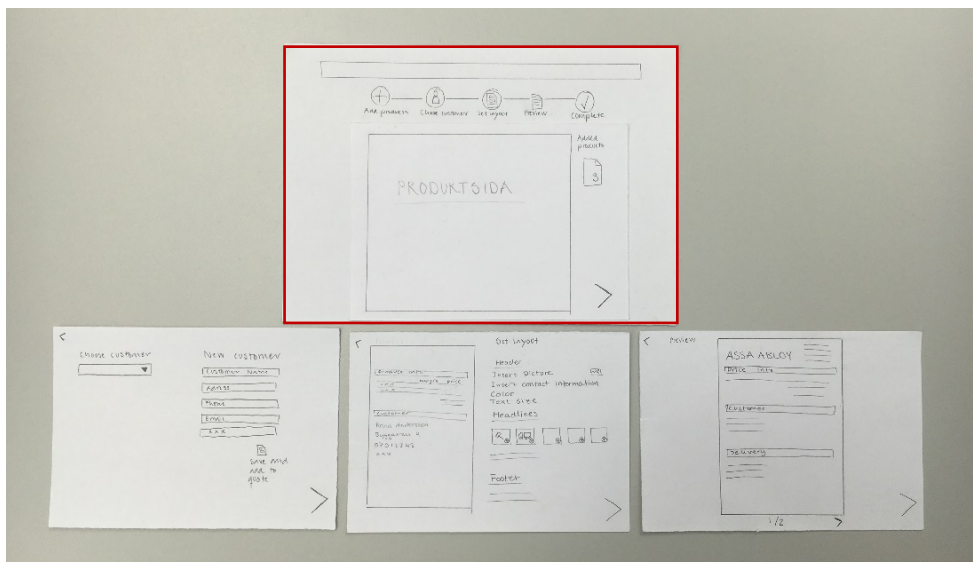

Figure 12. Concept one

In figure 12 concept one is presented. This concept is built on a timeline. The timeline is shown in the top of the page where the user can add different information to the quote. The five steps of the timeline are: add product, add customer, set layout, preview and complete. Simple sketches of how to add information to the quote are illustrated and can be placed on the bigger main page.
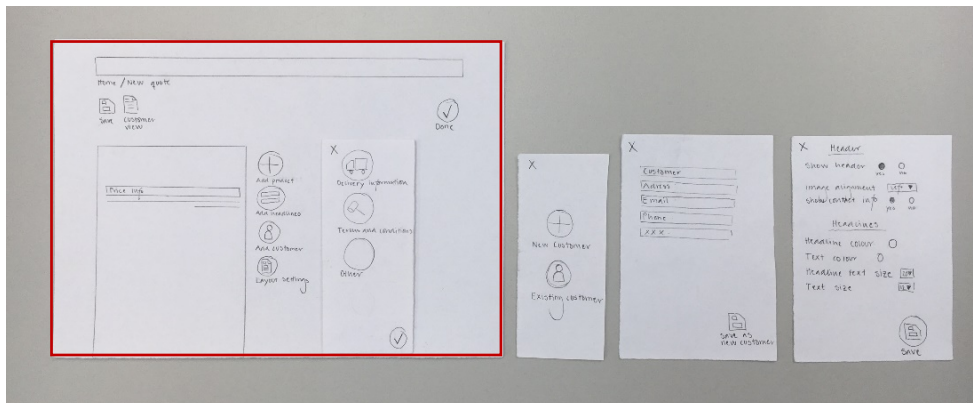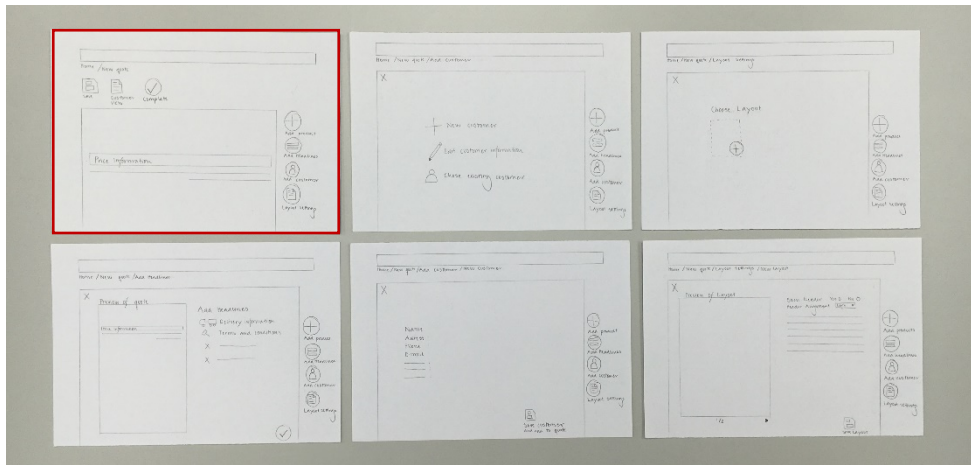

Figure 13. Concept two

In figure 13 concept two is presented. This concept is based on a main quote page, the left frame above, and different overlays. The main page has an overview of the quote to the left. To the right of the overview there are four categories: add product, add headlines, add customer and layout settings. When clicking the categories overlays appear on the right side of the categories. Different information can then be added to the quote for it to be completed.

Figure 14. Concept three

In figure 14 concept three is presented. In this concept each category is shown on an individual page. The categories are located to the right of the quote overview in the main page, the top left frame. When a category is clicked the user is taken to a new page where the information can be added. There is a text on top of the page indicating where in the workflow the user is.
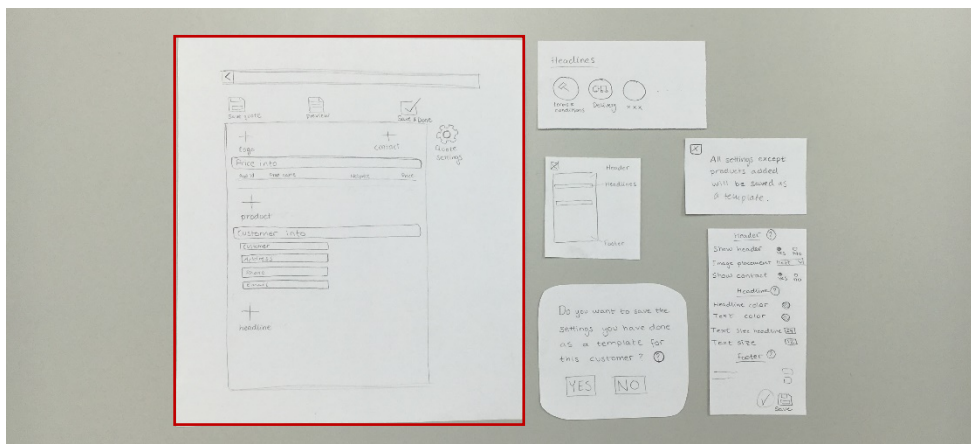
Figure 15. Concept four

In figure 15 concept four is presented. In this concept information is added to the quote outline in the main page. When clicking on the different plus icons on the outline overlays appears to add information as products, logo contact information and headlines. A customer is added to the quote by filling in their contact information in a field.
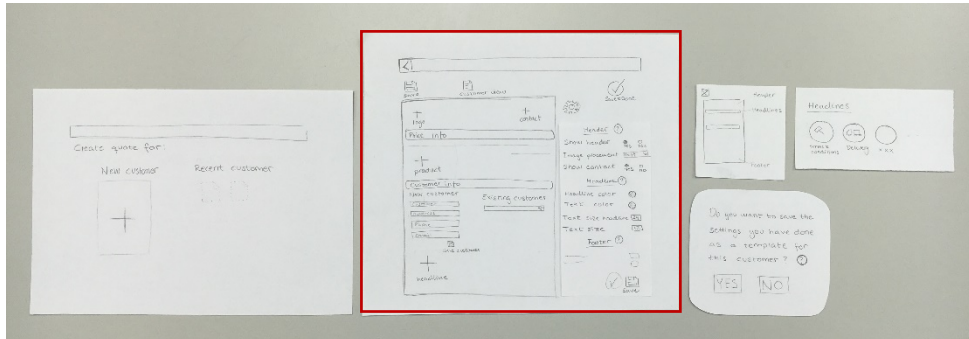
Figure 16. Concept five

In figure 16 concept five is presented. This concept is based on having the opportunity to choose a customer before entering quote mode. If no customer is in the system, a new customer can be created. In the main page information can be added to the quote by clicking the plusses in the outlines of the quote overview. The different plusses can add information like products, logo, headlines and contact information. When the information has been added, the possibility to save the quote as a template is given. The next time a quote is created to the same customer, the customer is selected in the first page and the same information directly appears on the quote.

6.2.2.2 *User Testing*

The chosen test group were employees within Assa Abloy Entrance Systems working within Entrematic and PDS Export. All test persons were potential users and were experienced or familiar with creating quotes in different programs. Since the goal of the test was to establish usability issues, the test group consisted of five persons.

All users tested the five concepts and were encouraged to think aloud when testing. To avoid "*The transfer of Learning Effec*t", the concepts were tested in different orders each time. During the interview the research team was divided into two parts. One person adapted the role as an interviewer and observation leader, answering questions the user asked. The observer asked follow-up question to get a deeper understanding of the problems that aroused. The second member of the research team adapted the role as a note taker and wrote down all questions and answers during the observation. After all data being compiled the five concepts were compared and discussed.

6.2.3 Results

Table 4. Summarized results from user tests in iteration 1

Concept	User comments
1	One user claimed that concept one was his favorite. The concept was described as guiding in a positive way, clean and that it had a good overview of where in the workflow the user was. By one test person the concept was described as confusing. The test person did not understand the timeline and how to follow it. Some test persons found it hard to make changes and reverse.
2	This concept was two test persons favorite. The overview of the quote was an advantage and were appreciated by all test persons. The test persons got feedback in the overview of the changes made. Several users claimed that the concept was natural and comfortable to work in. All changes were done in one page and it the test persons found it easy to pick up where they left.
3	Concept three were none of the test person's favorite. Some test persons claimed that the concept felt clean with a new page for every setting made and others that it felt like a word document. The test persons found it easy to navigate and no need to wonder what to do next. One test person claimed that the concept was good for an older generation. Several test persons claimed that it was a con that no overview was displayed.
4	Concept four was the most debated concept. The concept was favored by to test persons. Some users appreciated to work from the top to the button adding information and that the plus symbols felt clear and safe. These test persons felt they had a freedom as users to edit information the way they wanted to. The other part of the test group expressed confusion. They felt that there were too many clickable points in the overview and did not understand what to do. One test person did not understand what to do at the main page and another test person expressed this concept to be the most confusing.
5	Concept five was no test person's favorite. Generally, the test persons felt it hard to understand what information that were saved and felt confused.

6.2.4 Conclusion

The project team evaluated the results from iteration one and since concept three and five were not favored by any test person the concepts were disregarded. Concept one was only favored by one person and was thereby also disregarded. The two remaining concepts, concept two and four were opposed and further evaluated. Concept two received exclusively good feedback by all test persons and the given feedback was consistence with the project definition. Concept four received varied results. The test persons who favored the concept had knowledge of the current tool. Concept four had

most resemblance with the current tool and therefore the test persons who favored concept four could have been biased. Concept four was disregarded and concept two was elected the one to proceed with.

In this iteration a test group of five was chosen. A limited test group was chosen since the data gathered after five tests were saturated. The data received was enough for an adequate evaluation and to choose one concept.

The research team decided that the aggregate information was sufficient to build the first high fidelity prototype. The appreciated details from the five concepts were combined in the redesign of the chosen concept. A sketch from the redesigned concept is shown in figure 17. One of the changes made was the order of the categories, where the test persons preferred to add the customer first.
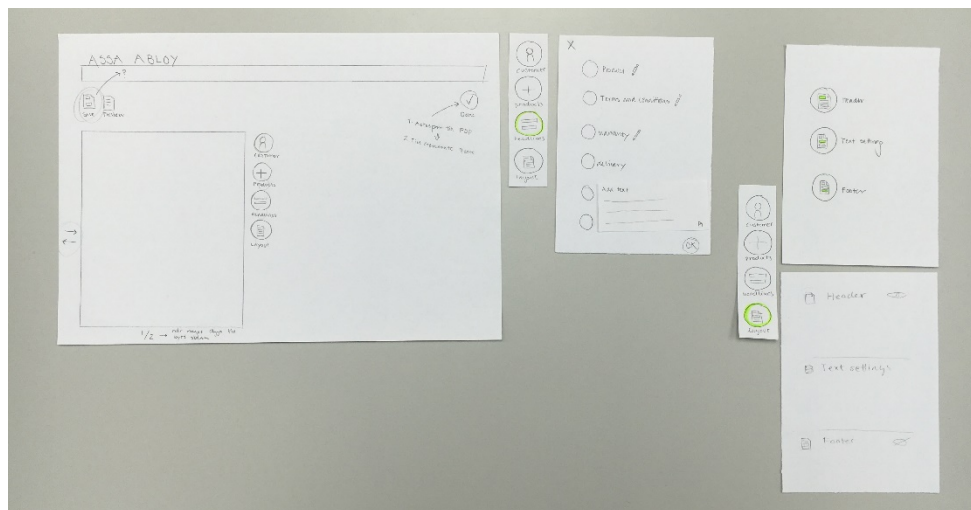

Figure 17. The chosen concept redesigned with appreciated details from the five concepts

6.3 Iteration Two

6.3.1 **Goals**

The goal with iteration two was to understand the overall impression of the created interface and to establish whether the users found the functions and

understood the overall created workflow. The goal was also to map problems and discover further improvements to implement in the final solution.

