MASTER

The design and impact of a new customer information system

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The design and impact of a new customer information system

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Back in 2011 I retained my bachelor degree of applied science in chemistry and I decided my next step was to retrieve my master degree in innovation management. The three and a half year journey I made since then has been an exciting trip. I met new people, discovered new talents, broadened my vision of my surroundings and made great friends! I am very grateful for this experience, which ends with this master thesis. The thesis also has been a bumpy ride itself and I learned some important lessons during these eleven months; I summed them up here:

- You can fake it till you become it
- A hug can mean a thousand words
- Feeling crazy is normal in a crazy world
- Hospital logistics needs some serious re-evaluation
- Do not plan everything, fun comes spontaneous
- One does not simply deny coffee while working on a thesis
- Knowledge is good, attitude is better

All of this would have never been possible without the help of lots of people and therefore I would like to express my gratitude to a select number.

First of all I would like to thank Marten for giving me the opportunity to do the project within Vlisco, I had an awesome time and you helped me in all possible ways, professionally and personally. Your accurate and efficient way of working inspired me and was a great ideology for my master thesis.

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1 http://www.ted.com/talks/amy_cuddy_your_body_language_shapes_who_you_are
MANAGEMENT SUMMARY

In this report, the results of a master thesis are presented relating to the implementation of a new customer information system. This implementation was performed as a result of a change in strategy from product centricity towards customer centricity. The research was carried out at Vlisco Netherlands B.V. in Helmond.

INTRODUCTION

A customer-centric company centralises the customer in all internal and external processes. By doing this, the customer can be served better and will be more satisfied. Customer centricity has proven to be the best way attract and retain customers with which close, profitable and long-term relationships can be developed (Ferguson, Paulin, & Leiriao, 2007) (Shah, Rust, Parasuraman, Staelin, & Day, 2006). One important activity in becoming a customer-centric company is developing a better understanding of the customer’s needs and behaviour (Shah et al., 2006). The key component in developing a better customer understanding is customer information (Shah et al., 2006). Data about the customer is obtained via multiple channels (Bolton, 2004); after the data is organised, it is transformed to information by using business processes (Motiwalla & Thompson, 2009). A reliable information system can help this transformation, and display the customer information in a practical way (Shah et al., 2006). A customer information system contributes to the understanding of the customers; it is a critical component in becoming customer-centric. One company experiencing the importance of a good customer information system is Vlisco Netherlands B.V.

Due to a reorganisation Vlisco attained a new strategy which centralises the customers in their processes. This customer centric strategy should give Vlisco the possibility to secure the desired growth in the upcoming years, despite the fierce market conditions. During the reorganisation the sales department experienced a lack in information supply from the existing information system. This system was organised from the product- and production-perspective, while they needed to have information from a customer-perspective. This lack in information supply lead to the idea of deploying a customer information system. The problem was that this system should be developed from scratch, furthermore the management would like to know what influence such a new system has on the current business and its customers. These problems resulted in the following research question:

*How does a new customer information system need to be designed, implemented and deployed to fulfil the information demand of a sales department in a company which is shifting towards a customer-centric strategy, and what is the impact of such system on the business and its customers?*

Based on this research question, the research objective was formulated; this was two-fold.

First this research delivers a realistic view on the impact of a new customer information system, developed and implemented according to scientifically approved methods. By describing the development, implementation and the research, this paper offers the full view on all stages and effects of such a new system in a company which is shifting towards a customer-centric strategy.

Second, this research delivers a practical customer information system based on proven theories and methods, which can be used by Vlisco Netherlands B.V.. By systematically researching the users’ needs, the new system has been designed to offer maximum usefulness in the daily operations of the users.
METHOD

In order to fulfil these research objectives and answer the research question, a design science approach was applied. Design science creates and evaluates IT artefacts intended to solve identified organisational problems (Hevner, March, Park, & Ram, 2004). In order to develop the customer information system, the SCRUM methodology from Schwaber (1997) has been used in combination with the guidelines of requirements engineering of X. Liang & Guo (2011). Semi-structured interviews, observations and documentation research were used to collect data required to build the information system and to analyse its effect. The collected data was analysed by transcribing, coding and categorising (Gibbs, 2008).

KEY RESULTS

The results in this section have been organised according to three phases: The first weeks of the research were meant for orientation inside the company and examine how the customer information is used at this moment. Furthermore the current sources of the information were investigated. After that analysis, the new customer information system was designed and developed using iterative cycles via which user input and feedback was attained. Six weeks after the deployment an evaluation was done with all main users of the new system.

ORIENTATION:

- Employees have multiple information system and other information sources to consult, but consider their colleagues as most reliable and important.
- The overall impression employees have about the information systems is that they are very complicated and they regularly contain data with questionable reliability.
- All interviewed employees had their own set of excels which functioned as their own datawarehouse.
- The employees of the sales department mostly use the following information:
  - General information
  - Sales history
  - Stock data
  - Complaints
  - Financial credit
  - Exclusivity details
  - Placed order details
  - Visit data
  - Sales targets
  - Role in value chain
  - Delivery performance
- Some employees have the opinion Vlisco also needs a CRM kind of system besides the new customer information system. This CRM system would make it possible to maintain the ‘personal touch’ customer are used to, despite the growth of the sales department.

DESIGN AND DEVELOPMENT:

During the design and development phase, 52 user requirements were identified. After prioritising them using the requirements engineering guidelines 19 proved valuable enough to implement. The system used to build the new customer information system is called Qlikview. By working with iterative cycles and creating prototypes for users to review, the development happened fast and the new customer information system obtained the requirements as the users desired them. The design guidelines used during the process changed, but in the end the following were applied:

- Have a clear distinction between the navigation and data presentation sections.
- Hide objects if they are not of any use.
Only show information if it is correct.
Show text and numbers as black letters in tables with a light-grey background and darker lines.
Use bright colours to display line-graphs and bar-charts.
Minimize design for maximum information exposure; every object/line/word should be functional.
Use clear and logical titles, especially since users are not familiar with terms from the data-base.
Use buttons for fast or complicated selections.
Try to have clear names in the “current selections” box (After selecting All Tier1 customers, users only want to see the customers they selected in current selection, not the variable “Tier”).
If there can be any ambiguity about the information displayed in an object, use the “Help” text to clarify what is displayed in the object.
Listen to the users and encourage co-creation.

The final customer information system constructed with these guidelines and user requirements in thought consisted of the following seven tabs:

- Customer selection
- Customer information
- SW exclusivity
- Production status
- Stock
- Sales(yd)
- Turnover and margin

These tabs contained information object to fulfil the requirements. Examples of these information objects are shown in Figure 1.

**EVALUATION**

During the evaluative interviews it became clear the new customer information system is used regularly by all people interviewed. They consider the system very user-friendly and mention it contains all the information an employee of the sales department needs. They attribute the user-friendliness to the user involvement during the development.

The interviewees use the new information system since, it is user-friendly, it contains the most important information for them, and it contains unique information and it helps them prepare for meetings. Interviewees did not use parts of the system because it contained information not
necessary in their function, they did not know the source of the information, or because smaller customers were not always findable in the system. In general the uses of the new system can be divided into two categories, operational uses and strategic uses.

The interviews revealed three effect of the new customer information system on the business: (1) employees have access to information which was unreachable earlier, (2) the account managers experience they are better aware of the status of their customers, and (3) the new customer information system saves time for account managers. Unfortunately the effect on the customers did not became clear from the interviews.

During the interviews some suggestions were made to develop the customer information system further:

- Make a one-page overview with all KPI’s per customer
- Add Europashop to the current customer information system
- Make the complaints more transparent by including them in the customer information system
- Reconsider the way of retrieving information from the financial department
- With small changes, the customer information system could become more useful for other departments

Besides the improvements for the customer information system, also other information system improvements were put forward:

- Professionalise the ordering system
- Make data available for customers
- Combine information from several systems/departments

**MANAGERIAL CONTRIBUTION**

This design study delivers a step by step explanation of the application of scientific methods to develop a new customer information system. Despite the many failures in IS implementations this research shows a successful implementation and the conditions it was realised in. This case can serve as an example for other companies/departments who want to implement a new customer information system. Within this study the incorporation of the users’ feedback during all phases proved very helpful and was appreciated during the evaluative interviews.
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1 INTRODUCTION

From the beginning of business management literature, it was clear that the customer was one of the most important components of business, business could not exist without the presence of customers (Drucker, 1954). Back then companies produced products, and customers were willing to buy them, regardless of the customizability or personalisation. Today the situation is different. Customers require products to be simpler and companies to be more transparent (Burns, Delany, Clark, & Sterner, 2013). Furthermore, social media and other unprecedented access to information are causing a power shift towards the consumers and simultaneously creating more informed and demanding customers (Burns et al., 2013) (Shah et al., 2006). A strategy, which tries to cope with these external changes, is becoming a customer-centric company. A customer-centric company centralises the customer in all internal and external processes. By doing this, the customer can be served better and will be more satisfied. Customer centricity has proven to be the best way to attract and retain customers with whom close, profitable and long-term relationships can be developed (Ferguson et al., 2007) (Shah et al., 2006).

One important activity in becoming a customer-centric company is developing a better understanding of the customer’s needs and behaviour (Shah et al., 2006). This better understanding helps a company to drive a profitable growth strategy and provides the confidence to invest in opportunities as well (Burns et al., 2013). The key component in developing a better customer understanding is customer information (Shah et al., 2006). Data about the customer is obtained via multiple channels (Bolton, 2004); after the data is organised, it is transformed to information by using business processes (Motiwalla & Thompson, 2009). A reliable information system can help this transformation, and display the customer information in a practical way (Shah et al., 2006). A customer information system contributes to the understanding of the customers; it is a critical component in becoming customer-centric. One example of a company experiencing this essential role of a customer information system is Vlisco Netherlands B.V.. The following section will explain their situation and what the problem is they faced at the beginning of this project.

1.1 PROBLEM STATEMENT

Vlisco Netherlands B.V. is a textile printing company located in Helmond and Amstelveen; their main business is printing exotic and colourful designs on cotton. The consumers wearing their fabrics mostly have a western-African origin and get their fabrics via a complicated distribution network. More information about Vlisco Netherlands B.V. is provided in section 1.4.

The market conditions are constantly changing, which means Vlisco’s competition rises and their customers are becoming more aware of their value. Despite these challenges, an investment fund bought Vlisco four years ago, with the goal to double the revenue within five years. To secure this desired growth while the market conditions are changing, Vlisco attained a new strategy. Instead of having the products in the centre of the company, the market had to become the focus point of the company, more concretely they were going to centralize the customers in the processes of the company; they introduced a customer-centric strategy.

With the new strategy, Vlisco aims to have complete understanding of the needs and behaviour of their customers. Vlisco acknowledged three major problems at the beginning of their reorganisation regarding understanding the customer and delivering the desired service. First,
there was a lack of structure in customer contact as no pre-defined processes were present; each customer contact was handled with the best insights of each specific Vlisco employee. Second, many employees had contact with the customer at the same time; this resulted in having the customer information spread across different employees and departments. Third, information present in the data centre was hard to reach for non-technical users and often presented in an user-unfriendly way.

Four years after the start of the reorganisation a lot has changed. The sales department is being professionalised, processes are being defined and more importantly, each customer now gets an account manager assigned via which most contact occurs. Also the information systems within Vlisco have evolved as some information became better accessible. These systems are a continuation of the original systems and mind-set, which means they are all designed from a product perspective. This resulted in a discrepancy between the new strategy of the company and their information systems. This discrepancy is noticed first in the department having most contact with the customers, the sales department. This situation lead to the following problem statement:

_The current information supply within Vlisco does not fulfil the information demand of the employees in the sales department._

### 1.2 RESEARCH QUESTIONS

All information supply is built from a product-perspective, while key account managers need information from a customer perspective. It is known that an information platform designed with the customer as primary thought will increase the customer understanding and ease the sharing of this knowledge through the company (Shah et al., 2006). That is why Vlisco wanted to deploy a new customer information system to which they refer as the customer dashboard. But before the dashboard could be deployed, it also needed to be designed and implemented. Furthermore it was unknown how this information system would affect the business and its customers. These questions and uncertainties were used to formulate the following research question:

_How does a new customer information system need to be designed, implemented and deployed to fulfil the information demand of a sales department in a company that is shifting towards a customer-centric strategy, and what is the impact of such system on the business and its customers?_

Based on this research question, the research objective and sub-questions were formulated. The research objective was two-fold.

First this research delivers a realistic view on the impact of a new customer information system, developed and implemented according to scientifically approved methods. By describing the development, implementation and the research, this paper offers the full view on all stages and effects of such a new system in a company that is shifting towards a customer-centric strategy.

Second, this research delivers a practical customer information system based on proven theories and methods, which can be used by Vlisco Netherlands B.V.. By systematically researching the users’ needs, the new system has been designed to offer maximum usefulness in the daily operations of the users.
In order to fulfill the research objective the research question was divided into four sub-research questions. These questions serve as a basis for the course of this research. The first question needed to be answered during the actual development of the new system. It incorporates the goal of the system, satisfying an information demand:

(1) How should a new customer information system be designed to satisfy the information demand of the sales department in a company that is shifting to customer centricity?

The second, third and fourth question were answered after implementation. They incorporate the result of the implementation and how the users experience this:

(2) How does the development, implementation and deployment of the customer information system affect the adoption of this system?
(3) How does implementing a customer information system impact the business in a company that is shifting to customer centricity?
(4) How does implementing a customer information system impact the customers of a company that is shifting to customer centricity?

The scope of this research was determined by the following factors. The customers belonging to the scope of the new customer information system (dashboard) are the most valuable customers of Vlisco, they are referred to as T1 and T2 customers in paragraph 1.4.1.1. The main users of the new customer information system are the employees having direct contact with these customers and additionally users whom are otherwise interested in the customer profile and/or status. Furthermore mostly data was used directly from the data warehouse as there was still plenty of potential interesting information.

To answer the questions above, certain methodologies have been used during the course of the research. The used methodologies will be discussed in the next section.

1.3 METHODS

The performed research followed a structure derived from the design science methodology (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007); the performed research consisted of five phases, (1) problem identification, (2) orientation, (3) design and development, (4) evaluation and (5) communication. The first phase identified the problem and justified the value of a solution. The second phase clarified all processes and information streams within Vlisco. The third phase was the actual design, implementation and deployment of the new customer information system. The fourth phase evaluated whether the new customer information system solves the problem stated in phase one. The fifth phase is to communicate the research and its findings to the research-field and companies.

During the phases, different kind of methods were used. Data collection methods and data analysis methods were used mainly during the first, second and fourth phase, and the method for implementing the information system was used solely during the third phase.
1.3.1 DATA COLLECTION

In line with the explorative nature of the study, qualitative data collection methods were chosen (Blumberg, Cooper, & Schindler, 2008), namely semi-structured interviews, observations and studying documents.

Since the sales department has not documented all their processes, in-depth interviews with employees proved to be the most appropriate method to identify the current processes and information flows through the department. Studying additional documents and observing employees behaviour could give some concrete ideas of information flows or supplement to the identification of processes. Combining these three methods allowed for triangulation, where different sources validated each other’s information (Schwenk, 1985). All three methods will be elaborated further in section 3.1.

1.3.2 DATA ANALYSIS

Qualitative data analysis is an iterative process where data is revisited when new questions arise (Saunders, Lewis, & Thornhill, 2009). This also allowed the analysis to start before all data was collected (Gibbs, 2008). The process during this research included: (1) preparing the data for analysis by structuring and coding the collected data, (2) analysing the data by assigning themes to the codes and searching for patterns within these themes (Gibbs, 2008), and (3) guarding the analysis quality. The process will be elaborated further in section 3.2.

1.3.3 DEVELOPMENT

Building a new (part of the) information system is a challenging task (Beatty & Williams, 2006), section 2.2.1.1 will elaborate on this and also on different methodologies. Within the current research the SCRUM methodology is used, since it is a well-established method (Vlaanderen, Jansen, Brinkkemper, & Jaspers, 2011) (Mann & Maurer, 2005), it allowed for small iterative cycles and the project details fitted the needs for applying SCRUM. The SCRUM method also allowed a continuous input from future users, this input has been organized using the requirements engineering guidelines. The usage of these guidelines contributed to a fast, accurate development of a system fulfilling users’ needs.

1.4 COMPANY PROFILE

Vlisco Netherlands B.V. is a textile printing company located in Helmond and Amstelveen; their main business is printing exotic and colourful designs on cotton. In Western Africa, the fabrics are seen as a luxury product and have become part of their culture. Vlisco Netherlands B.V. is part of Vlisco Group. Vlisco Group owns multiple brands which all have their own identity. Throughout the report the name Vlisco, always refers to the brand Vlisco Netherlands B.V.

Vlisco’s identity is mainly classic and genuine. The brand already exists over 160 years and has designs in their collection, which are worn by generations of Africans. The prints are designed by designers of Vlisco and all have copyrights. When a design becomes popular the market gives the design a name and meaning; women in Africa use the meaning of these fabrics to express their feelings to society.
1.4.1 SALES STRUCTURE

Before the fabrics reach the consumer in Africa, they have been transported from Helmond to the market via various channels. In the past four years, Vlisco has changed from selling to anyone, to setting up a decent and reliable distribution network. This network is still in development and the implementation of the new customer information system will add up to this. By categorizing the customers into “Tiers” and “Clusters”, Vlisco attempts to structure the distribution and price structures.

1.4.1.1 TIERS

A customer belongs to a certain tier when he fulfils a certain role in the process and buys a corresponding volume. A visual representation of the different tiers and their roles is shown in Figure 2. Tier 1 (T1) customers buy fabrics directly from Vlisco, export them to a specific country and distribute them among the Tier 2 (T2) customers. T2 customers distribute them among the cities towards the Tier 3 (T3) customers. These T3 customers eventually are the ladies on the markets, which sell the goods to the consumers. Figure 2 shows solid and dashed lines. The solid lines show how the majority of the goods are distributed and what the goal is for the future. However as Vlisco is still in a transition phase there are also the dashed lines, which show that a minority of the goods are still being distributed via other channels. The figure also shows the role of the Vlisco African Companies (VAC’s). They are the internal route via which Vlisco serves the T2 customers. These VAC’s are owned by Vlisco and specialised in the distribution of fabrics in a specific country or region. One exceptional route, which is not described in the diagram, is the route of products towards T2 customers via the “Europashop”. This shop has the same function as a VAC, however it is not a separate company and is not located in Africa. The “Europashop” is a part of Vlisco in Helmond and sells products from its own stock. Like in the VAC’s, customers can come to the “Europashop” to browse through all fabrics and buy it directly. The difference in sales process will be clarified in paragraph 1.4.2

![Figure 2: Sales Structure Tiers](image-url)
### 1.4.1.2 CLUSTERS

Another categorisation of customers is the cluster they belong to. This is based on the geographic position of their consumption market. Vlisco has four different clusters, “Nigeria”, “Democratic Republic of Congo”, “Republic of Côte d’Ivoire” and “International Markets”. Each of these clusters has their specific preference with regards to designs and colours. The consumption market of the first three clusters corresponds with their names and the “International Market” cluster is mainly serving the market in Europe and the United States.

### 1.4.2 SALES PROCESS

The sales process customers go through depends on the tier they belong to, the next paragraph describes the two processes which are relevant to the new customer information system. T1 customers are allowed to place orders directly at the factory and follow a process shown in the schematic overview of Figure 3. T2 customers on the other hand buy their fabrics via VAC’s or via the “Europashop”. This means they shop through the stock of these stores and can only request a specific design through these channels. T2 customers therefore only go through the last two stages of the process shown in Figure 3.