6.3.2 **Process**

6.3.2.1 *High Fidelity Prototyping*

The second iteration started with concept generation for details of the workflow in the sales tool. Basic frames were then created in a prototype program called Figma. Interactions added were compared towards the needs analysis and the compiled data from the user observations. New added interactions were also approved by the development team, for them to be implemented in the final solution. The goal in this test was to test the added details to refine the design, therefore some examples of the frames tested are shown below.

Frames from the high fidelity prototype are shown in Fig. 18-22.

Figure 18 Frame of choose customer page

In figure 18 the interaction for adding a customer is shown. When clicking the customer icon the overlay to the right is appearing. Through a drop down field on the top of the overlay, a customer can be chosen. The customer information is appearing for the user to review. When clicking save, the information is added to the quote.
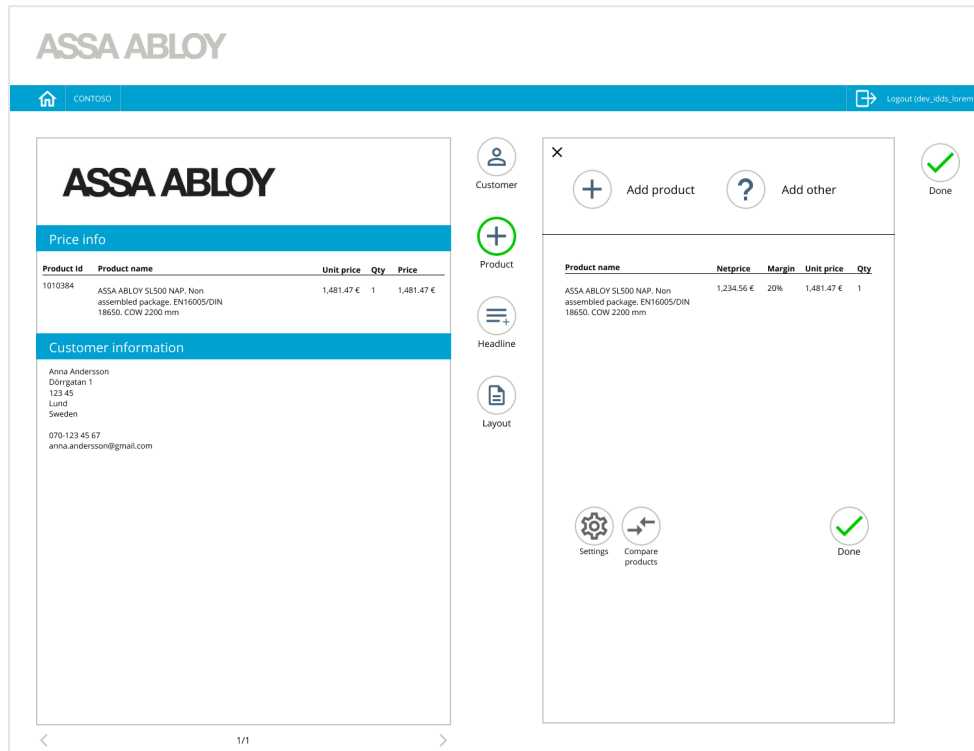

Figure 19. Frame of add products page

The add products page is shown in figure 19 and can be accessed through clicking the product category. A product is added through clicking the add product icon. The user is then transferred to the products page seen in figure 20. When a product is added the product, netprice, margin, unit price and quantity is shown on the right side. This information can be edited by the user, except for the net price, which is the price Assa Abloy Entrence Systems is selling the product to the customer for. The product id, product name, unit price, quantity and price is shown on the left side. This is an overview of the quote shown to the customer.
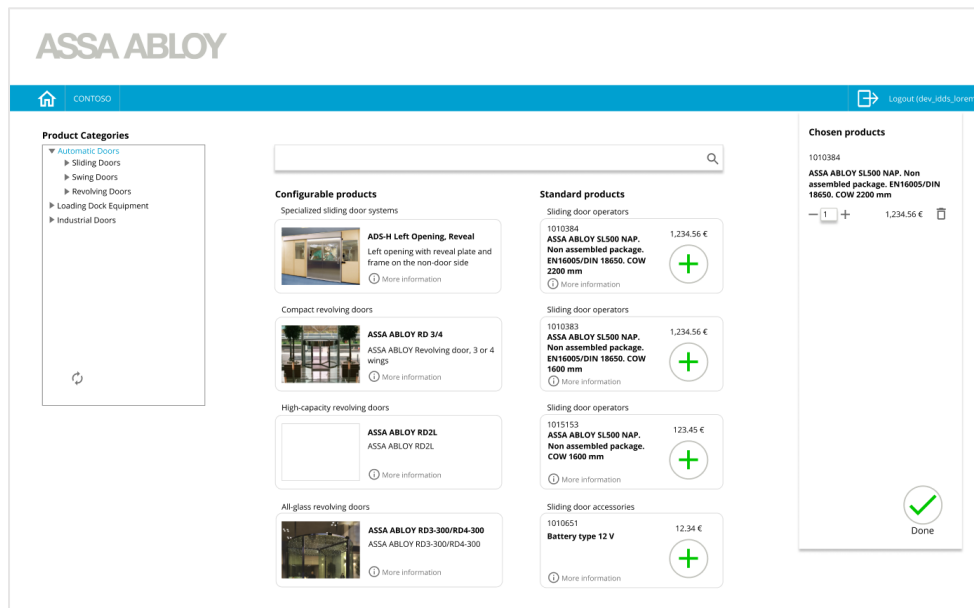
Figure 20. Frame of products page

In figure 20 the page for adding products to the quote is shown. The products can be searched through the product categories or the search bar. When adding a product, this is appearing on the chosen products list to the right. Two product categories exists, configurable products and standard products.
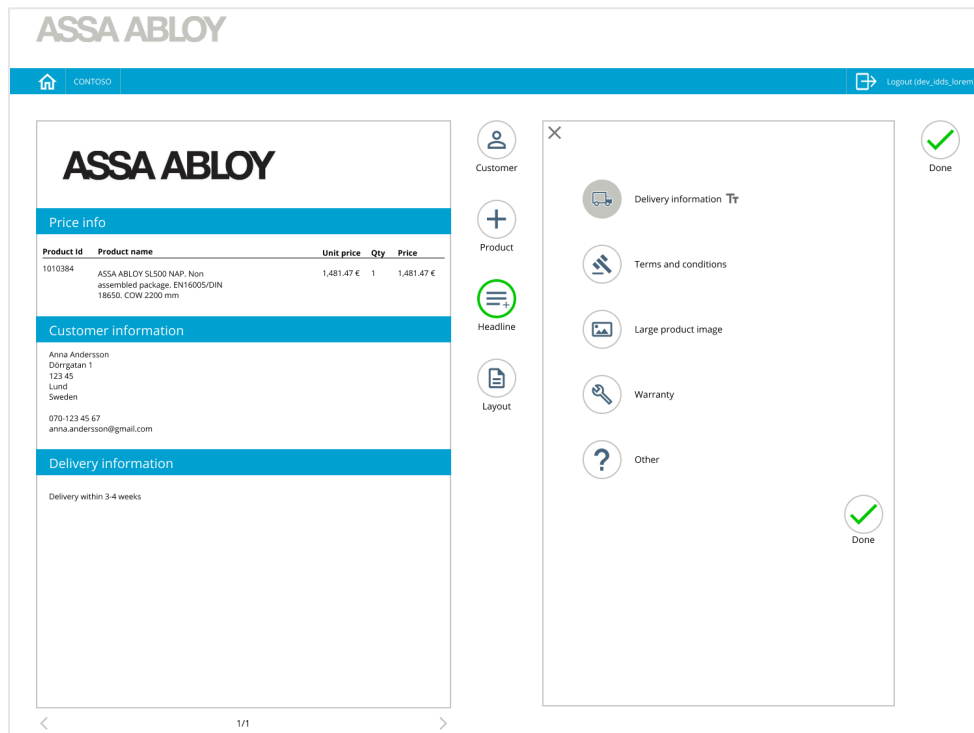
Figure 21 Frame of add headline page

The add headline frame is shown in figure 21. The category is accessed though clicking the headline icon. When clicked, different headlines such as delivery information, terms and conditions and warranty can be added to the quote. This is done by clikcing the icon to the left of the text. The text is edited through the text symbol. The information is added to the overview of the quote on the left side of the frame.
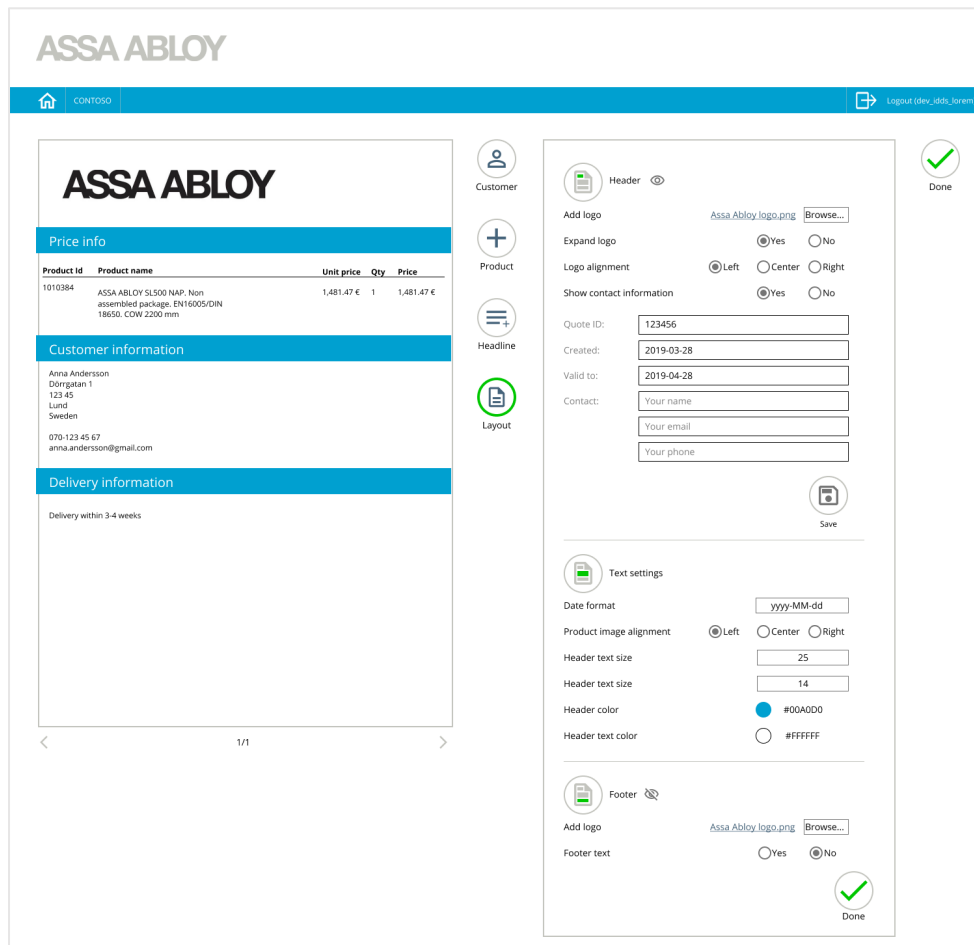
Figure 22 Frame of layout settings page

The layout settings are shown in figure 22. The information shown is divided into three categories, header settings, main settings and footer settings. The quote layout can be altered and saved. The layout settings made will be the default and will be appearing on the next quote made.

When the quote is finished, the done button in the tope right corner is clicked to complete the quote.

6.3.2.2 *User T*esting

The chosen test group were employees within Assa Abloy Entrance Systems working within Entrematic and PDS Export. The test group for iteration two was similar to the test group for iteration one in knowledge and experience,

but with some new individuals. All testers were potential users with different knowledge of the existing program. All testers had a basic understanding for Assa Abloy products and could therefore quickly familiarize with how the program worked product-wise.

All users were given the same introduction to the program and the prototype to had similar prerequisites. The test were more detailed than during iteration one. More functions were added and a more complete workflow was tested. This made it possible to test the overall experience of the sales tool. The users were encouraged to think aloud and think freely regarding any upcoming idea or feedback. The users were informed the tested prototype was not a finished product and that feedback were to be implemented in the final solutions. The users were also informed that all data collected would be anonymous.

During the user test some mistakes with the prototype occurred, these were immediately changed before the next user test. Iteration two was also tested by the development team to verify that the concept could be implemented.