![Sales Process Diagram](image)

**FIGURE 3 SALES PROCESS DIAGRAM**

In the preparation phase, the key account manager (KAM) updates its knowledge about the customer and has contact with the customer to make an appointment. During the product selection phase, customers select the products they would like to have produced. This can be done by email, but is mostly done by visiting Vlisco in Helmond. After the products have been chosen, a sales order is placed within Vlisco containing the quantity and price of the products together with all kinds of administrative information. For each distinct product on the sales order, a work order is made which contains information about when the product is going in production and how much is going to be produced. After the product is ready, the work order is supplemented with the completion date and amount produced. After all products of a sales order are finished, this sales order is put on the list “Ready to invoice”, also called designated stock. Designated stock is the stock designated to a specific customer. The products stay on stock until the customer actually buys the products. After the goods have been invoiced by Vlisco and paid by the customer, they are picked and packed. Finally it depends on the delivery conditions if the customer picks up the goods in Helmond, or Vlisco ships them to a specified location. From here the sales order receives the status “sold” and its revenue is added up to the total revenue attained from that customer. When a customer has complaints about the product or process, these are also taken care of in this process step.
1.4.3 TARGETS

Each T1 customer signs a contract with Vlisco at the beginning of the year. This so called key account plan (KAP), contains conditions about prices, delivery and payment. Furthermore the KAP contains targets a customer should make to receive a discount over his total revenue with Vlisco. This revenue target is set per month and is specified per product category and product group. The key account managers together with the customer aim at reaching the target each month.

1.4.4 PRODUCTS

The products of Vlisco are categorised in three different ways. First, the product group differentiates between the different production methods. Currently Vlisco produces five different product groups, which all have unique properties and their own consumption market. Second, the product category differentiates between collection, exclusive or catalogue goods. Every quarter Vlisco launches a new collection, containing several new designs. In essence these designs are only sold within the quarter and are marked as “Collection goods”. Furthermore there are also designs, exclusively sold to a specific customer, region or cluster, these products have an exclusivity period of nine months and are marked as “Exclusive goods”. All other fabrics sold by Vlisco come from the catalogue and are there for called “Catalogue Goods”. When the collection or exclusivity period of these specific goods ends, they are automatically transferred to the catalogue and become catalogue goods logically. Third, the products can be graded into two quality groups, “First-choice” or “Fents”, first choice products are of guaranteed quality without stitches or other flaws. Fents are products which contain some errors but are still good enough to be sold and worn, they are offered to customers with a discount. Figure 4 shows all the different options how a product can be categorised.

FIGURE 4 PRODUCT CATEGORISATION

1.5 THESIS OUTLINE

The outline of the rest of the thesis is as follows. Chapter 2 will give a more elaborated literature review about the concepts of customer centricity and information system development. Chapter 3 elaborates on the methods used during this research. Chapter 4 will discuss the results of the applied methods. Chapter 5 is the concluding chapter with the conclusion, discussion, limitations and suggestions for future research.
2 LITERATURE

This chapter provides background information about two major concepts, which were used during this research. Section 2.1 discusses customer centricity, which is the strategy Vlisco is aiming for; there are specific processes present in a company which applies this strategy. As well there is a clear link between customer centricity and the information infrastructure. As the dashboard designed in this research is a kind of information system, section 2.2 discusses the background of information systems as well as their development and their impact according to the literature.

2.1 CUSTOMER CENTRICITY

The actual definition of customer centricity is fuzzy and not clearly defined in literature. A few papers discussing the definition of customer centricity are convinced that customer-centric processes are designed with the customer’s preferences and needs in mind (T.-P. Liang & Tanniru, 2007) (Attivio, 2012) (Egol et al., 2004). More broader definitions are given by Shah et al. (2006) and Gummesson (2008).

According to the “American marketing concept” customer centricity means that companies should learn about customer’s needs and should want to satisfy these; this is a prerequisite for survival and profitability (Gummesson, 2008). Furthermore Gummesson (2008) states customer centricity is about solving the customer’s problem by providing exactly what the customer wants, where it is wanted and when it is wanted. In the end Gummesson (2008) mentions customer centricity involves corporate social responsibility. The definition of customer centricity according to Shah et al. (2006) has similar elements, but also focusses on the organisation’s strategy. The true essence of a customer-centric strategy lies in creating value for the customer and, in the process, creating value for the firm, thus meaning every decision begins with the customer in combination with anticipated opportunities for improvement.

Despite the unclear definition, it is clear that most companies which currently have a customer-centric strategy, started as a product-centric strategy (Shah et al., 2006). There are major differences between the two strategies; and any company trying to make the transition faces the same challenges. A company shifts from stating that they care about customers to actually caring about their customers. This requires a totally different mind-set and change in operational processes (Egol et al., 2004). One key challenge in this shift is to develop the ability to successfully match the customer’s needs with the right product adjustments (Shah et al., 2006). Since the customer’s needs change constantly, the development of a customer-centric strategy becomes a dynamic process within the organisation (T.-P. Liang & Tanniru, 2007). Customer-centric companies believe that the customer’s needs can be obtained best by constantly interacting with the customers (Shah et al., 2006). Company’s employees are an important parameter in this interaction, these employees should be acting like the customer’s advocates (Shah et al., 2006).

Within this research, there is a special interest in the specific processes of a customer-centric company, as well in the role of information in these processes and the company in general. The next two paragraphs will summarize the most important literature.
2.1.1 PROCESSES

Processes are the tools a company uses to reach their strategic goal. Companies are constantly evolving and the processes are the flexible layer which changes along. The most important goal of a customer-centric company is to create value for the customer and maintain a high quality of the proposed solution. Within this strategy, the customer relation management (CRM) process is the most important process (Galbraith, 2005) as this directly creates value to the customer. Other valuable processes are the processes which support CRM. The literature mentions the following processes as being the most important to execute CRM or to maintain a customer-centric strategy:

- the strategy-development process (Payne & Frow, 2005): the process where the business and customer strategy is created
- the dual value creation process (Payne & Frow, 2005) (Shah et al., 2006): The process of creating value for both parties in the case of an exchange.
- the information-management process(Galbraith, 2005) (Payne & Frow, 2005) (Shah et al., 2006): The usage and maintenance of the CRM- or information-system
- the performance-assessment process (Payne & Frow, 2005) (Lamberti, 2013): The process which determines how employees their performance is being assessed.
- solution development process (Galbraith, 2005): the process of creating the perfect solution for each customer.
- product portfolio process (Galbraith, 2005): the process of making a portfolio with all products and solutions sold to customers, so they can be easily used in the future.

As with any company, a customer-centric company sells its products via a sales process, the focus during the sales process is on solving immediate and long-term issues a customer faces (Egol et al., 2004). These issues can be more easily identified since a sales-person is working as an insider at the customer (Egol et al., 2004) and is supported by a proper information system (Egol et al., 2004). What the role of information is in a customer-centric company will be discussed in the following section.

2.1.2 ROLE OF INFORMATION AND IT

Recent advances in information technology (IT) have facilitated customer-centric processes as all customer information can be logged digitally, stored centrally and shared through the organisation. The enhanced possibility of analysing vast amounts of data allows companies to set up customer profiles, which can be categorised and used during the sales process (Egol et al., 2004). More specific, if all exchange data is stored and analysed, the customer contacts can review past performances with the goal to discover why the customer buys a certain product at the company (Shah et al., 2006), therefor customer data is considered to be a highly valuable asset in a customer centric company (Bolton, 2004) (Shah et al., 2006) (Shanks & Tay, 2001). Besides analysis, IT also allows companies to easily automate processes. Automating processes will often lead to faster and better results, however Shah et al. (2006) warns companies about IT automations which manage customer contact; as it probably will result faster in better information, however customer often appreciate a personal approach.
Creating a good system for information sharing is regularly an obstacle in becoming a customer-centric company (Bolton, 2004) (Shah et al., 2006). One critical component is the central data warehouse, which is easily accessible by all departments (Shah et al., 2006). Another component is the attitude among employees to be willing to share their information with colleagues, so the entire company is better able to satisfy the customer needs (Shah et al., 2006). Even though a good information system needs an investment, it does not directly increase customer relationship performance, but instead enhance the firm’s ability to perform the required customer-centric processes according to Jayachandran, Sharma, Kaufman, & Raman (2005).

2.2 INFORMATION SYSTEMS

Information systems (IS) are vital components in successful businesses nowadays. They support all departments with the ease of sharing and retrieving information as well as automation of processes. By using IT, the organisational data is processed into useful information and spread across the company (Motiwalla & Thompson, 2009). In order to do this, IS usually uses a three-phased model of input, process and output. During the input phase, data is collected and stored in a computer-readable format. During the process phase, rules and procedures, defined by the organisation, are used to process the raw data. In the end, the output phase results in a displayable report, which shows useful information for the business.

Information can be displayed in a variety of ways and whether this is useful depends on the information requirements of the user. The user utilizes the information with a specific purpose, which corresponds with the users’ function. Roughly three types of functions can be distinguished in information requirements, operational, mid-management and strategic-management functions. Figure 5 (Motiwalla & Thompson, 2009) shows how the requirements among these three types differ. In short, operational functions mainly need very specific information in high quantities, where strategic management needs more general information, in low quantities, but high quality (Motiwalla & Thompson, 2009).

![FIGURE 5 MANAGEMENT HIERARCHY WITH INFORMATION REQUIREMENTS](Image)
Building a new (part of the) information system proved to be a challenging task (Beatty & Williams, 2006). The reasons for these projects to be challenging is because a lot of parties are involved (Nah, Lau, & Kuang, 2001), it is being seen as an IT-project (Bolton, 2004) (Carton, Adam, & Sammon, 2008), and processes and IT need to be aligned (Nah et al., 2001). In order to overcome the challenges, plenty of methods are explicated to develop information systems. Schwaber (1997) summarizes the most used methods. The most used methods for the development process are; waterfall, spiral, iterative and SCRUM methodology.

### 2.2.1.1 Different Methodologies

The waterfall method is one of the first defined system development process. As Figure 6 shows, it is a linear process, which means all phases follow each other and there are no feedback loops. This linear process proved to be difficult in practice as the development of a whole information system could not be planned ahead.

![Figure 6: Waterfall Methodology](image)

As an alternative the spiral method was developed which contained several evaluation moments with the end-user. By building up the system per phase and evaluating after each phase, the spiral method tends to lower the chance of errors, however this process is still linear as requirements are set in the requirement phase and designing happens in the design phase.

![Figure 7: Spiral Methodology](image)

The iterative methodology improved the spiral methodology by having small iterations of all waterfall steps, divided in parts of the functionalities of the system. All functionalities of the system
are divided in subsystems and can be produced and tested individually. Due to this approach the delivery of a working system is ensured (at least the subsystems) and costs can be controlled better.

![Iterative Methodology](image)

**FIGURE 8 ITERATIVE METHODOLOGY**

Even though the iterative process is more advanced than the waterfall and the spiral method, it still needs the processes to be defined up front, even though it is known it is impossible to know all requirements up front (J. S.-C. Hsu, Lin, Zheng, & Hung, 2012). SCRUM is a different kind of methodology, where only the start and the end phase are predefined and everything in between is being determined during the development process. Figure 9 displays a schematic overview of this method.

![SCRUM Methodology](image)

**FIGURE 9 SCRUM METHODOLOGY**

SCRUM requires the developer to know the inputs of the system and a broad definition of the output. After defining the planning and system architecture, the development will perform some short sprints/iterations, which take between 1 and 4 weeks. Many of the processes within these sprints are unidentified and uncontrolled, process knowledge is mostly acquired via tacit knowledge or by trial and error. Projects which typically lend for SCRUM have the following characteristics (Schwaber, 1997):

- **Flexible deliverable** – the deliverable is determined by the environment.
- **Flexible schedule** – The deliverable can be delivered before or after the planned completion date
- **Small team** – The team consists of ideally less than six members

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Frequent review – The progress and risk of the project is frequently reviewed, usually once every 1 to 4 weeks

Collaboration – intra and inter-collaboration is expected during the project

In chapter 3.3 the implementation design is discussed and will elaborate more on how the SCRUM is carried out.

2.2.1.2 CUSTOMISATION

When building an information system design choices need to made regarding the adaption towards business processes (Motiwalla & Thompson, 2009). In essence it is a balance between the level of customizing the system, and redesigning business processes. Customisation takes a lot of time, not only in the development phase, but also when the core of the application changes due to maintenance, extra labour has to be done to restore the customisation (Beatty & Williams, 2006). One of the major problems CIO’s face when introducing a new version of the enterprise information system, is to transfer all the customisations from the old system. This is why the developer should be aware of the common error of over-customisation (Beatty & Williams, 2006). Business process redesign on the other hand is also a very costly process and will ask the business to change (Motiwalla & Thompson, 2009). Forcing end-users to change their processes, will not positively affect the adaption of the new system (Turetken, 2013).

2.2.1.3 USERS AS CO-DEVELOPERS

Users are the most important source of information during the whole information system development process. The better developers collaborate with users in the design phase, the better design quality can be obtained (J. S.-C. Hsu et al., 2012). Also users proved to be very useful during the development stage for reviewing the product (J. S.-C. Hsu et al., 2012). It is critical for the future users to select appropriate representatives to participate in the development (J. S.-C. Hsu et al., 2012).

2.2.2 DESIGN OF USER INTERFACE

Successful designers of user interfaces go beyond the vague notion of user friendliness, they have thorough understanding of the diversity of users and complementary tasks to be performed (Shneiderman, Plaisant, Cohen, & Jacobs, 2009). The ultimate goal in designing the user interface, is to deliver a system which will not encumber users and will deliver the outcome a user predicts with each action done (Yong Ahn, Ki Kim, & Soo Han, 2003). A well designed interface will therefore almost disappear during usage and will enable users to focus on their questions and assignments (Shneiderman et al., 2009).

2.2.2.1 GENERAL

A designer needs to understand what tasks and sub-tasks need to be carried out using the dashboard and design the dashboard in such a way that these tasks can be carried out effortlessly. It can be tempting to implement excessive functionalities, this should be avoided as this leads to a higher complexity, which makes the implementation and usage more difficult (Shneiderman et al., 2009). Furthermore the implementation can be enhanced by giving the interface a standardized and consistent design (Shneiderman et al., 2009). Users will accept the interface faster if uses a standardized design, which means it looks similar to other applications they use regularly.
Consistency refers to the common use of terms, units, lay-outs, colour typography and so on (Smith & Mosier, 1986).

Applying colour in the design can have three effects (Heijden, 2009). First the informational effect, meaning a colour carries an information load. This can be used in charts where two colours can visualize good and bad values, or gradients to represent actual values. Second the isolation effect, meaning a certain value or message is isolated from the rest. It can be used to draw attention to notifications or to put emphasis on more important data points. This effect of course only works when used limited, as too much coloured objects compete for attention. Third the aesthetic effect, colours can produce a certain harmony within the user interface. It is the result when the colours used give a sense of visual order and balance.

### 2.2.2.2 APPLICATION DESIGN

To design a usable application the literature gives plenty of guidelines. A very extensive list of guidelines was produced by Smith et al. (1986), of which the majority is common sense by now or is already done by today’s software. Below a list of guidelines are presented which are valuable for the upcoming interface.

**Group common objects:** In an interface there are several kind of objects. Within each interface it is advised to group these objects together. Navigation objects are often placed on the far left or on the top and the data in the rest of the window. Potential information for the user is often in the left or right top corner (Shneiderman et al., 2009).

**Usable formats:** Objects need to be designed in a ready-to-use way. This means they do not need unnecessary interventions of users. A concrete example is including all action-related variables in a table (Smith & Mosier, 1986).

**Clear titles and names:** it is common that words can have multiple meanings within an organisation. When building the new customer information system use the correct terms, and titles which the user is also familiar with (Shneiderman et al., 2009) (Smith & Mosier, 1986).

**Protect data:** If data is not allowed to be changed or used in another sense than displayed, protect it (Smith & Mosier, 1986).

**Minimal use of abbreviations:** Abbreviations should be avoided as they reduce readability. When abbreviations are used, the developer should use minimal punctuation and only use commonly used ones (Smith & Mosier, 1986).

**Use active voice:** When instructions are displayed an active voice should be used. (Smith & Mosier, 1986).

### 2.2.2.3 DATA OBJECTS

Data objects are part of the dashboard if they contain any kind of data or information. These objects can be roughly divided into three categories, navigation, notification and presentation. Navigation objects allow the users to navigate through the application and through the data. Examples of navigation objects are: buttons, filters and search bars. Notification items are to provide the user information about the application and its data, also error messages belong to this category. Presentation objects are the objects which actually present the data in any form. It is possible to draw a distinction between visual data objects and tabular data objects, which both serve another
purpose. Visual objects are often used to display trends and relations, while tabular objects are often used to display exact numbers and single data points.

Most information management software offers the possibility to give visual effects to the graphs, for example beautiful backgrounds, shadows or 3D effects. There are two important reasons why not to use them (Heijden, 2009). First, these effects can distort the correct representation of the data, especially when it comes to proportions and 3D effects, this effect becomes inevitable. Second, the effects will draw the attention to the graph and its presentation instead of to the data. In the end the final goal should be to give the users more insights into the data, not only showing beautiful graphs.

**2.2.3 DEPLOYMENT OF A NEW IS**

After the new customer information system has been developed, it still needs to be deployed into the organisation. The goal of the deployment is to have employees including the system in their operations. There are plenty examples of companies which failed to deploy a new information system (Carton et al., 2008) (Bolton, 2004). Poor preparation, poor project management and a lack of clear strategy are most mentioned as the reasons for failure (Carton et al., 2008) (Bolton, 2004). Using a proper development method like SCRUM can already reduce the risk of failure. Another factor which can contribute to a better deployment is to increase the user acceptance of the information system.

The Technology Acceptance Model (TAM) suggests there are two major factors affecting future users, to use new technologies: “perceived usefulness” and “perceived ease of use” (Davis, 1989). Even today the TAM is one of the most used models to test IS for acceptance (C.-L. Hsu & Lu, 2007). The developer of TAM introduced one extra factor in a revised model (Venkatesh & Davis, 2000), namely the “intention to use”. Studying the revised TAM, developers should concern themselves with how their new system is perceived by their future users and how they can influence the vision of these users. The perceived usefulness is influenced by output quality, job relevance and the subjective norm, among others (Venkatesh & Davis, 2000). Even though a well-designed user interface helps the users in operating the system more easily, no direct correlation has been found with regards to the TAM (Hong, Hwang, Hsu, Wong, & Chen, 2011).

Besides keeping the TAM in mind, the literature also provides some best practices regarding IS deployment. First, the reason for building the IS should be clear, the IS should be built because of a need for new functionalities (Beatty & Williams, 2006). Second, each upgrade or extension should be treated as a new project with full support (Bolton, 2004) (Beatty & Williams, 2006). Third, the team deploying the new IS is of vital importance, they should be selected carefully and kept together by all means (Bolton, 2004) (Beatty & Williams, 2006). Fourth, the IS deployment should be considered as a business project, no IT project (Motiwalla & Thompson, 2009) (Beatty & Williams, 2006). Fifth and final, the future users should be trained well, such they know how to use the system and the functionalities become clear (Beatty & Williams, 2006).

**2.2.4 IMPACT OF DEPLOYING A NEW IS**

Information systems are deployed as they are being deemed of having a positive influence on the business. Literature describes that the deployment of information systems increases the quality, quantity and fluency of information in companies (Motiwalla & Thompson, 2009). These enhancements have a direct or indirect effect on the business. Business processes are being
changed because new information shows more efficient options (Motiwalla & Thompson, 2009). Improved sharing of information causes departments to collaborate more easily as department boundaries fade. Specific information produced by a department becomes available quicker throughout the organisation, which makes it possible for other departments to respond faster. An organisation becomes more agile in responding to changes in the environment, which stimulates the growth of a company. The better information flows both up and down the organizational hierarchy also effect decision-making at all levels of the organisation; decisions can be made faster and risks can be estimated better (Motiwalla & Thompson, 2009).