6.3.3 Results

Table 5. Summarized observation results from iteration 2

Concept	User comments
Choose customer	The results of the choose customer interaction was well received among the test persons. The drop down was appreciated and no test person had problems using this function. One user claimed "I like the simplicity and understand it fast". Several users did not understand why the save button had to be clicked before the information could be added to the quote, since this information already existed in the system.
Products page	In general, the interface was liked but the users wished for detail changes. Details commented on was wanting the same information for both standard products and configurable products, this including picture, button for choosing the product and ID-number. The number of products added wished to be changed manually instead of changing the quantity with the plus and minus signs.
Add products	Several test persons did not understand the margin, unit price and quantity were clickable and could be changed on the right editable side. One test person wished to be able to change the order of the headlines appearing on the quote. Several users found in confusing with two done buttons on the same page. One user claimed that there were several clickable areas on the right side, which created confusion.

|	
Add headlines	The initial feedback was good from the user testing. The users understood how to add information and liked the thought of pre determined texts to add to the quote. The test persons did not understand that the text could be edited though the text symbol.
Layout settings	The layout settings received mostly good feedback. One user claimed "It is a lot of information shown on this page but the categorization makes it visual". The categories header setting, main settings and footer settings received good feedback and the test persons found it easier to navigate. The round symbols in the three categories was interpreted as clickable by one test person. One user though the three categories of settings could be more visible with a bold text.
Other feedback	Other requests made by the users was that they wanted to able to name a quote based on the project it belonged to. One user claimed "Everything felt very natural" and another claimed "I like the overview on the left side and that the changes made always are visible".

6.3.3.1 Conclusion

When entering the second iteration the research team was able to extend the target group but chose not to. After five user tests the information was saturated and all test persons commented on similar details. The goal of the iteration was reached by finding details to develop and redesign. The data was therefore saturated. As a result some test persons could be saved for the third iteration were the research team wanted to achieve a test with higher statistical security.

The choose customer page reveived good feedback and only minor changes were made in iteration three. The details commented on in the products page was changed for iteartion three. In the add product page, the project team wanted to make some layout changes based on the feedback received on confusion from several clickable areas.

The add headlines page worked well in the testing. The project team wanted to clarify what information was added to the quote when clicking an icon and wanted to replace the text symbol. The results received on the layout settings page was considered and changed for iteration three.

In general, several users addressed the issue of seeing two done buttons on the same page, this since there always is one done button in the top right corner to complete the quote. This was something the project team wanted to change and a decision was made to redesign and move the done button for completing the quote. The moving of the button led to the possibllity to make the overlays bigger.

Since the function of being able to change the order of the headlines on the quote did not exsist, the project team wished to add this function. An exstensive brainstorming and concept generation was initiated to find the location for this function. The project team came to the conclusion that the best location to insert this function was in the headlined page. The page was redesigned several times and eveolved after the test from iteration two. The redesigns of headline page is shown in figure 23.
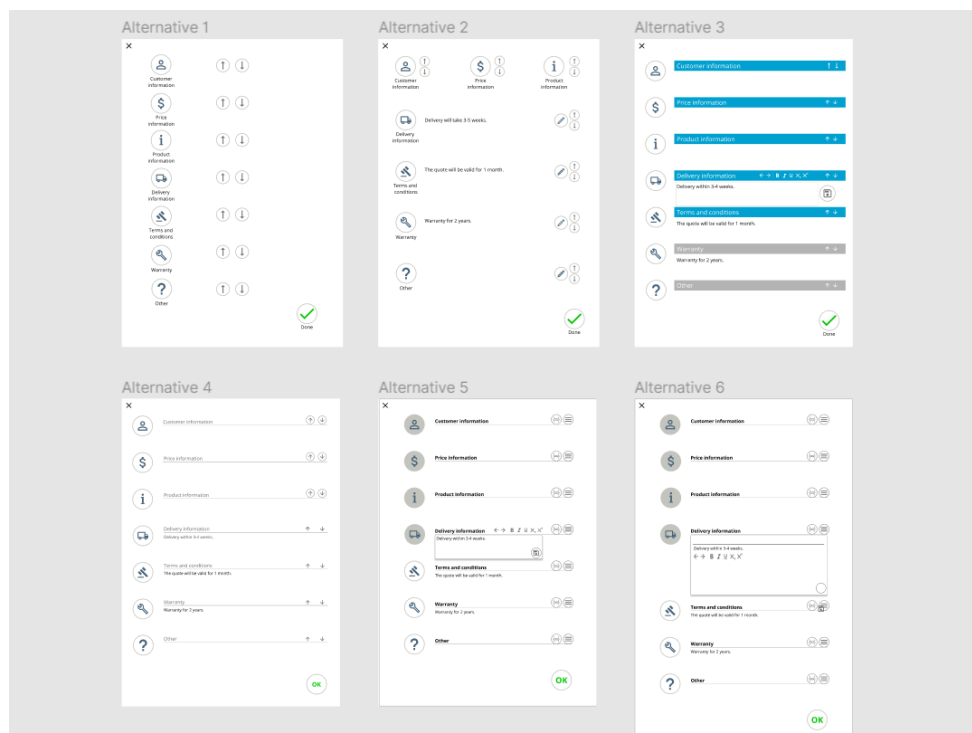
Figure 23. Redesigns of headline page

The project team wanted to add a project name to the quote, this to be able to sort quotes based on projects. For this to happen, the overview page had to be created. The feedback from the development team were implemented in iteration three.

6.4 Iteration Three

6.4.1 **Goals**

The goal with the third iteration was to perform the last user test and gather enough statistically secure data. The data was gathered to determine if the project goals were fulfilled in the discussion.

6.4.2 **Process**

6.4.2.1 High Fidelity Prototyping

The third iteration started with implementing the changes determined in the conclusion of iteration two. The structure of the prototype was organized to improve the workflow and promote easy changes. To complete the experience of creating a quote the entire workflow was designed.

Examples of frames from the redesigned high fidelity prototype are shown in figure 24-28.
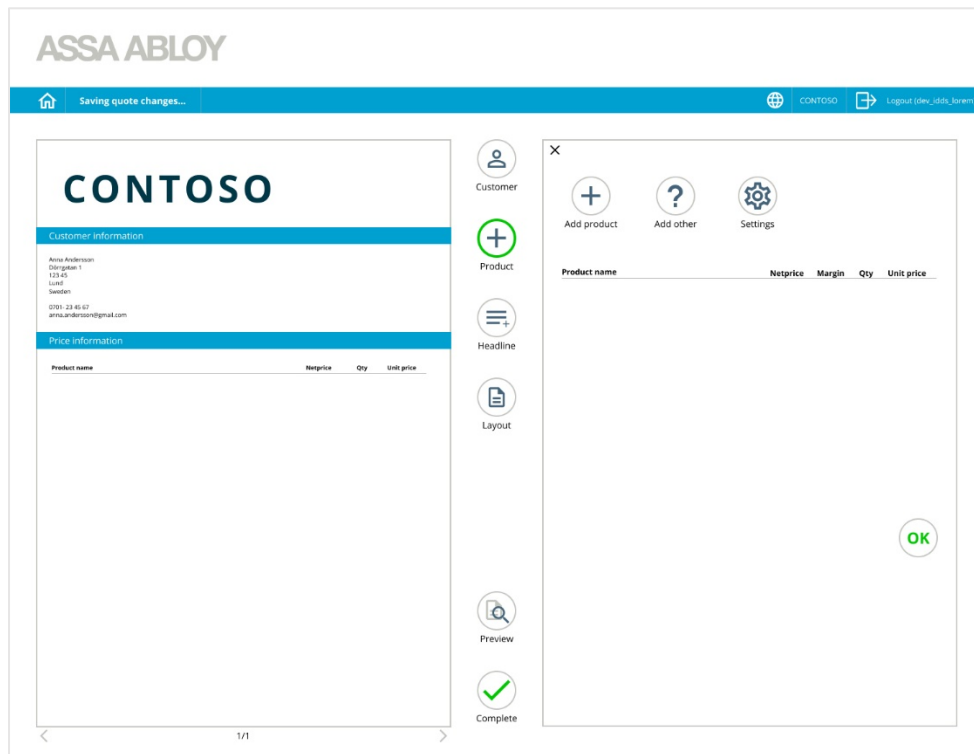
**Figure 24. Redesigned add product page**

In figure 24 the redesign of the add product page from iteration two is presented. The clickable areas have been limited to the top of the overlay and the order of the headlines have been changed on the overview of the quote. The same functionality remains. The done button from iteration two has been moved and redesigned to a complete button. The done button in the overlay were redesigned to an OK button. The OK button is placed in the right bottom of the screen.
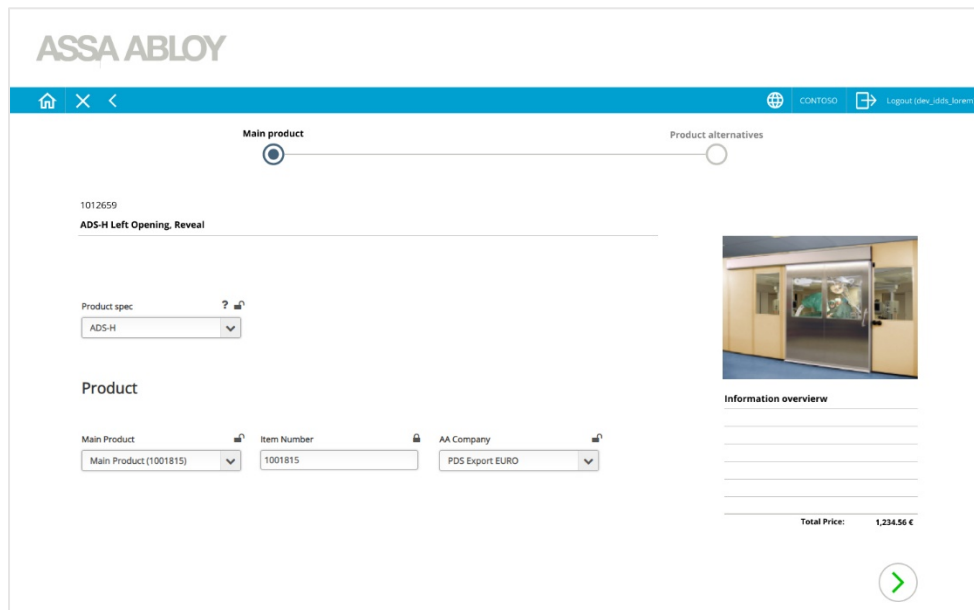
Figure 25. Frame of configuration page

In figure 25 the configuration frame is presented. This frame was added in iteration three. The project team made minor redesign of the user interface since the configuration was outside of the project scope. The page was created to ensure the user received the full experience of using the tool.
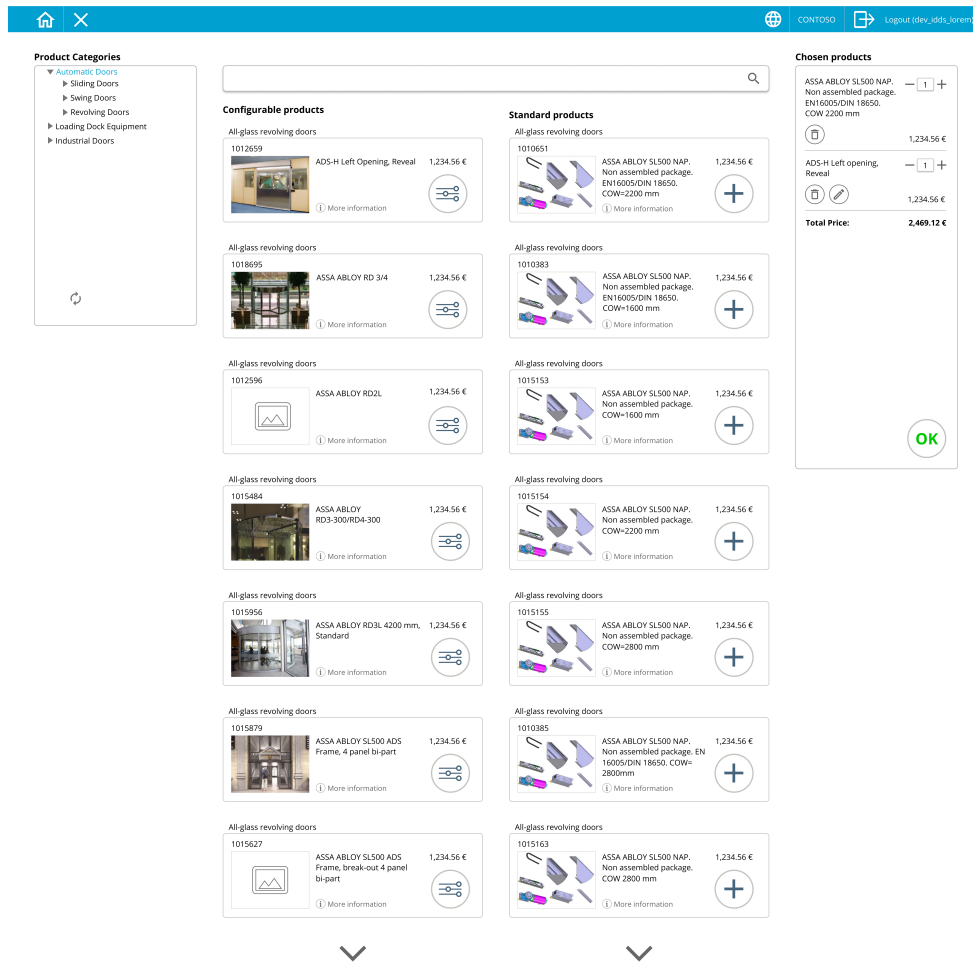
Figure 26. Redesigned product page