Considering enhancements of customer information, it is clear these have a positive influence on the customer service of a company (Motiwalla & Thompson, 2009). In the first stages of customer information management it enables segmentation of customers and in later stages even customisation and personalisation (Shah et al., 2006). Even though improved customer information has no direct effect on the profitability of the company, there is an indirect effect (Roh, Ahn, & Han, 2005). An example of indirect effect is the effect of easier adoption of innovations when customer information is processed better (Pekovic, Gatignon, & Rolland, 2013).
This chapter describes the different methods used to execute the research. As described earlier, the performed research followed a structure derived from the design science methodology (Peffers et al., 2007). Design science creates and evaluates IT artefacts intended to solve identified organisational problems (Hevner et al., 2004). These artefacts are created using relevant scientific theories (Hevner et al., 2004). A proposed model for design science research is the "design science research methodology" (DSRM) of Peffers et al. (2007); analysing prior research they identified six commonly used stages in design science in the information systems research field. Figure 10 shows all six identified phases and some keyword belonging to them.

FIGURE 10 DESIGN SCIENCE RESEARCH METHODOLOGY BY PEFFERS ET AL. (2007)

The method of the performed research is derived from DSRM and contained five stages (1) problem identification, (2) orientation, (3) design and development, (4) evaluation and (5) communication. Figure 11 gives an overview of all stages.

FIGURE 11 APPLIED RESEARCH METHOD

The first phase identified the problem and justified the value of a solution. The second phase clarified all processes and information streams within Vlisco by using the data collection and analysis methods described in this section. The third phase was the actual design, implementation and deployment of the dashboard (the artefact) by applying the SCRUM method; this method also included the definition of the objectives of the dashboard. The fourth phase evaluated if the dashboard solves the problem stated in phase one, by having interviews with all intensive users of the dashboard. The fifth phase was the communication of the research and its findings to the
research-field and companies; this phase was fulfilled by drawing conclusions in the end of this thesis and publishing them in the TU/e library.

During the phases, different kinds of methods were used. Data collection methods and data analysis methods were used mainly during the first, second and fourth phase, and the method for implementing the information system was used solely during the third phase. This chapter includes a separate section for each kind of methods. Section 3.1 elaborates on the data collection methods. Section 3.2 discusses the data analysis methods. Section 3.3 elaborates on the methods used during the implementation.

### 3.1 DATA COLLECTION METHODS

In line with the explorative nature of the study, qualitative data collection methods were chosen (Blumberg et al., 2008), namely semi-structured interviews, observations and documents.

Since the sales department has not documented all their processes, in-depth interviews with employees proved to be the most appropriate method to identify the current processes and information flows through the department. Studying additional documents and observing employees’ behaviour could give some concrete ideas of information flows or supplement to the identification of processes. Combining these three methods allowed for triangulation, where different sources validated each other’s information (Schwenk, 1985). The data collection can be split in two parts, observation data collection and post-intervention data collection.

#### 3.1.1 SAMPLE SELECTION

Performing a single case study within Vlisco resulted in a limited sample to have interviews with and to observe. The sampling method used was a combination of judgement sampling and snowball sampling (Hair, Celsi, Money, Samouel, & Page, 2011). Judgement sampling used the judgements of managers within Vlisco to determine the employees who have best knowledge about the flow of customer information and all related processes. From the interviews with that initial sample, other suggestions of knowledgeable persons were made, due to this the sample was extended. This sampling method to extend the sample by using results from the data collection is called snowball sampling (Hair et al., 2011).

#### 3.1.2 INTERVIEWS

To gain understanding in the sales process and operational tasks of the sales department, 45 minute in-depth interviews were conducted before the implementation of the new customer information system. As the goal was to map the sales process and identify the information flow, and the interviewees had very specific knowledge a semi-structured interview suited best (Blumberg et al., 2008). Before starting with the interviews, interview outlines were made; different outlines were made for salespersons and for support-persons, both are shown in Appendix A. The different outlines were chosen since the assumption was made that the salespersons were often the information demanders, while the support-persons were often information suppliers. The outline was used as a general guideline and contained five areas of interest: overall sales process, function within this process, specific operational tasks, information demand and supply and customer

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contact. By using probing techniques the interviewer received deeper insights into subjects which the respondent was knowledgeable about.

To gain understanding in how the deployment of the new customer information system changed the processes in and around the sales department, another series of 45 minute in-depth interviews were conducted after the deployment. Since the goal was more clear now, the interviews were more structured and therefore had a more detailed outline. At this point one single outline was sufficient enough as preparation, this can also be found in Appendix A. The four areas of interest during these interviews were: experiences with deployment, changes in processes, new processes, changes in information flows. Also during these interviews probing was used to get deeper insights in specific areas of interest.

3.1.3 OBSERVATIONS

Confirming the information from the interviews and deepen knowledge about the information flows, respondents were observed various times for various durations. The collection of data by observations was mainly done before the deployment. Participants were observed during their activities when retrieving information, or moments they need the information. The former was mainly observing the participant going through the information system or retrieving information via phone and email. The latter was mainly when discussing a customer’s status with colleagues or when having contact with a customer about orders and ordering products.

3.1.4 DOCUMENTATION

The third data collection method was via documents and computer files. Information was consulted via multiple kinds of documentations; task descriptions, process workflows, data sheets, the department’s hierarchical tree, emails (internal and external), customer visit forms, key account plans and raw customer data. This form of data collection proved extremely useful to determine and confirm processes and to get more specific information about information flows. Documentation is considered to be a rather objective source of information and was there for very suitable to support information received from the interviews and observations (Blumberg et al., 2008). The documentation was searched and studied after the observation-interviews were held, this allowed for a more narrow search for documents.
3.2 DATA ANALYSIS METHOD

The objective of the data analysis is to identify, examine, compare and interpret patterns and themes. In contrast with quantitative data analysis, qualitative data analysis is an iterative process where data is revisited when new questions arise (Saunders et al., 2009). This also allowed the analysis to start before all data was collected (Gibbs, 2008). The method applied in this chapter is as described in Saunders et al. (2009), which is based on the process of qualitative data analysis by Miles & Huberman (1994) shown in Figure 12. In section 3.2.1, the data preparation is described, in the process-model this is represented as data reduction and data display. Section 0 will describe the data analysis done to draw conclusions. Where after the last section, 3.2.3, verifies the analysis part by assessing several indicators for research quality.

3.2.1 DATA PREPARATION

The interviews, observation notes and other collected data were structured. The data preparation already started while the data was being collected, by making notes, and recording interviews. These notes and recordings are vital for further information processing, as depending on memory could lead to biased results (Saunders et al., 2009). The raw data was mostly transcribed into neat copies to make them more easily to analyse. The transcription was done by the researcher as this allowed for analysing the data while preparing it and the researcher knew the context of the notes and voice-recordings (Gibbs, 2008). As transcribing raw data takes a lot of time, the decision was made to transcribe the observation-interviews less detailed than the post-intervention interviews. These second series of interviews contained more dense information, which demanded a more accurate transcription.

All transcripts where stored centrally to make them easily accessible. In order to make them useful for analysis, the transcripts were coded. Coding a transcript means, it was being divided in small sections of text and each section got a code. By coding sections with similar content with the same code, the sections can be categorised and sorted. During the coding process, each code retrieved its own definition, this definition became more clear as more sections retrieve the code.
3.2.2 DATA ANALYSIS

The data analysis started already after the first data was collected and coded. By organising the codes into specific themes, the themes could be analysed and conclusions could be drawn. By making an hierarchy with themes and sub-themes, the codes became organised and could be examined in a structured way (Gibbs, 2008). Within each (sub-)theme patterns were identified which were caused by the deployment of the new customer information system. Since it was an iterative process of data collection and data analysis, the coding-hierarchy evolved through the research (Gibbs, 2008). Furthermore, conclusions drawn in the beginning of the research were re-examined in later data collections and if possible cross-validated via other sources.

3.2.3 ANALYSIS QUALITY

The traditional guidelines about research quality are designed for quantitative studies and are therefore difficult to apply to qualitative research (Gibbs, 2008) (Major & Savin-Baden, 2010). However, procedures are applied to maximize the research quality in terms of reflexivity, creditability, generalizability and reliability.

3.2.3.1 REFLEXIVITY

Reflexivity is the recognition that the product of research inevitably reflects some of the background, milieu and predilections of the researcher (Gibbs, 2008). In this research the reflexivity has been guaranteed by explaining the relation between the researcher and the organisation. Also the complexity of the data is elaborated thoroughly. The limitations of this study due to lack of objectivity are discussed in the last chapter.

3.2.3.2 CREDITABILITY

Creditability is another term for what is called validity in quantitative research. Within this research the best effort is done, to make it as creditable as possible and some techniques are used to eliminate obvious mistakes. First method triangulation has been applied, to prevent biases caused by using a single data collection method (Schwenk, 1985). Second, the accuracy of the transcripts of interviews have been checked by evaluating them with the interviewees. This way any misinterpretation could be filtered and the quality of the data has been validated by the respondents (Gibbs, 2008) (Saunders et al., 2009). Third quotations are being presented in the results and discussion section of this report, to demonstrate the validity of the data interpretation. Guidelines for proper use of quotations in research reports were retrieved from Gibbs (2008).

3.2.3.3 GENERALIZABILITY

Generalizability is that the results of a sample can be induced into a theory or rule for a whole population. This case-study used a small non-random sample, so there is a higher risk of over-generalising the findings (Saunders et al., 2009). When documenting the findings within this report, attention was given to minimize the over-generalization of the findings. Furthermore the results given are explicitly stating the sample were they come from, and extreme cases are mentioned as being such, this should avoid ‘selective anecdotalism'; making generalizations based on extreme cases. (Gibbs, 2008).
Reliability within a research setting means, a large extent of consistency is present within the research. A research is reliable when the same results would be obtained when a different researcher, with a different sample measures with a different instrument (Blumberg et al., 2008). In order to ensure the research to be as reliable as it can be, the following actions were taken. In order to prevent a researcher bias, solid interview guides were constructed and checked by the supervisors. Also the researcher obtained information from (Blumberg et al., 2008) (Kvale, 2008) and (Saunders et al., 2009) on how to conduct reliable interviews. To prevent a definitional drift when coding, memos were used with the definition and obvious examples of each specific code, by having obvious examples and the definition in mind all time, the coding happened as consistent as possible. To prevent an instrument bias, triangulation was used, by using three different methods to retrieve the same information and verify the sources.

3.3 IMPLEMENTATION METHODS

In the literature section, several system development methodologies are described. Within this project the SCRUM method was chosen as IS development method since it is a well-established method(Vlaanderen et al., 2011) (Mann & Maurer, 2005), it allowed for small iterative cycles, and the project details fitted the needs for applying SCRUM. These needs were fulfilled, as the project had a broad definition of the end-product, had frequent reviews, consisted of a small team and good collaboration from colleagues was expected. There was only one discrepancy with the SCRUM method, the project had to be finished within 20 weeks, there was no flexible completion date. Schwaber (1997) has been used as a guide about SCRUM for section 3.3.1. After that, section 3.3.2 will elaborate on the requirements engineering method performed during one of the SCRUM phases.

3.3.1 SCRUM

The SCRUM method has three steps; planning & high level design, development and closure. The following paragraphs will explain how these three steps are organised and have been executed.

3.3.1.1 PLANNING

The planning phase consist of 6 core activities, where after the foundation of the development is set. The six core activities will be explained in the upcoming paragraphs:

**Backlog list development:** Within the SCRUM method, backlogs are used to describe what functionality the current system misses. To develop a list with all backlogs, these need to be obtained properly. A structured way of obtaining the backlogs and develop a list, is by applying the principles of requirements engineering (X. Liang & Guo, 2011). How these principles are applied is elaborated in section 3.3.2.

**Determination Packets:** Packets are a series of information objects or system components which need to be changed or implemented in order to fulfil a backlog. In this project, the packets are mostly how data is going to be displayed, what kind of graphs or tables and which of these objects are combined on a tab. These packets were mostly discussed during the same interviews as the observation-interviews. Users are better in describing how they want to see something, than in
telling actually what they want to see. This caused packets to change organically during the course of the project while discussing the objects over and over with users.

**Definition delivery date and functionality of one or more releases:** Within the project, the delivery date was set on the end-date of the internship, being 21 September 2014; the functionality of the final release was described as: "the system should support the key account managers in their daily operations by displaying customer information in an interactive way".

**Definition project team:** As the implementation of the system was an internship project, the core team only consisted of the intern and his company supervisor. The rest of the team consisted of flexible members. Two flexible team members from the IT department were able help with complicated IT tasks. The first supervisor of the TU/e was another flexible member fulfilling an advisory role. In total the whole project team consisted of five people.

**Assessments of risks and risk control:** Risks are defined as everything that effects the success of the project negatively. With that definition in mind, an assessment has been made by the team and possible actions or responses have been made to control these risks.

**Verification of management approval:** The approval of this project had already happen before the internship project started, so this activity was not applicable.

### 3.3.1.2 HIGH LEVEL DESIGN

The high level design was performed parallel to the planning. The goal of the high level design is to have a decent technical foundation before the actual project starts. There are two core aspects treated in this phase, the technical aspect of the implementation and the review of the backlog items in the planning phase by making a prototype.

**Technical aspect of implementation:** As a preparation on the sprints, the technical aspects of the implementation were studied. The different information systems the company uses were analysed and it was determined which system would be most suitable for the development of the dashboard. This has been determined by comparing the goal of the new system with the possibilities of the existing systems.

After the system was known, the availability of information was examined; when a backlog was identified in the planning phase, the search for its sources started. There were three ways of finding the source with the data, first interviews were held with employees which were identified as information suppliers by the future users. The outlines for these interviews are presented in Appendix A.2. Second the existing systems of Vlisco were searched to find the correct source necessary to build each packet. While searching these systems it was possible other interesting information was found, these were added to the backlog list together with their packet. Third, unfindable information sources were obtained via the IT department or other employees which were contacted via email or telephone. The availability was used during the requirements engineering in chapter 3.3.2.

**Review backlog items and design:** After the requirements engineering and making packets, the backlog items needed to be reviewed if interpreted correctly. A prototype seemed the best way to show future users how the backlogs were interpreted. Another advantage of making a prototype is that users could get a good idea of what was going to be developed and could also deliver feedback.
on layout and the high level design. Furthermore a prototype also allowed the project team to present the high level design.

The prototype was made in Excel and was a visual representation of the new system. When designing the layout, the literature from chapter 2.2.2 was taken into consideration. The goal was to create an interface with mostly black, white and grey taints and to use bright colours in the graphs and visuals. This should ensure that the trends in these graphs were emphasized as this was the most important within the interface. Furthermore the tools to select the data were placed at the top of each tab to create a consistent dashboard. The prototype was send to all future users and individual meetings were used to collect the feedback on the prototype.

3.3.1.3 DEVELOPMENT

Within this project a series of short sprints was carried out. Each week there was a review meeting to check on the progress. In global these sprints had four steps. First, the development, where packages were changed to meet backlog requirements, this happened with non-linear micro processes of designing, developing, implementing, testing and document changes. Second, the packets were closed, this means an executable version was created and it showed how the backlog requirements were implemented. Third, a meeting was organised to present the progress and review any potential problems. Risks were being reviewed and appropriate responses defined. Fourth, the information gathered from the meeting was consolidated and transformed into concrete backlogs and package adjustments for the next sprint.

3.3.1.4 CLOSURE

Within SCRUM a project is closing when the team feels that one or more of the variables, of time, competition, requirements, costs and quality, concur for a new release to occur. The closure phase prepares for the latest product for release. This means the system should be integrated, users should be documented, training materials should be made and the product should be marketed.

3.3.2 REQUIREMENTS ENGINEERING

Requirements engineering gives some guidelines about how to collect the requirements for implementing a new (update of a) information system (X. Liang & Guo, 2011). Within this project, the requirements consist mainly out of information a user wants to see in the new customer information system.

3.3.2.1 CLASSIFICATION

To determine what information was most desirable to have in the dashboard, semi-structured interviews were held with employees, which have direct contact with the customers or had intensive contact in an earlier function. This interview was combined with the interview of observation phase and therefor used the same outline (Appendix A).

Besides the interviews with the users, also other interviews, observations and documentation research were performed to look into potentially interesting information in the future system. The most useful documentation research proved to be analysing three existing information systems within the company; containing data about logistics, product information and sales information. By analysing these systems, a fast glance could be obtained about the data available in the data warehouse.
3.3.2.2 PRIORITISATION

The requirements were prioritized according to the function shown below, where “a” is the number of future users indicated the requirement as “need to have”, “b” is the number of future users indicating the requirement as “nice to have”, “c” is a correction and “d” indicates the availability. The correction was valued 3 or 6 if a requirement was mentioned as “need to have” outside of the conducted interviews. The availability (d) was categorised in 4 different categories, (1) the data was present in the information management system, (2) the data was present in the data warehouse, (3) the data was present in an Excel file, or (4) the data was not found. Each category had its own value of 1.5; 1.0; 0.5 or 0.25 respectively.

\[ f(a, b, c, d) = (3a + b + c) * d \]

The project team decided to include all objects with a score equal to or higher than 4.5. This threshold was chosen as it represents a fair amount of time which was allowed to be invested in the requirements. Two fictional cases which were considered as threshold were: (1) an object which was considered “need to have” (a) by one person, and is already present in the information system (d), should be implemented. (2) An object which was considered as “need to have” by three persons (a), but not yet in the data warehouse(d), should be invested more time in to eventually implement.

3.3.2.3 DOCUMENTATION

All requirements retrieved from the data collection methods have been documented in an Excel file with the variables name, description, desired format, priority and all the information used to prioritize them. This list is called the backlog list.

3.3.2.4 CHANGES

As discussed in paragraph 3.3.1.3, the SCRUM method has a review after every sprint. During these reviews, potentially changing requirements were discussed and proper actions were taken to integrate these changes in the final product.

3.3.2.5 INTEGRATION

As the requirements engineering method is used as an integral part of the SCRUM method, this principle was granted by essence.
4 RESULTS

The results presented in this chapter are the result of the methods of the previous chapter. The sample for interviewing and observing was determined by two sampling methods, which both led to a sample with different properties. The judgemental sampling resulted in a sample consisting of six employees who have direct contact with the customers regularly. The function of these employees is (key) account manager and store employees, they were considered to become the intensive users of the dashboard. Second, the snowballing method led to a sample consisting of nine employees which offer support to the sales department. The functions of these employees varied from production planner, to product expert. Some of which have biweekly contact with customers others barely have customer contact. Their role in the research was mostly specific information supply. These employees were considered as potential users of the dashboard.

During the further course of this report, the sample from judgemental sampling is referred to as “salespersons”, as they all do sales. The sample from the snowball sampling is referred to as “support-persons”, as they have the commonality of supporting the sales department. The salespersons and support-persons together have over 95% of the contact with the T1 and T2 customers and are for that reason the most appropriate sample to answer the research question. For the sake of clarity in the rest of the report, the different persons were coded as shown in Table 1.

<table>
<thead>
<tr>
<th>Salespersons</th>
<th>Support-persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person A</td>
<td>Person K</td>
</tr>
<tr>
<td>Person B</td>
<td>Person L</td>
</tr>
<tr>
<td>Person C</td>
<td>Person M</td>
</tr>
<tr>
<td>Person D</td>
<td>Person N</td>
</tr>
<tr>
<td>Person E</td>
<td>Person O</td>
</tr>
<tr>
<td>Person F</td>
<td>Person P</td>
</tr>
<tr>
<td>Person Q</td>
<td>Person R</td>
</tr>
<tr>
<td>Person S</td>
<td></td>
</tr>
</tbody>
</table>

4.1 ORIENTATION RESULTS

The orientation results were obtained via interviews, observations and documentation research. In total 14 people were interviewed; all people from Table 1 except for person F. All interviews except for the two, with person C and E, were in Dutch and all interviews lasted between 10 and 50 minutes. The observations were mainly done before the deployment of the new information system. The documentation research was performed on 11 different kind of documents with a total of approximately 150 documents. The results of these collection methods are categorized in three different themes. With each theme a summary of the most important results is given in the form of a table mentioning the collection method and the source of the information.
The goal of retrieving information before the development and deployment was to have a clear overview of the processes around customers and how customer information is used during these processes.