In figure 26 the redesigned product page is shown. Commented details from iteration two such as an icon for configurable products and pictures for standard products was added. In the redesigned product page the information bar for configurable products and the standard products have the same esthetics.
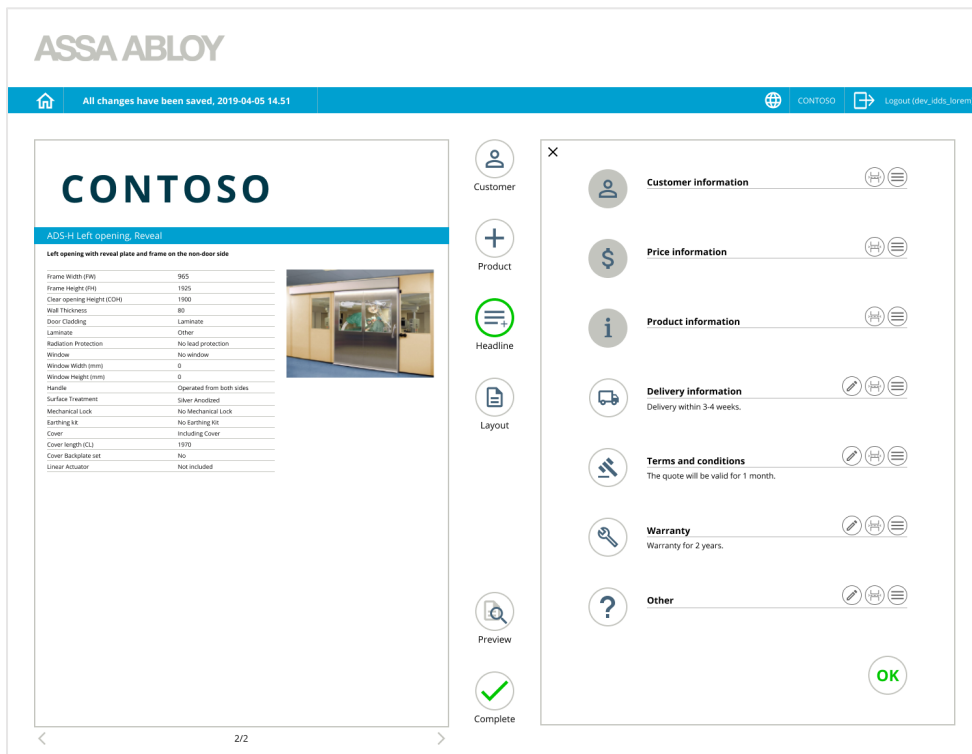
Figure 27. Redesigned add headline page

In redesigned add headline page shown in figure 27 the changes requested in iteration two has been changed. The headlines are added to the quote immediately when clicking the corresponding symbol. The grayed out symbols represents the headlines added to quote. The order of the headlines can be changed through the symbol furthest to the right with three horizontal lines. The symbol is clicked and dragged to change the order of the headlines. A page bread symbol has been added. The pen symbol has been added to edit the headline information. The information added is now visible on the overlay.
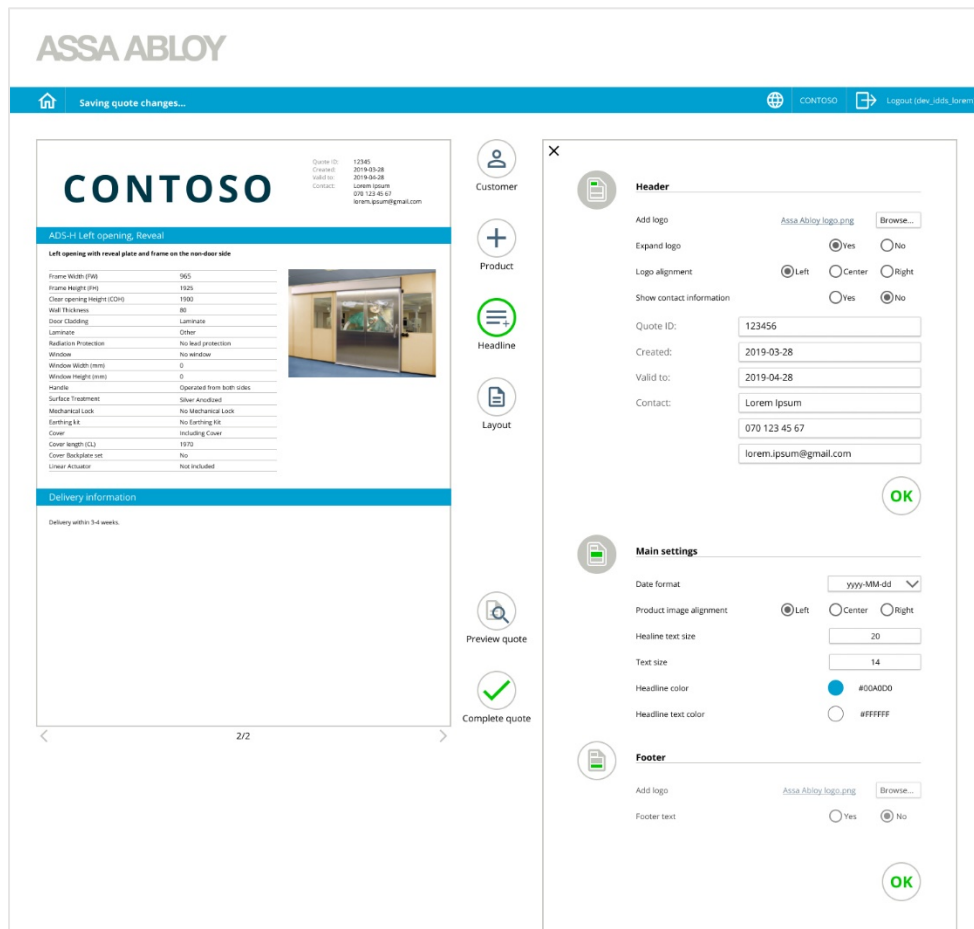
Figure 28. Redesign of layout settings page

In the redesigned layout settings page shown in figure 28 the icons for header, main settings and footer are now clickable to hide the information on the quote. The grayed out icons symbolize that the information is added to quote.

6.4.2.2 User Testing

The chosen test group were employees within Assa Abloy Entrance Systems working within Entrematic and PDS Export. The goal was to get higher statistical security by testing on a larger test group. Therefore the test group consisted of 11 people. The test group had various prior knowledge of the sales tool but had knowledge regarding products from Assa Abloy Entrance Systems. About half of the test group, six out of eleven test persons, had no experience from the sales tool before the test. They did not take part in testing

prototype one or two. This part of the test group therefore symbolized the intended end users.

For iteration three a test plan was created and followed by the test person. The test plan can be found in appendix B.1 Test Plan. The user test started with the project team introducing themselves, the plan of the user test, and the project, depending on the prior knowledge of the test person. The test person was encouraged to think aloud according to the think aloud method. According to the test template the test person adapted the role as a distributor in the test. The test began when the test template was handed out to the test person. After the test, a survey with graded answers was answered by the test person and an interview with open questions was performed.

The project team had different roles during the tests. One person adapted the role as a test leader answering questions and observed the test person. The other person adapted the role as a note taker during the whole test. The test environment was a conference room at Assa Abloy Entrance Systems with no other participants then the test leader, note taker and test person.

The data collected during the test was objective quantitative data, subjective quantitative data and subjective qualitative data. The objective qualitative data were the notes taken during the observation. The subjective quantitative data was the answers from the survey. The subjective qualitative data was the data gathered in the interview.

6.4.3 **Results**

6.4.3.1 *Objective Qualitative Data*
During the user test observation notes were taken to collect objective qualitative data. Summarized answers can be found in table 6.

Table 6 Summarized answers from user observations in iteration three

| Task	Area	Summarized answers
Add customer	*Customer*	Most users solved this task very fast and without difficulties. The users appreciate the drop down function and can easily find the customer Anna Andersson. Several users think that this step is easy and according to one user it feels "crystal clear".
Add products	*Products*	Most users solved this task easily and appreciated the simple and clean layout. The users gave complements for the overview of the shown products when using the tree. All users implemented the configuration without difficulties and several users appreciated a clear start and end. Several users appreciated the overview of chosen products. Some users commented on the icon for configurable products. They found it confusing that it differs from the symbol used for standard products.
Show extended product information	*Price and product-settings*	Some users thought it was easy to understand where to find the settings while some thought it was hard to understand where to do the settings. Several users commented that the problem is not the placement of the settings itself, but the name. For some users settings means settings regarding the program and not the products and price. Most users commented that they will learn while trying and that it will not be a problem to find the settings.
Add delivery information	*Headlines*	Most users solved the task easy without any difficulties. The users found it easy to understand how to add information by clicking on the icons. Some users found it hard to understand the *page break* icon and the *move headline position* icon. Most users understood the *page break* icon after explanation but several users wanted to change the *move headline position* icon to arrows. Most users commented that they will learn the symbols and icons fast. They thought the program is self-learning and that you will learn by trying.

Show contact information	*Layout*	Most users found the layout settings very logical, easy and a fine layout.
		All users solved the task very fast and without difficulties.
		Most users appreciated the freedom in the layout settings.
		Some users thought it was unclear how to show header and footer and how to take those away.
Preview	*General*	All users appreciated the preview page and founded it very clear.
		Some users requested the project name on the quote and wanted to see this on the preview page.
Complete quote	*General/ Manage quote*	Most users appreciate to have complete as the last step.
		Most users like that it is very visible that the quote is downloaded
		All users appreciated that the user is automatically taken to the manage quote page after the quote being downloaded.

6.4.3.2 *Subjective Quantitative Data*

After the user test was performed a survey was answered by each test person to collect subjective quantitative data. The results are presented in figure 29-33.

How do you experience the structure of the quoting tool?
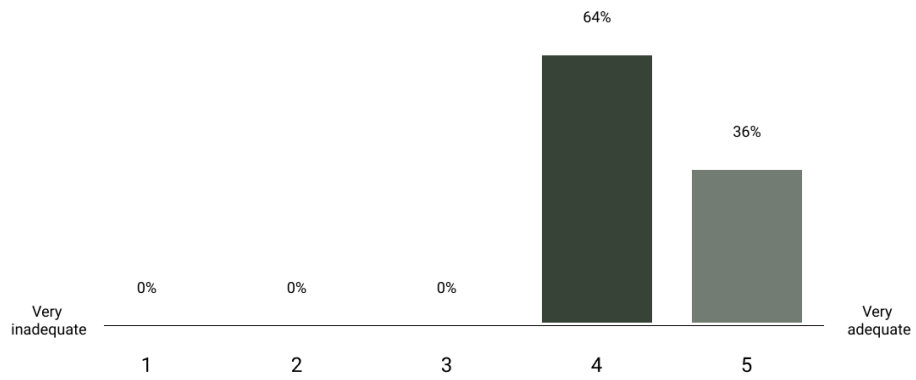
Figure 29

How do you experience the guidance of the quoting tool?
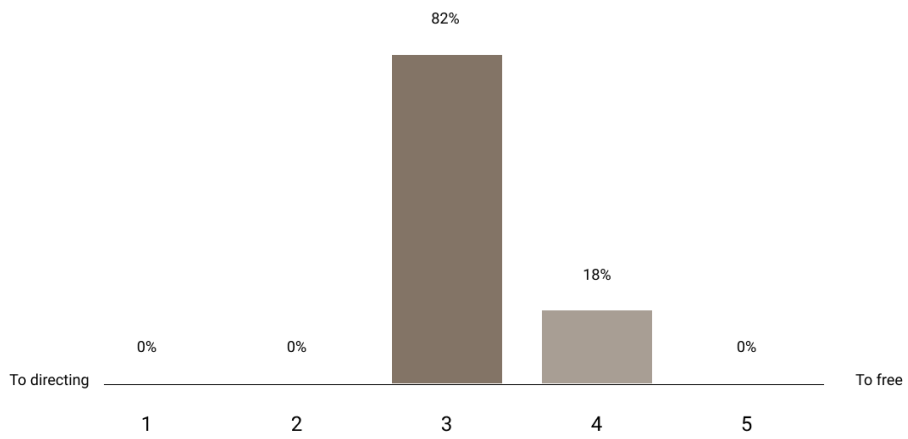
Figure 30

What level of difficulty of learning the quoting tool?

54.5%

45.5%

0%   0%   0%

Very hard   Very easy

1   2   3   4   5
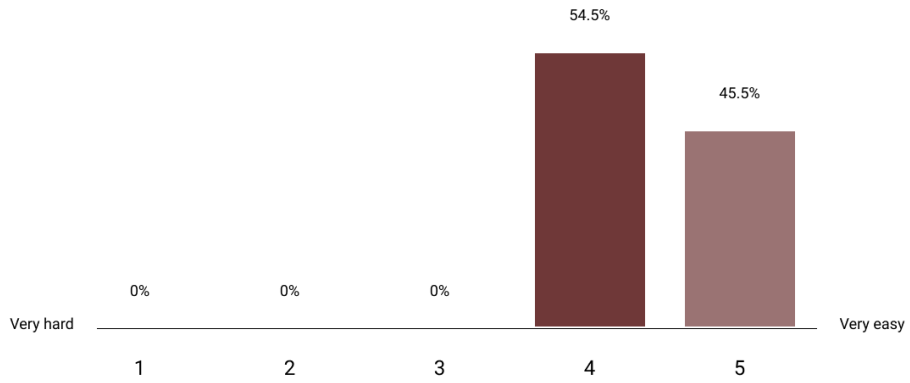
Figure 31

How are you experiencing the workflow of creating a quote?