## 4.1.1 INFORMATION SOURCES

An overview of the information obtained in the theme “Information sources” is shown in Table 2. The next paragraph will summarize the findings.

**TABLE 2 RESULTS THEME: INFORMATION SOURCES**

<table>
<thead>
<tr>
<th>Method</th>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>A, B, C, D, E, K, L, M, O, P, Q, R, S</td>
<td>Mentioned JDEdwards as an information source</td>
</tr>
<tr>
<td>Document</td>
<td>Stock lists</td>
<td>Come directly from JDEdwards</td>
</tr>
<tr>
<td>Observations</td>
<td>A, D, E, R</td>
<td>Showed examples of complexity when working with JDEdwards</td>
</tr>
<tr>
<td>Interview</td>
<td>A, B, C, D, E, R</td>
<td>Mentioned colleagues as an information source</td>
</tr>
<tr>
<td>Interview</td>
<td>A, C, D, E, R</td>
<td>“If I want to make sure information is correct I call” a colleague of the specific department</td>
</tr>
<tr>
<td>Observation</td>
<td>A, E</td>
<td>Have called colleagues to obtain information</td>
</tr>
<tr>
<td>Observation</td>
<td>A, E</td>
<td>Have called colleagues to check the correctness of information</td>
</tr>
<tr>
<td>Documents</td>
<td>Mailings of A, E, K, L, O</td>
<td>Showed different kinds of questions colleagues asked each other about the customer and its status</td>
</tr>
<tr>
<td>Interview</td>
<td>A, B, C, D, E, K, L, M, N, O, P, Q, R, S</td>
<td>Mentioned Qlikview as an information source</td>
</tr>
<tr>
<td>Observation</td>
<td>N</td>
<td>Is very well known with one specific Qlikview application</td>
</tr>
<tr>
<td>Interview</td>
<td>N</td>
<td>“Qlikview is a useful tool when you know how to use it, the problem is it requires lots of practice”</td>
</tr>
<tr>
<td>Interview</td>
<td>O, P</td>
<td>Use Qlikview to retain product information</td>
</tr>
<tr>
<td>Interview</td>
<td>C, D, E</td>
<td>Mention they do not use customer information from Qlikview</td>
</tr>
<tr>
<td>Interview</td>
<td>A, B, S</td>
<td>Are convinced Qlikview is a program with great potential</td>
</tr>
<tr>
<td>Document</td>
<td>Exclusive design list</td>
<td>Is composed from data in Qlikview</td>
</tr>
<tr>
<td>Document</td>
<td>QV applications</td>
<td>Are existing application of Qlikview within Vlisco Netherlands B.V.</td>
</tr>
<tr>
<td>Observations</td>
<td>A, B, N</td>
<td>Have been using Qlikview multiple times</td>
</tr>
<tr>
<td>Interview</td>
<td>C, D, E</td>
<td>Mention they have an aversion against the present information systems and Qlikview in specific</td>
</tr>
<tr>
<td>Interview</td>
<td>D, E, K, N, O, P</td>
<td>Mentioned PDM as an information source</td>
</tr>
<tr>
<td>Interview</td>
<td>A</td>
<td>Mentioned VOP as an information source</td>
</tr>
<tr>
<td>Document</td>
<td>Customer_profile.xls</td>
<td>One of the documents an account managers owns to have an overview of the customer information</td>
</tr>
<tr>
<td>Interview</td>
<td>A, B, C, D, E, K, L, M, N, O, P, Q, R, S</td>
<td>Mentioned they had their own Excel files to have a decent overview of the information needed for their specific function</td>
</tr>
</tbody>
</table>

Account managers have a couple of possible information sources. The most used are colleagues, and the information systems, JDEdwards, Qlikview, VOP and PDM. During the interviews, it became clear that every employee has different experiences with the sources, but information directly from colleagues is generally considered as most reliable. The overall impression employees have about the information systems is that they are very complicated and they regularly contain data with questionable reliability. This ambiguity makes some employees only use information directly from other colleagues. After information is collected, it is often stored in a number of Excel files. Every person which was interviewed had an own collection of Excel files which functioned as a kind of personal database/library.
### 4.1.2 USAGE OF CUSTOMER INFORMATION

An overview of the information obtained in the theme: “Usage of customer information” is shown in Table 3. This section will summarize the findings.

**TABLE 3 RESULTS THEME: USAGE OF CUSTOMER INFORMATION**

<table>
<thead>
<tr>
<th>Method</th>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation A</td>
<td></td>
<td>Gets small questions from internal and external parties about sales, stock, financial position, complaints, targets, order details and delivery performance.</td>
</tr>
<tr>
<td>Observation E</td>
<td></td>
<td>Gets small questions from internal and external parties about sales, stock, complaints, targets and order details.</td>
</tr>
<tr>
<td>Interview S</td>
<td></td>
<td>“We have a monthly review with our customers, during these reviews, we discuss more strategic topics with them. When there are big complaints, these meetings offer the possibility to contain its effect.”</td>
</tr>
<tr>
<td>Interview A</td>
<td></td>
<td>“During the monthly meetings I keep reminding customers about their stock.” “They often like to order new products, while they have plenty in stock of other goods.”</td>
</tr>
<tr>
<td>Interview B</td>
<td></td>
<td>While discussing monthly meetings: “It is very dependent on the customers what they subject is, some have massive amounts of stock, others have problems in the market and again other customers have problems reaching their target”</td>
</tr>
<tr>
<td>Interview A</td>
<td></td>
<td>“It is important to enter the customer visits well prepared as customers tend to ask questions about all different kinds of subjects.” Examples mentioned: targets, financial details, product details, deliveries.</td>
</tr>
<tr>
<td>Interview A</td>
<td></td>
<td>“Sales targets are our main guideline, they are used with practical each customer contact”</td>
</tr>
<tr>
<td>Interview O</td>
<td></td>
<td>When talking about the customer visits the following was said: “I have to know which designs are exclusive such that I do not offer customers something they can not order”</td>
</tr>
<tr>
<td>Observation F</td>
<td></td>
<td>This employee started with Vlisco during the project. She was searching for general information for several times.</td>
</tr>
<tr>
<td>Interview C</td>
<td></td>
<td>This employee took a customer from another account manager and said: “The first thing I do is making a profile of the customer’s sales data together with the general information”</td>
</tr>
<tr>
<td>Interview M</td>
<td></td>
<td>“We make forecasts for the factory, we make them by comparing last quartile sales with the same quartile previous year and looking at the sales of the following quartile.”</td>
</tr>
<tr>
<td>Interview K</td>
<td></td>
<td>“The forecasts made for the factories are based on historical sales data”</td>
</tr>
<tr>
<td>Interview A</td>
<td></td>
<td>“The sales orders are send to the factory, where they convert the sales order to a workorder. This workorder is their guide to produce the right products in time.”</td>
</tr>
<tr>
<td>Interview A</td>
<td></td>
<td>“With every complaint we take into account the history of the customer. A customer which received a bad batch for the third time demands a different approach than a single case”</td>
</tr>
<tr>
<td>Interview L</td>
<td></td>
<td>“Customers can have complaints about all kind of things, most common are product specifications and delivery performance”</td>
</tr>
</tbody>
</table>
During the analysis and interviews a lot of different information about the customers was mentioned. The following list is the most found and mentioned customer information Vlisco manages.

- General information
- Sales history
- Stock data
- Complaints
- Financial credit
- Exclusivity details
- Placed order details
- Visit data
- Sales targets
- Role in value chain
- Delivery performance

Within Vlisco, this information is being used during various activities and processes. In the next paragraphs the activities will be explained together with the role of customer information. Table 4 summarizes the results acquired from the analysis and in which activity or process it is used.

### TABLE 4 SUMMARY RESULTS OBSERVATION PHASE

<table>
<thead>
<tr>
<th>General information</th>
<th>Sales history</th>
<th>Stock data</th>
<th>Complaints</th>
<th>Financial credit</th>
<th>Exclusivity details</th>
<th>Placed order details</th>
<th>Customer visit data</th>
<th>Sales targets</th>
<th>Role in value chain</th>
<th>Delivery performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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</table>

#### 4.1.2.1 AD-HOC QUESTIONS

Account managers have a lot to do with ad-hoc questions from all kind of directions, internal or external. Often the request is very specific, resulting in a single number or single sentence answer. As these questions can be very diverse, many kinds of customer information can be used. The most used are sales history, financial credit and placed order details.

#### 4.1.2.2 MONTHLY REVIEW

All customers get a review each month, during this review the activities of that month are checked and the upcoming month is analysed/planned. The most used information is the stock details, last month’s sales and sales targets. The goal of stock management is to have only necessary stock and especially no old stock. Obviously it is aimed to fulfil the month’s target, if this is not the case, other information sources can help searching for explanation; think about complaints or failed deliveries.
4.1.2.3 CUSTOMER VISIT PREPARATIONS

During the customer visits a lot of different subjects can be discussed, not every information source will be used all the time, however Table 4 gives a proper indication of all possible subjects. Before every visit the account manager checks all possible problems and issues to discuss during the visit.

4.1.2.4 DURING CUSTOMER VISIT

During the visit itself all possible problems can be discussed, but also orders are being placed. One limitation in the ordering process is that some designs are exclusive to other customers. Here this information needs to be present. When a customer is ordering new products, the stock is also checked if it would not be more wise to first sell products from stock instead of producing new.