54.5%

45.5%

0%   0%   0%

Very unnatural   Very natural

1   2   3   4   5
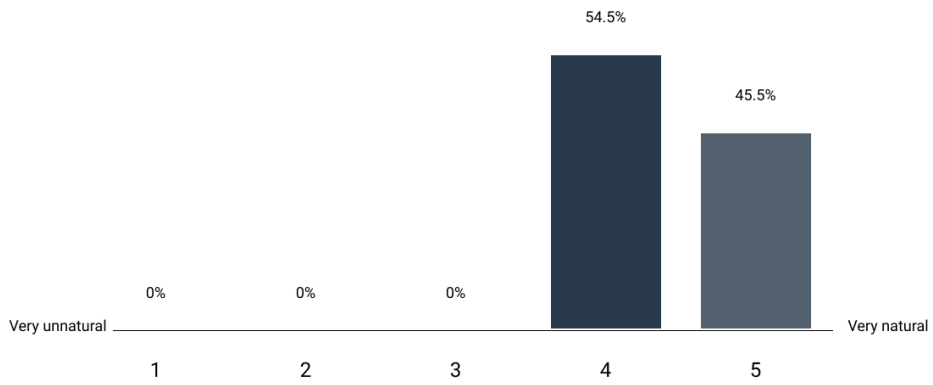
Figure 32

How are you experiencing the feedback from the quoting tool?
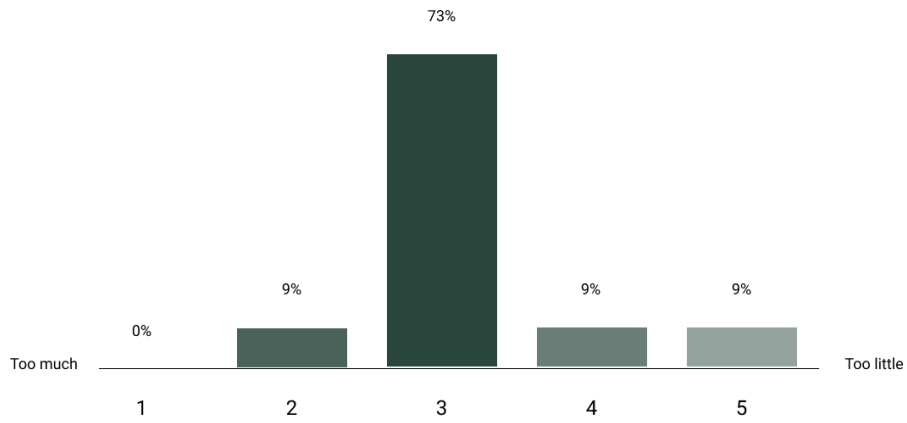
Figure 33

6.4.3.3 *Subjective Qualitative Data*

After the user test the test leader performed a short interview to collect subjective qualitative data. Summarized answers can be found in table 7.

Table 7. Summarized answers from interviews in iteration three

Interview question	Summarized answers
What is your general experience of the sales tool?	Most users appreciated the overall layout of the tool and several users commented that it was user friendly, good looking and simple to understand. One user commented "In my daily life one can work with ten processes at the same time and therefore a good overview is of utmost importance. This program fulfil this."
	They liked changing settings on one side and that the settings where instantly mirrored on the other side. The mirror gave the user instant feedback and several users commented that it made the sales tool feel safe.
	Some users claimed that it was hard finding all functions necessary to complete the test template. But they also commented that the sales tool is easy to learn by yourself and by trying the program ones you know how to use it.
	Some test persons with knowledge regarding the old sales tool appreciated that the old sales tool has not reached the distributors yet since they knew sales tool is easier, better looking and more user friendly. They also claimed that no training will be necessary to the distributors since the program is self-learning.
	Several users appreciated the guidance in form of the clickable categories in the middle. Some users referred to these as a time line and they felt safe working with it.
What did you think was hard with the program?	Several users thought nothing was hard with the program and choose not to answer this question.
	Some users found it hard to understand the "page break" icon and the "move headline" icon. They also claimed that they would learn by performing tasks and that the icons would be no problem.
	Some users thought the part concerning "show extended product information" in the test plan was confusing. They did not understand were to find it in the program and asked the test leader for help. They also claimed that the program is self-explanatory and without the test template they would try the different functions in the program to learn it.

How did you experience the different saving features?	Most users found the saving features to be adequate, felt natural and provided security. They found the last step, complete, to be a clear end to the task.
	One user claimed "For me, it feels safe to tick off data by saving or clicking ok."
	Some users did not understand that the program saved the quote while working. They thought that the quote was saved when clicking on complete.
Is there anything you would like to change in the tool?	Several test persons chose not to answer this question. They consider the program to be natural and self-explanatory and that no clarifications were needed.
	Several users felt the setting icon in the product category to be a bit unclear. They considered the name setting to be settings to the software or similar and suggested that the name or the icon to be changed.
	Some test persons had comments regarding different icons but most of these test persons also claimed that it is hard to fulfill all needs and that all users have different opinions and that it would be hard to fulfill all wishes.
Do you consider the program to be easier to use the second time you would use it?	Several users commented that the sales tool is easy to use even the first time but that it would take less time creating a quote the second time. One user said "I am very exploring and want to click around to learn it, therefore it takes a long time the first time I am using the program"
	Some test persons also claimed that you don't have to remember the functions and that the program is self-explanatory.
Do you consider the program to promote trial and error?	All test persons consider the program to be very forgiving and enabled trial and error. They claimed the program to be safe and therefore they felt safe to try to click on different functions in the program.
	One test person appreciated that the icons were clickable and that it made it easy to repent

6.4.4 Conclusion

Some details were misunderstood by several individuals in the test group. Therefor these detail changes were performed:
- A redesign of the setting symbol on the add product page
- An ID-number was added to chosen products in the products page

- A redesign of the click and drag icon on the add headlines page
- The clickable symbols in layout was changed
- Product details were added in the configuration of the products

In general the result received on the tool was positive. The results were considered statistically secure since the tests were performed on 11 test persons. The goal of the third iteration was fulfilled though establishing statically secure results. A thorough analysis of the results will be presented in the discussion.

7 Deliver

In Deliver the final concept will be presented.

7.1 Presentation of Final Concept
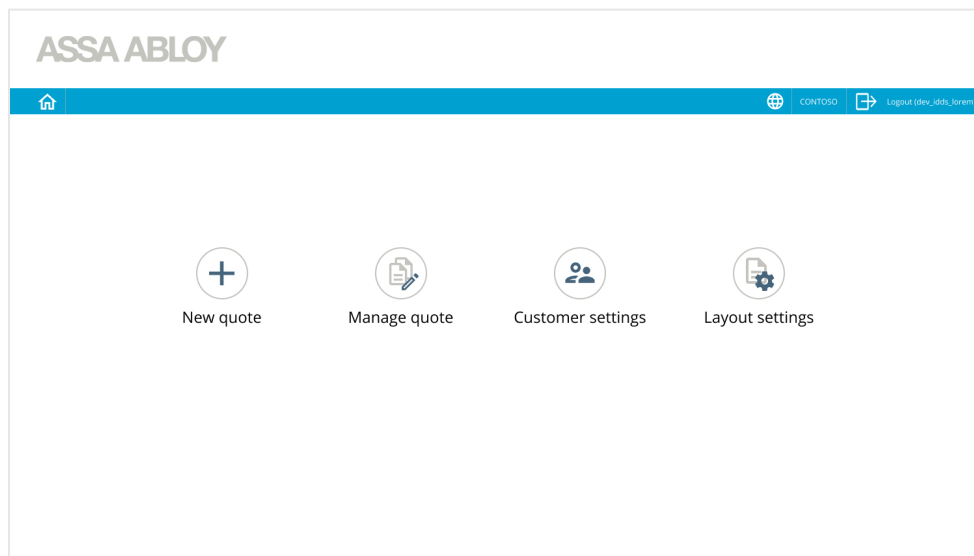
Figure 34. Frame of home page

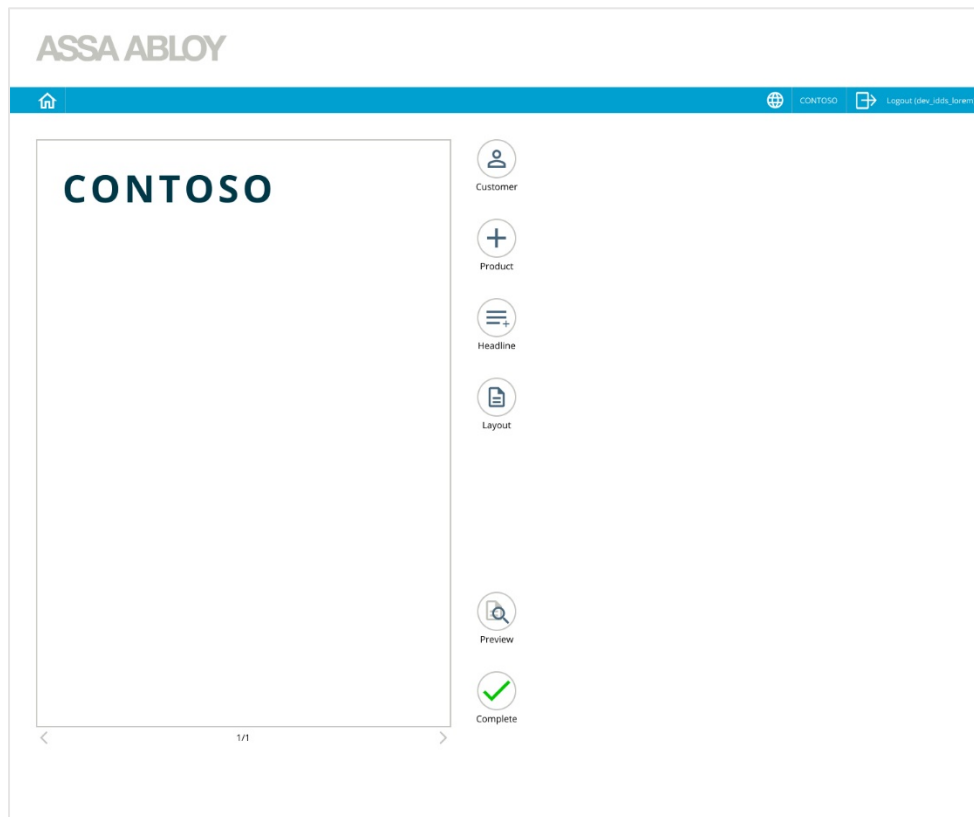The home page consists of a header where login-information and language settings is shown. The four buttons represent the pages which can be accessed through this page. These are New quote, Manage quote, Customer settings and Layout settings. When clicking new quote the user is taken to the next page.

Figure 35. Frame of quote page

When clicking New quote the user is being transferred to this page, the quote page.

On the quote page an empty quote is visible on the left side and options on categories to add to the quote are shown vertically to the right of the quote. The categories are Customer, Product, Headline and Layout. Preview and Complete are also shown further down.
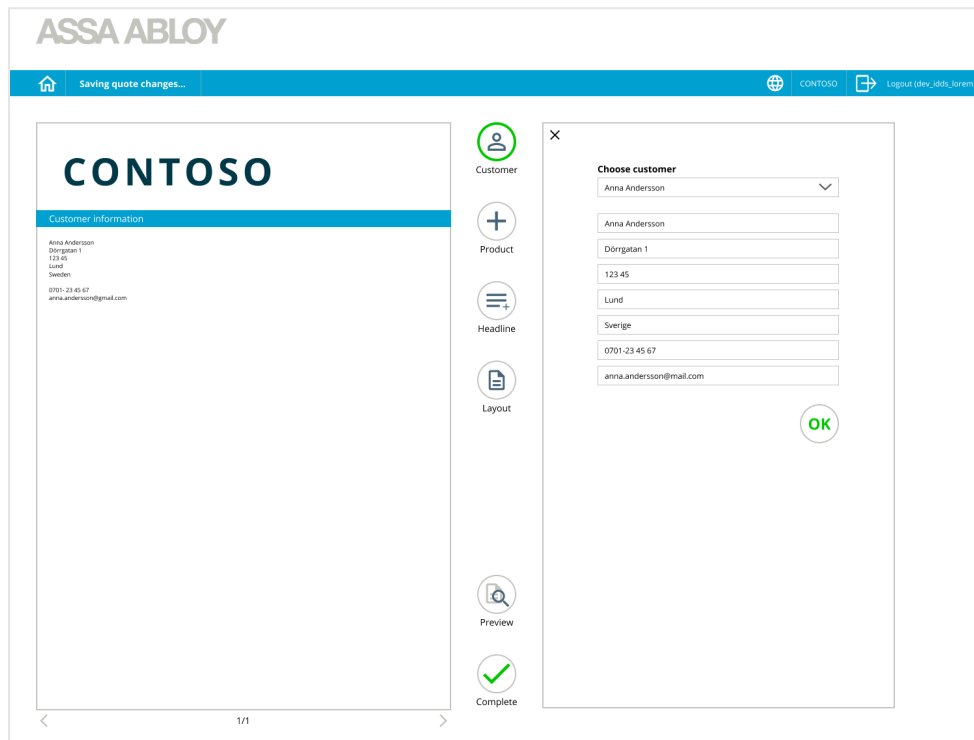
Figure 36. Frame of customer page

When clicking on customer an overlay is appearing on the right side of the categories. The different users can be accessed through a drop down on the top of the overlay page. When clicking this the contact information is transferred to the quote overview to the left. When the customer has been chosen their contact information can be reviewed before clicking OK to close the overlay.
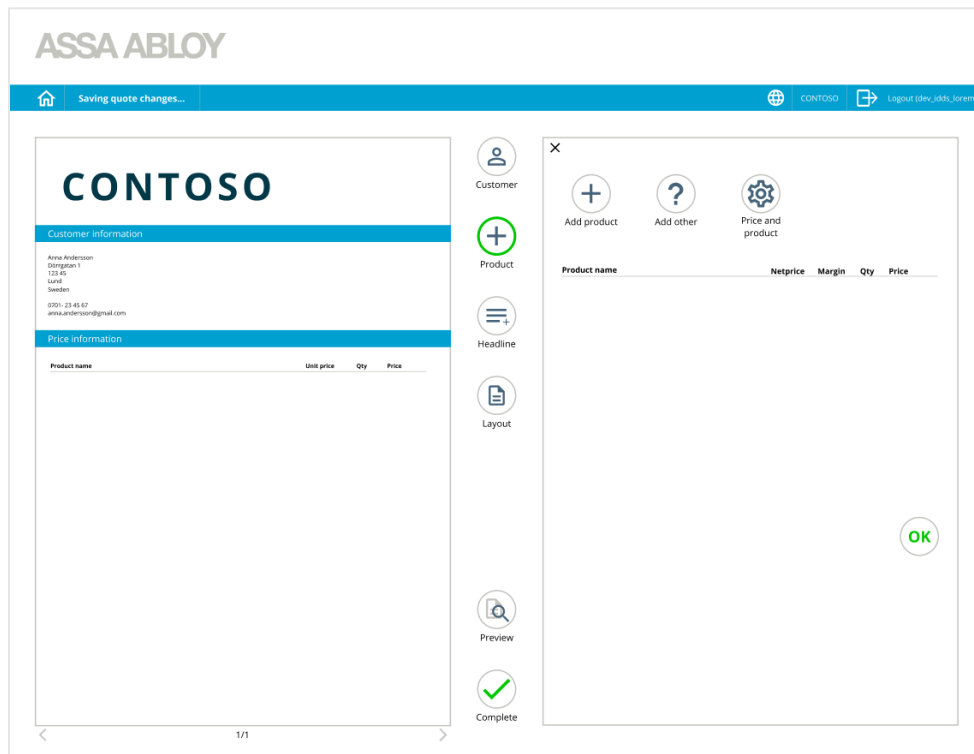
Figure 37. Product page

When clicking on product, a new overlay is appearing. This contains three buttons called Add product, Add other and Price and product.
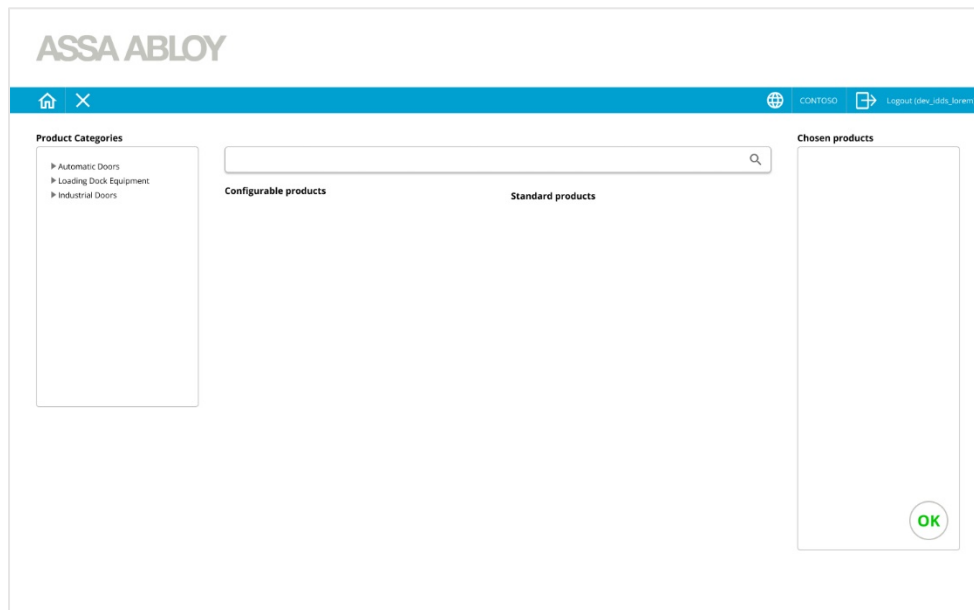
Figure 38. Frame of add product page

When entering the product page, products can be searched through the search bar or through the product categories Configurable products and Standard products have two different categories. To the right there is a chosen product area.
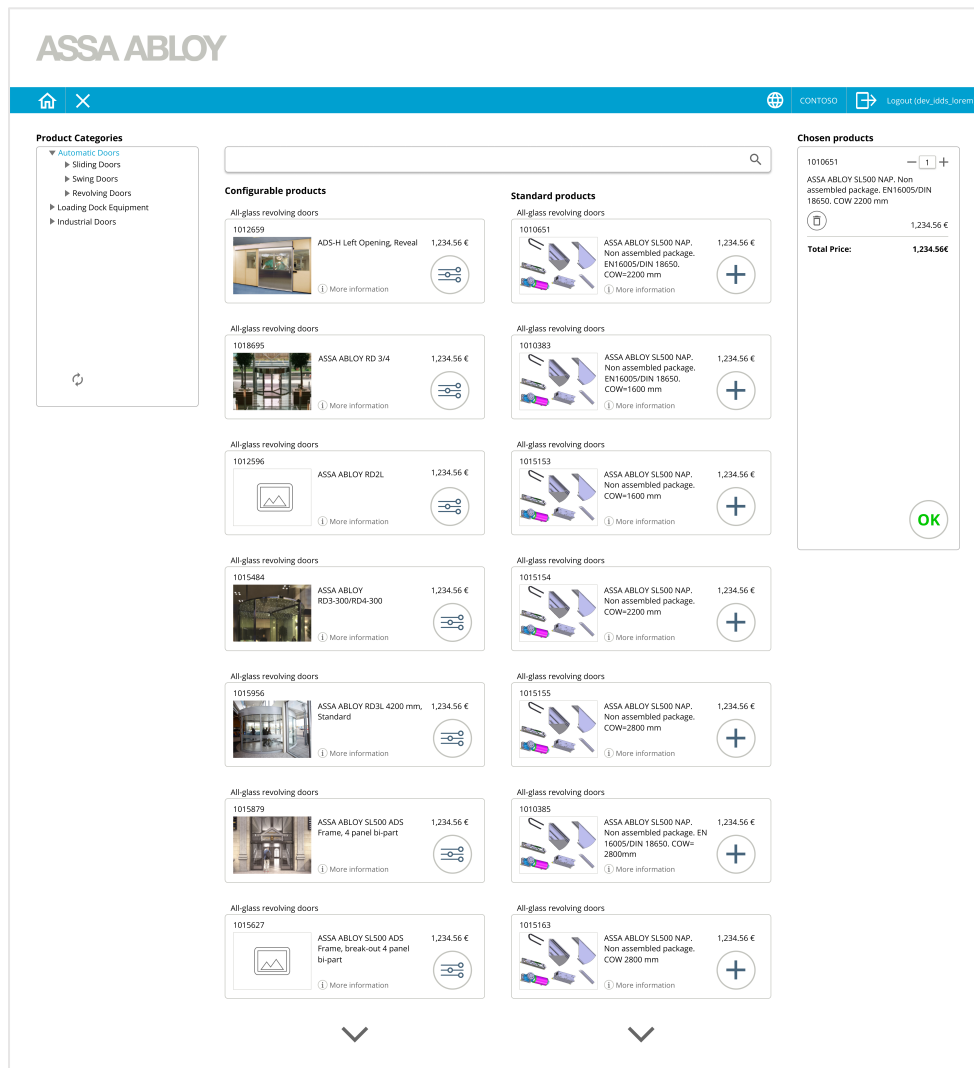
Figure 39. Frame of choose product page

When clicking on Automatic doors in the product categories, all products in that category is displayed. The user can continue clicking in the tree to sort products, or look for the product in the list displayed. When the right product is found, the plus button is clicked to add a standard product to the chosen products list. When adding a configurable product to the quote configure icon is clicked. The difference between the configure button and the plus button is that the plus adds the product immediately to the quote. The configure button means a configuration has to be completed before adding the

configure product to the quote. When all products are added the green Ok button is clicked.

Figure 40. Frame of configuration page

When clicking the configuration button, configuration is completed by making decisions regarding what the product should contain. A timeline is showing on top of the page to visualize the steps left to complete the configuration. The product specification listing can be found to the right. If the user wish to cancel the configuration, the arrow or cross in the header is clicked. If the user wishes to add the product, the green forward button is clicked.

Figure 41. Frame of product page

When the products have been added, the user returns to the quote page. The margin, quantity and unit price can be edited on the right side of the page. The left side shows an overview of what will be viewed by the customer. Other settings can be made in this page like extend product information. When the information has been added, the quote is two pages long and therefor there is now ½ underneath the quote overview to the left. When all information and products have been added, the OK button is clicked to close the overlay.
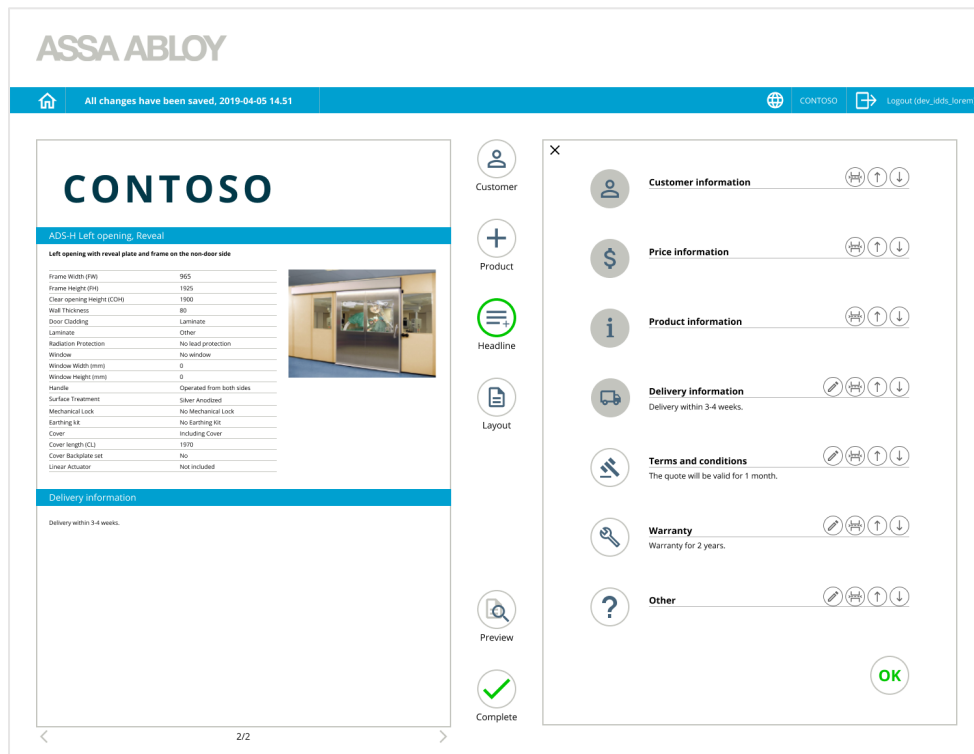
Figure 42. Frame of headline page

The next category is headlines. Here other information can be added to the quote, like terms and conditions, warranty and delivery information. The color of the symbol represent if the information is showing on the quote or not. When clicking the symbol, a headline and text is added to the quote. If the user wish to change the information or switch the order of how the headlines appear, this can be done with the symbols to the right of the headline text.
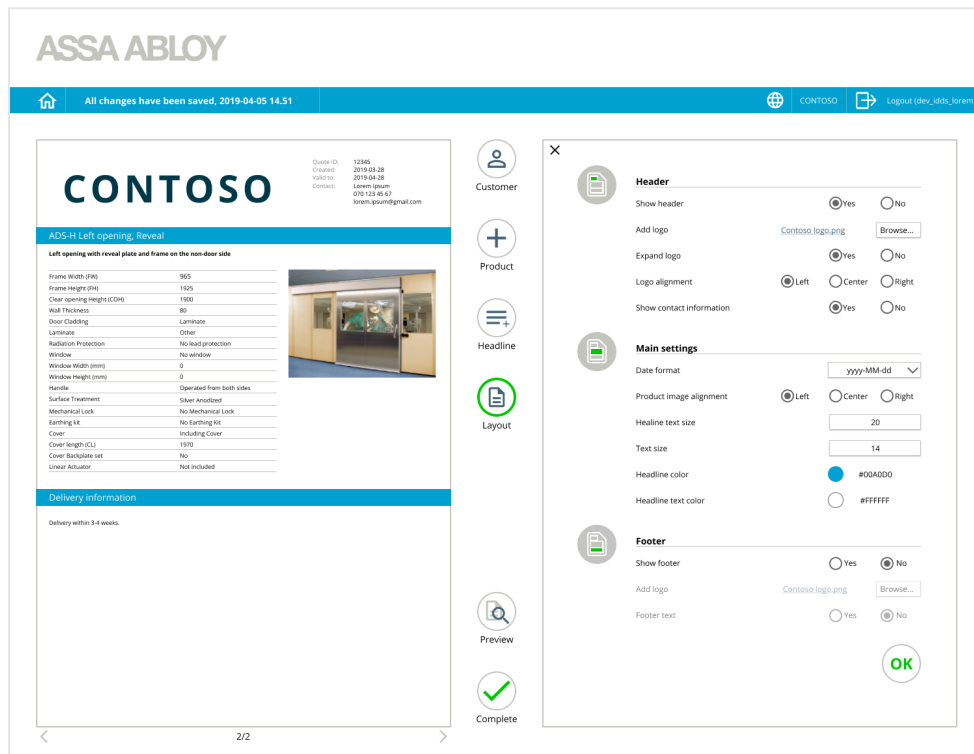
Figure 43. Frame of layout page

When clicking the last category Layout, a new overlay is appearing. In this category layout settings can be changed. A header and footer can be added and main settings can be made. The settings are saved and appears on the next quote made.

When clicking preview a bigger version of the quote is shown, and complete is making the quote get a completed status, for you as a user to see which quotes are started and which are finished. This is seen in the quote overview, which the user also can access though the manage quotes button in the home page. During the whole process, the quote has been auto saved, which can be seen in the blue header saying the quote has been saved.

8 Discussion

This chapter will discuss issues related to the design process, methods used, results and future prospects.

8.1 Results

In the *Define* phase a needs analysis was created to transform the collected data presented in the affinity diagram into needs. The needs analysis together with the project definition represented the goal of what the final concept should fulfill to be successful. The needs from the needs analysis was therefore compared to the test results from the third iteration to determine if the goal of the project has been fulfilled.

Provides easy navigation, both back and forth
According to the first established need the program should provide easy navigation. From the summarized answers from observations shown in table 6 the test persons found it easy to understand how to move back and forth in the tool. Therefore this need is fulfilled.

Provides guidance
The second established need expresses that the sales tool should provide guidance. According to a question from the user survey, shown in figure 30, 82% of the test persons found the guidance to be at a good level between free and directing. From the summarized interviews shown in table 7 several users appreciated the guidance provided by the clickable categories in the middle of the page. Some users referred to these as a time line and they felt safe working with it. As a summary the project team consider the need fulfilled.

Provides tasks with a clear start and end
The third established need phrase that the system should provide tasks with a clear start and end. According to the summarized answers from the interviews presented in table 7 most users found the saving features to be

adequate, natural and secure. They found the last step, complete, to be a clear end to the task. One user claimed "for me, it feels safe to tick off data by saving and clicking ok" From the summarized observation results presented in figure 7 several tasks were completed with simplicity. As a summary the program provided tasks with a clear start and end. Therefore the need was fulfilled.

Provides an overview of the template
The forth established need expressed that the sales tool should provide an overview of the template. In the created concept the template function was removed but a clear overview was instead created in the quote mode. According to the summarized observation results presented in figure 7 most users liked the created overview of the quote. They appreciated editing the quote on one side and the changes were instantly mirrored on the other side. The reflecting feature gave the test persons instant feedback and several commented that it made the sales tool safe. The sales tool provided the test persons with an overview of the quote and the need was therefore fulfilled.

Provides clarification between quoting mode and template mode
The fifth established need is fulfilled by removing the template mode.

Provides a preview of the template
The sixth established need phrase that a preview of the template should be established. The template mode is removed and therefore a preview of the template is redundant. To give the user a clear preview of the finished quote a preview function was added. According to the summarized observation results shown in figure 7 all test persons appreciated the preview page and founded it very clear. The need was therefore fulfilled.

Provides clearer workflow
The seventh established need expressed that the sales tool should provide clearer workflow. According to a question from the user survey, shown in figure 32, 45.5% of the test persons found the workflow very natural and 54.5% found it natural. The project team therefore considered the need to be fulfilled.

Provides continuous feedback during the workflow and provides feedback when performing specific tasks
The eight established need expressed that the sales tool should provide feedback during the workflow and when performing specific tasks.

85

According to a question from the user survey, shown in figure 33, 73% felt the system provided the test person with a good amount of feedback. Other test persons considered the feedback to be too much and other to be too little. According to the summarized interview answers presented in table 7 several users appreciated that the changes was instantly mirrored on the quote overview. The mirroring gave the user instant feedback and several users commented that it made the sales tool safe. All users have different preferences and the project team consider the given feedback to the test persons to be appropriate. Therefore the need was considered to be fulfilled.

Provides clarified error messages
The ninth established need phrased that the sales tool should provide clarified error messages. The project team has fulfilled this need by making a sales tool that enables trial and error. Very few error messages is needed and the ones created for the prototype was not entered by any test person.

Enables trial and error
The tenth established need expressed that the sales tool should enable trial and error. According to the summarized observation results shown in table 6 most users thought that the program was self-learning and that they learned by trying. According to the summarized interview answers shown in table 7 all test persons considered the program to be very forgiving and enabled trial and error. They claimed the program to be safe and therefore they felt safe when trying different functions in the program. The project team therefore considered the need to be fulfilled.

Enable options to save
According to the summarized interview answers shown in figure 8 most users found the saving features to be adequate, natural and secure. One user claimed the save and ok functions within the tasks to be good and created a feeling of security. Some users found it hard to understand that the program automatically saved the quote. At first the project team wanted to reject the function but according to the development team the function had to remain. After the received feedback the project team tried to clarify that the quote was automatically saved by making the text segments bigger. The project team then considered the need to be fulfilled.

Clarifies what settings can be made
The twelfth need expressed that the sales tool should clarify what settings can be made. In the created concept there was mainly two types of settings.

The first type was the layout settings that reflected the previous template. According to the summarized observation result most users found the layout settings very logical, easy and esthetically pleasing. All users solved the given task regarding the layout settings very fast and without difficulties. They also appreciated the freedom in the layout settings. In the sales tool some settings regarding the product and price were displayed in the setting symbol in the product category. According to the summarized observation results shown in table 6 some users thought it was easy to understand what settings could be made while others thought it was hard to understand where to find the settings. Several users commented that the problem was not the placement of the settings itself but the name of the icon. The name was therefore changed before the final prototype was created. The project team therefore considered the need to be fulfilled.

Clarifies what information can be added to quote and template
The thirteenth need phrased that the sales tool should clarify what information can be added to quote and template. The need was fulfilled by removing the template page, and in the created concept all information could be added directly on the quote. Therefore the project team considered the need to be fulfilled.

Clarifies how the template should be used
This need was fulfilled by removing the template and clarify all functions in quote. In the created concept the foundation of the quote was created in the category layout and as stated above most users found the layout settings to be very logical and easy. Therefore the project team considered the need to be fulfilled.

Provides an overview of added products
The last need expressed that the sales tool should provide an overview of added products. According to the summarized answers from user observation shown in table 6 several users appreciated the overview of chosen products. The project team therefore consider the need to be fulfilled.

8.1.1 Conclusions

For the project definition to be achieved the sales tool should be easy and quick to learn for new users and the needs analysis should be fulfilled. According to a question answered in the user survey shown in table 30 54.5% found the sales tool to be easy to learn and 45.5% found it very easy to learn.

Since these goals was achieved in the final concept, the project purpose of increasing the user experience and usability was accomplished.

If the concept of the project team is implemented by Assa Abloy Entrance Systems and used by the target group, the efficiency would increase and the structure in the organization would be clarified.

8.2 Design Process

8.2.1 The Design Process of this Project

The design process chosen for this project combines the double diamond process and human centered design. The project have been following the four phases in the double diamond process; *Discover*, *Define*, *Develop* and *Deliver* as stated in chapter 3 *Theory and Methods*. Human centered design has been used as an approach and six design principle has been followed throughout all steps in the design project. This combination has worked well because the two methods complement each other by one being a structure and the other an approach. A design process is an iterative and dynamic process and in combination with the human centered design the user has been in focus during the whole process. The iterative process were used to get feedback from the users in different stages of the process.

8.2.2 Principles of Human-Centered Design

During this design project the research team has followed the approach of human-centered design. The principles are discussed to determine if the goal has been achieved.

The six design principles are:

1. The design is based upon an explicit understanding of users, tasks and environments
2. Users are involved throughout design and development
3. The design is driven and refined by user-centered evaluation
4. The process is iterative
5. The design addresses the whole user experience
6. The team should include multidisciplinary skills and perspectives.

The first four principles are connected and were fulfilled in their combination. The project team have worked with these through having interviews and observations, to understand the users. The users have been a part of an iterative development process where the prototype have evolved based on the feedback from the users.

The fifth principle have been followed to the best possible extent. The tested experience is limited to the interactions in the prototype. To test the full experience a test environment would need to be created. Due to the time limit of the project and limited possibilities at Assa Abloy Entrance Systems the test environment is addressed as a further development of the project. A trade of were made that the experience tested during observations would be enough for this stage in the project.

The sixth principle was hard to influence but was followed to the best possible extent. The project team have similar background, experience and knowledge and therefore external experts have been asked during the project to complement the knowledge within the project team. All prototypes was also tested on the development team at Assa Abloy Entrance Systems to complement the comments from the users and the knowledge and experiences of the project team.

Therefore the project team state that a human centered design approach has been followed during this project.

8.2.3 The Design Process in Collaboration with Assa Abloy Entrance Systems

The development team at Assa Abloy Entrance Systems has been a part of the entire design process since it has been important that the new concept will ultimately be implemented. The development team have given the project team the freedom to work in their own way, but the work has been adapted to the needs and limitations of Assa Abloy Entrance Systems. When creating an interface and working with users, there is always a trade off on what would be ideal for the users and what can be created in reality.

8.3 Methods

8.3.1 **Heuristic Evaluation**

Heuristic evaluation is a method where evaluators reviews the interface by using recognized usability principles. The evaluators should have different skill sets to discover different kinds of usability issues and therefore the project team choose to expand the team with one external expert. Another person was invited to the evaluation but was prevented and due to the time limit and limited number of experts in interaction design at Assa Abloy Entrance Systems, the valuation team consisted of three people.

8.3.2 **User Interviews and Observations**

During the initial interviews and observations a simplified test plan was created. This since the interviews and observations were not complex in their design and the purpose was to collect a wide range of information. The simplified test plan included a question template with general questions in order to receive open answers but within the same directions. A complete test plan with a test template would be too strict and would limit the information gathered from the test persons. The purpose of the initial user interviews and observation was to discover the project area.

When testing concepts in iteration one and two a test plan could have been used to plan and structure the information gathered. Initially the project team considered a project plan to be unnecessary since a test plan would decrease open answers. After using a test plan in iteration three the project team realized open answers could have been achieved with a test plan. The project team consider the data collected in iteration one and two is still valid since the goal was to choose a concept and not to evaluate the result.

The test plan used in iteration three was valuable to the project team. The test template increased the comparability in the test results. Du to time limitation no interviews or observation was filmed or recorded. There were no time to go through all material. The project team tried to write down word by word in order for the information not to be misinterpreted at a later stage.

8.3.3 Affinity Diagram

Several interviews and observations were performed in Swedish and were therefore noted in Swedish. Before the Affinity Diagram were created the notes were translated into English. Translating information can lead to misinterpretation and the project team tried to be careful when translating the words in a proper way.

In the process of the method each data is compiled and written on post-it note. The notes were clustered into groups and then named based on their contents and rated based on their priority. The clustering, naming and prioritizing was done by the project team, and could therefore be influenced by their opinions. In this process the project team was careful to review the answers so that the results would not be misinterpreted.

8.3.4 7 Fundamentals of Design

The data gathered in the heuristic evaluation was compiled and sorted in the ten heuristics. The heuristic evaluation data was considered a complement to the user observation data gathered in the affinity diagram. When comparing the two sources of data the areas overlapped and it was difficult to organize and evaluate the combined collected data. The information gathered in the heuristic evaluation was therefore restructured and sorted in the categories of 7 fundamentals of design.

8.3.5 Needs Analysis

The Needs Analysis is based on the results from the Affinity Diagram and can therefore be affected by possible misinterpretations in earlier stages of the process.

When the needs analysis was created, needs as "provide an overview of the template" and "clarifies what information can be added to quote and template" were established. These needs were affected by the evaluated sales tool. After establishing the project definition, the project team realized a template was not necessary. Therefore the final concept does not fulfill the needs concerning the template.

8.3.6 **Ideation**

In the ideation phase ideas and solutions were generated and prototyped. In the beginning of the design process the project team generated ideas on their own to avoid being influenced by each other. The concepts were then presented within the project team to inspire each other and generate new ideas. The varying approach of prototyping led to multiple concepts and ideas not connected to each other improving the ideation phase for the team.

8.3.7 **Prototyping**

The prototyping phase was performed in three iterations including both high fidelity and low fidelity prototypes. A low fidelity prototype was chosen in the first iteration for the project team to be able to test several concepts. A low fidelity prototype was chosen to be influenced by and easily redesigned with the feedback from the test persons. This approach was successful by encouraging feedback and making the development move forward

In iteration two a high fidelity prototype was created. This was chosen to test functions and details in the prototype. A high fidelity prototype is more similar to the finished product and more qualitative and detailed feedback could be received from the test persons.

During iteration three the high fidelity prototype was further developed. More details were implemented and the workflow of creating a quote was completed. The prototype was still not clickable everywhere at all times, due to a very high complexity of such a prototype. A fully working prototype with a complete test environment would be the optimal solution, but due to time limitations a tradeoff had to be made. The esthetics and basic functions were fully developed but the complete functionality was limited. This may have affected the result from the survey and the final interview presented in figure 28-32 and table 7, since the interactions were limited.

8.3.8 **User Testing**

User testing is a method used during several phases in the project and trade-offs considering what to test and on whom had to be made. These tradeoffs are discussed below.

8.3.8.1 Target Group Excluded from Test Group

The project team decided not to test on distributors, who was the determined target group. The decision was taken due to several reasons. Early in the process, contact repeatedly tried to be established with distributors through the back office and sales department without results. Useful information regarding the distributors was collected through interviews and observations with the sales department and the back office, since they were in close contact with the distributors. The project team decided enough information was gathered for the *Develop* phase to begin. The project team also decided that the back office and sales department had sufficient knowledge about the distributors in order to test the concepts with high credibility. Their knowledge about the Assa Abloy Entrance Systems products would be valuable and their input would reflect the target group.

Another reason for not testing the prototype on the distributors was that the prototype was not a finished product ready to be used. The distributors had no knowledge regarding the existence of the sales tool and the purpose of testing the prototype could be misinterpreted. The purpose of the master thesis was to develop the user experience and the usability of the sales tool and not to add new features and functions. Showing a prototype to the distributors could create expectations that would not be fulfilled.

A further strong reason for choosing the back office and sales department as the test group was their availability in the Landskrona office. To make an observation in person created a second dimension and contributed to a comprehensive picture by being able to observe not only the interaction but also the user reaction. The availability also enabled the project team to clarify questions afterwards in an easy way which added value to the project. In total around 30 tests has taken place. Without the test persons in the Landskrona office this would not have been possible.

8.3.8.2 Selected Test Group

The test group chosen differed in the three iterations. The first two iterations had a smaller test group, this since the data quickly became saturated. The smaller test groups for iteration one and two all belonged to the back office or sales department. They had good knowledge of what the tool would be used for and were experts within the product area. This was important to understand all aspects of the target group and what they wanted. They were asked to perform as a distributor during the tests to get them into the target group's mind.

During iteration three a bigger and more varied test group was selected. The test group consisted of individuals who were part of prior testing, but also individuals not knowing anything about the sales tool. The individuals not tested on before were employees in Assa Abloy Entrance Systems also creating quotes, but in the direct sales channel. They represented the minds of distributors without prior knowledge of the tool. Therefore a wide range of data could be collected.

The data from the test persons could have been separated to compare the result between the test persons with and without prior knowledge. Though the data was anonymously collected the distinction could not be performed and therefore not compared. The comparison could have given the project team further insights in whether prior testing affects the experience of the sales tool.

8.4 Future

The future for the project presented in this report will hopefully result in the development department implementing the changes suggested. If not exactly like suggested, then hopefully with the user in mind when developing the new version of the tool. Hopefully this project will also motivate future projects to work in close collaboration with the end user.

Due to the scope of this project the sales tool is not adapted to responsive design. An opportunity for development could be to investigate how to make the sales tool responsive and adapted to different sizes of screens such as smartphones and tablets.

A feature not investigated during the project was the user interface for an admin. An investigation should be made to understand the admins user needs and their required functions.

In this project a large amount of data was collected through interviews, observations and user testing. Areas that could be interested for Assa Abloy Entrance Systems were found but due to time limitation the project team had no time investigating these areas and functions noted. Some of these areas are presented below for the company to investigate further.

One requested feature was to present a history to the products chosen to streamline the search for products. The products chosen together in a previous quote would be shown in the product page as suggested products. This to share the knowledge of the products but also to help the user to make the right choices of which products can be combined. Another feature could be that the products chosen most frequently would appear to the user, so the searching for products would go quicker.

Another requested feature was regarding the delivery time. The users wished to access information about the manufacturing time of the product when adding delivery information. A shorter delivery time than the production time should not be possible. If this was included in the delivery information it would help the distributor to set a reasonable time for the delivery. It would help the distributor if this information automatically entered the quote.

The configuration part of the sales tool was a part shortly investigated by the project team. Limitations had to be made du to time limitations. The configuration part is an important part of the sales tool and should be further investigated. The project team focused on the esthetics to create a user interface which would match the rest of the interface, but an investigation should be made focusing on how to create a configuration with the best user experience.

9 Conclusion

As the digital work environment is increasing, the demands of usability and accessibility has to be amplified. The cognitive overload has increased significantly which can lead to stress and the feeling of not being in control of the work tasks. From the results it was concluded that through a human centered design approach better usability and work environment could be achieved. This result could conclude in less stressed employees due to a better digital work environment.

To reach the project purpose the users of the sales tool was identified through interviews and the target group was determined. The user experience of the current sales tool was analyzed through a heuristic evaluation and observations of the users. Goals of the project was determined to understand how the user experience could be improved and was tested to be verified. A new concept was developed throughout three iterations to accomplish the goals.

According to the results of the last iteration all user needs determined were fulfilled. The conclusion established in the discussion proved that the project definition of creating an interface that would be easy and quick to learn for new users was achieved. The project purpose of increasing the user experience and usability was therefore accomplished. If the final concept would be implemented and adopted, efficiency would increase since the external users would more confidently create accurate quotes without the assistance from internal users at Assa Abloy Entrance Systems.

The future for the project presented in this report will hopefully result in the development department implementing the changes suggested. If not exactly like suggested, then hopefully with the user in mind when developing the new version of the tool. Hopefully this project will also motivate future projects at Assa Abloy Entrance Systems to work in close collaboration with the end user.

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Appendix A
Interview and Observation Questions

A.1 Initial Interviews with Back Office

Initial questions
1. How much do you work in the sales tool?
2. What interactions do you use in the sales tool?
3. Do you go through the web shop or are you going directly through the quoting part?
4. Have you created a quote for a configurable product?
5. Is there any specific place you have made a mistake using the sales tool?
6. Is there something you would want to change with the sales tool?

Interaction with suppliers
7. What kind of interaction do you have with the distributors?
8. What do they usually ask you?
9. Have you ever created an order for a distributor?

About suppliers
10. What role does the distributors have? Are they the people installing the product or a sales person?
11. What knowledge does the distributors have of the product?
12. What background do the people you talk to have?
13. How does your communication work? (email, phone and so on)

Contact with suppliers
14. Do you know any distributors we can get in contact with?
15. Do you know distributors using the tool?
16. Do you know distributors not using the tool? If so, why?

A.2 Interview Questions Iteration Three

1. Vad är din generella upplevelse av gränssnittet?

2. Var det något du tyckte var svårt med verktyget?

3. Var det någon gång du ville spara men inte hade möjlighet? Eller tvärtom, var du någon gång tvungen att spara när du inte ville det?

4. Hade du velat att något skulle vara annorlunda? Ser du förbättringar som kan göras med verktyget?

5. Var det enklare andra gången du testade verktyget? Kändes det annorlunda/logiskt/bättre?

6. Vågar du testa dig fram utan att vara rädd att göra fel?

7. Var det lätt att hitta inställningar?

Appendix B
Test Plan

B.1 Test Plan

Syfte

Ett nytt gränssnitt har tagits fram för offertverktyget som ska vara enkelt att lära sig och lätt att använda. Syftet är att analysera och utvärdera om de mål som sattes upp uppfylls i denna prototyp. Exempel på de behov som gränssnittet skulle uppfylla är klarare guidning, navigation, start och slut, klarhet, översikt, tydligt arbetsflöde, feedback, felmeddelanden, tillåta fel, spara och att skapa tydlighet i vilken information som kan läggas till.

Frågeställningar

Kan användaren skapa en quote utan hjälp? (inga tips från testledare)
Hittar användaren de funktioner som efterfrågas i testuppgifterna?
Ställer användaren mycket frågor om funktioner under testet?

Vilken data som ska samlas in

Objektiv kvalitativ data
Samlas in genom observationer

Subjektiv kvantitativ data
Samlas in genom enkät efter utförande av test där test personerna skattar upplevelsen av verktyget

Kvalitativ subjektiv
Samlas in genom öppna frågor i form av en kort intervju efter utförande av test.

Testuppgifter

- Skapa en quote
- Lägg till kund
- Lägg till produkt x
- Gör en produktinställning
- Lägg till headline
- Ändra en inställning under layout
- Förhandsgranska quoten
- Slutför quoten.

Upplägg för genomförande
Alla testpersoner uppmärksammas på att resultaten från testerna kommer att vara anonyma. En testmall skapas för att beskriva upplägget för utförandet

Urval av försökspersoner
För att få ett resultat med högre statistisk säkerhet valdes 11 försökspersoner. Urvalet skedde enligt tre framtagna tumregler.

- Testpersonerna har kunskap om produkterna som säljs
- Testpersonerna arbetar på Assa Abloy Entrance Systems
- Testpersonerna har olika mycket kunskap kring att skapa offerter

Testmiljö/utrustning
Testet utförs i ett konferensrum. Projektteamet tillhandahåller bärbar dator och mus för att kunna utföra uppgifterna.

Testledare och övrigas rollfördelning
En testledare håller i testet, observerar testpersonen och svarar på frågor. Den andra personen i projektteamet antecknar allt som sker under testet.

Hur resultaten rapporteras
Resultatet sammanställs och presenteras i rapporten.

B.2 Test Template

Du är en återförsäljare som heter Lorem och jobbar på företaget Contoso.

Du har fått en förfrågan från din kund Anna Andersson som vill göra en tillbyggnad på sin butik Ica Maxi i Lund.

Din uppgift är att göra en quote med kundens förfrågningar

Kunden efterfrågar två olika produkter inom Automatic Doors:

1. Den ena produkten är en standardprodukt med
   ID nr: **1010651**
   Produktnamn*Assa Abloy SL500 NAP. Non assembled Package. EN 16005/DIN 18650. COW= 2200 mm*

2. Den andra produkten är en konfigurerbar produkt med
   ID nr:**1012659**
   Produktnamn: *ADS-H Left Opening, Reveal*

   PS. Du behöver inte göra några inställningar i konfigurationen.

Du vill visualisera produkterna på ett bra sätt för kunden och vill därför ändra en inställning där du visa utökad produktinformation (*extended product information*).

I det mail du fått står det att kunden önskar leverans inom 3-4 veckor, information som du vill lägga till på din quote.

När du har lagt till all information i quoten inser du att du vill visa din kontaktinformation i headern bredvid din logga och lägger därför till den.

Nu är du helt klar med din quote och vill kolla en översikt för att se så att allt ser rätt ut innan du slutför den helt.

Appendix C
Affinity Diagram

All ingoing data in affinity diagram

Orient
- orient within the sales tool
- hard to navigate
- lost in the process
- what to do next
- how to finalize and get to the next step
- clear starts and end of tasks
- more guidance
- difference between quote and template mode
- overview of template
- contents in template mode
- visibility of contents in template vs quote mode
- where to find templates
- trying to orient within the template
- manage settings in homepage
- click cart to come to quote
- want preview
- create pdf = done?
- find the quote from product page
- go back one step
- find the home page
- how to find the home page?

Feedback
- overall feedback
- shopping cart items
- feedback when adding standard products

- message create first quote
- insufficient error messages
- no signifier for text field
- feedback when adding standard products
- more visible feedback
- dare to try and make error

Save 3
- automatic save
- save template
- feedback when header settings are saved
- save the template
- no save buttons in template mode

Create template
- plus sign in create template
- create the first templat
- modify headers in template
- modify information under header in template mode
- add logo
- add logo in template mode
- side buttons in template mode
- feedback when adding headers in template mode
- unclear default button in template mode
- default template
- add information to header in template mode
- add product in template mode
- no add product in template mode

Manage Quote 5
- what is visible to client on quote
- add information to header in quoting mode
- add cost to quote
- price info on quote
- add margin to price
- set price margin
- order several configurable products
- search words

- set currency
- overview of added products
- add logo in quoting mode
- make template changes within quoting mode
- price choices
- unclear gross price
- increase quantity of quote
- change the quantity of products

Symbols 6
- symbol for no picture
- symbol for adding logo in template mode
- symbols in the blue header
- shopping cart icon
- same setting symbol different meaning

Quote Overview 8
- quote overview
- create quote name
- no quote names in overview
- how to differ quote from same customer

Header Settings 7
- header in settings
- headlines in template settings
- more help within header settings
- setting symbol for header information
- manage colors for top header
- insufficient information regarding header information in template mode