4.1.2.5 NEW TO CUSTOMER

When an account manager gets a customer new to him, the general information is checked together with the sales history of last year. By looking at this data the account manager can get a feeling what kind of products this customer is interested in. The same information is also useful for new employees in the department as every customer is new to them.

4.1.2.6 PRODUCTION SCHEDULE/FORECASTING

The capacity of the plant is scheduled per quartile. To make these plans, a lot of information is used including the sales history of each customer. The sales of previous years is checked to spot any difference over the seasons and the sales of last months is checked to analyse how the current year is doing compared to the previous years. Using this information an estimate can be made how many products are going to be ordered.

4.1.2.7 PRODUCTION OF PRODUCTS

When the factory is going to produce, they use the information from the sales orders to know what to produce and when the products should be finished.

4.1.2.8 AFTER SALES

After the product is sold and delivered, the account manager can receive complaints. To handle these complaints the historical data is necessary and sometimes also the delivery performance. In essence the account manager is not part of the actual complaint process, however they are the first person a customer will talk to about possible issues.
4.1.3 INFORMATION FOR PERSONALISATION

An overview of the information obtained in the theme: “Information for personalisation” is shown in Table 5. The upcoming paragraph summarizes the findings.

TABLE 5 RESULTS THEME: INFORMATION FOR PERSONALISATION

<table>
<thead>
<tr>
<th>Method</th>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>E</td>
<td>“Customers appreciate the personal attention we give them. They come back because they know us and like doing business with us.”</td>
</tr>
<tr>
<td>Interview</td>
<td>E</td>
<td>“When I would transfer all information I know about a customer to another person, it would take him years to be able to deliver the same service. Giving the customer an experience goes further than having knowledge”</td>
</tr>
<tr>
<td>Interview</td>
<td>E</td>
<td>“Transferring knowledge about the customer is important when the customer is handed over to another colleague”</td>
</tr>
<tr>
<td>Interview</td>
<td>E</td>
<td>“Sometimes I talk with a customer and notice he had contact with a colleague without I know of. It would be nice to have it centrally, when customer contact occurred”</td>
</tr>
<tr>
<td>Interview</td>
<td>A</td>
<td>“A customer appreciates it very much if we take into account his religion and dining preferences during a visit”</td>
</tr>
<tr>
<td>Interview</td>
<td>L</td>
<td>“Even though I am no contact person anymore for the customers, they keep coming back to me whenever they are around. There is a personal connection”</td>
</tr>
<tr>
<td>Interview</td>
<td>L</td>
<td>“I even know the names and birthdates of the children of some customers”</td>
</tr>
<tr>
<td>Interview</td>
<td>L</td>
<td>“Once we gave a customer flowers because it was his wife’s birthday, this kind of personal attention is really appreciated”</td>
</tr>
<tr>
<td>Interview</td>
<td>L</td>
<td>“In the past years, the sales department has grown and customers got other contact persons. It proved hard for the new account managers to keep delivering the personal touch.”</td>
</tr>
<tr>
<td>Interview</td>
<td>L</td>
<td>“I could write books with all the knowledge I have from our customers.”</td>
</tr>
<tr>
<td>Interview</td>
<td>A</td>
<td>“We really need a system where we can log each contact moment with the customer”</td>
</tr>
<tr>
<td>Interview</td>
<td>A</td>
<td>“The most ideal situation would be if a CRM system was implemented in the future”</td>
</tr>
<tr>
<td>Interview</td>
<td>B</td>
<td>“Sometimes I really miss the functionalities of a CRM system within Vlisco”</td>
</tr>
</tbody>
</table>

A very interesting discussion conducted with multiple employees is about the fact that customers of Vlisco appreciate the level of personal attention they receive, and the difficulty of grasping the right information to maintain this. When professionalising the sales department there is a risk of losing this ‘personal touch’ as one of the employees called it. All key account managers agree upon the fact that besides the customer dashboard also a CRM system would fit well within Vlisco. This system should give the possibility to expand the department, but still deliver the personal service. At this moment all information making the service personal is in the memory of Vlisco employees, a CRM system should be aimed at making this information fluid throughout the organisation. Concrete examples were birthdays, dining preferences, and names of the customer’s spouse and children.
4.2 DESIGN AND DEVELOPMENT RESULTS

During the development and deployment of the new customer information system, several products have been delivered as a result of the SCRUM methodology. This chapter is organised according to the steps of the SCRUM methodology.

4.2.1 PLANNING

The planning phase resulted in three products: the backlog list, the packets and the risk assessment. The upcoming sections will present these results.

4.2.1.1 BACKLOG LIST

Using the requirements engineering method, a backlog list was created. This list contained all information sources the current system misses according to the persons A-E, L, P and S. During the classification phase a total of 52 backlogs were classified, the list is shown in Appendix B. All 52 backlogs were prioritised using the function from section 3.3.2.2. After all final scores were calculated, 19 backlogs scored 4.5 or higher, meaning these were used to make the packets. The 19 backlogs with priority are shown in Table 6, the table contains all details, including the packets.

4.2.1.2 PACKETS

Packets consist of a single or multiple information objects in order to fulfil one or more backlogs. All 52 backlogs were categorised into packets, but in essence only the packets which would fulfil the 19 prioritised backlogs were taken in consideration when creating the new system. These backlogs were consolidated into 11 packets. Four extra packets were added namely: “Brancheplant mix”, “Turnover details”, “Cash/digital payment distribution” and “shipping details”. The “Brancheplant mix” is added because with minor effort this can be implemented when the data of other packets is available. The other three additional packets were considered to have high potential, this means they are worth time spending more time on as they would enhance the usefulness of the dashboard greatly according to the sales team. The “turnover details” and “Cash/digital payment distribution” were data which should be retained from the finance department. Data from this department is considered rather confidential, so future users did not think this was possible within the new customer information system. This could be a reason for scoring low on the priority list.

All packets are described using an unambiguous definition. This unambiguity was necessary as these descriptions were the guidelines during the development phase. It also helped explaining external people why information was needed and with which goal. All 15 packets with definitions are shown in Table 7.
<table>
<thead>
<tr>
<th>Backlog</th>
<th>Description</th>
<th>Packet</th>
<th>Format</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock age</td>
<td>A quick overview of the age distribution in the stock</td>
<td>Stock age</td>
<td>Histogram</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>1,5</td>
<td>22,5</td>
</tr>
<tr>
<td>Stocklist details</td>
<td>All details of the stock present</td>
<td>Stock details</td>
<td>Table</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>Amount of products</td>
<td>The amount of ordered products at category level</td>
<td>Sales trends</td>
<td>Histogram</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>1,5</td>
<td>18</td>
</tr>
<tr>
<td>Invoiced Order details</td>
<td>Detailed overview of all orders received at SKU-level</td>
<td>Invoiced Order details</td>
<td>Table</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>1,5</td>
<td>18</td>
</tr>
<tr>
<td>Customer delivery</td>
<td>Do we deliver the ordered products in time and complete?</td>
<td>Customer delivery performance</td>
<td>Stacked histogram</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1,5</td>
<td>16,5</td>
</tr>
<tr>
<td>performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover</td>
<td>The turnover Vlisco gets from a customer</td>
<td>Sales trends</td>
<td>Histogram</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Producing orders</td>
<td>What is the Expected date of completing this order and what is the Workorder number.</td>
<td>Production status</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1,5</td>
<td>12</td>
</tr>
<tr>
<td>Company name</td>
<td></td>
<td>General information</td>
<td>Text</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Classification</td>
<td>The Class which Vlisco has assigned to this customer. Example: T1 gold</td>
<td>General information</td>
<td>Text</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Exclusivity details</td>
<td>The details of all current exclusive orders of this customer</td>
<td>Exclusive design details</td>
<td>Table</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Category Mix</td>
<td>The proportions to which product groups and categories are being ordered</td>
<td>Product Category Mix</td>
<td>Histogram; Gauge meter</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1,5</td>
<td>9</td>
</tr>
<tr>
<td>Rebate Revenue Bonus</td>
<td>The progress towards the revenue-level to recieve a bonus discount</td>
<td>Sales Targets</td>
<td>Gauge meter</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0,5</td>
<td>7,5</td>
</tr>
<tr>
<td>Sales targets</td>
<td>The comparison between actual sales and the sales targets</td>
<td>Sales trends</td>
<td>Table</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0,5</td>
<td>7,5</td>
</tr>
<tr>
<td>average price</td>
<td>The average price price per yard</td>
<td>Sales trends</td>
<td>Histogram</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0,5</td>
<td>6</td>
</tr>
<tr>
<td>registration number</td>
<td></td>
<td>General information</td>
<td>Text</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Location</td>
<td>The address for mail</td>
<td>General information</td>
<td>Text</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>classification target</td>
<td>Progress towards the classification target</td>
<td>Classification target</td>
<td>Gauge meter</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>0,5</td>
<td>4,5</td>
</tr>
<tr>
<td>Sales territory</td>
<td></td>
<td>General information</td>
<td>Text</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>0,5</td>
<td>4,5</td>
</tr>
<tr>
<td>Exclusivity</td>
<td>Does the customer have the possibility to order exclusive designs?</td>
<td>Exclusive design details</td>
<td>yes/no</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>0,5</td>
<td>4,5</td>
</tr>
<tr>
<td>Packet</td>
<td>Definition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock age</td>
<td>Stock age are taken from all SalesOrderLines of which the WO-status is finished, but the SO status is not yet shipped. Within the dashboard we want to calculate Stock age in two manners: (1) # of yards categorized in months since the requested delivery date is expired (2) # of yards categorized in months since the product is out of the factory.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock details</td>
<td>In the Stock details we want information about all SalesOrderLines of which the WO-status is finished, but the SO status is not yet shipped. The desired parameters are: SKU code; Requested delivery date, Date completion WO, Amount, Value, Age( according to definition (2) in row above). Most preferably the Stocklist is copied from the JDE form: &quot;Orderpositie per klant Gereed/niet gefaktureerd met verkoopprijs/bedrag&quot; (R5542041/VLIS0003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales trends</td>
<td>This should be a Bar and Line chart which shows the trend of sales in a given time-period. The sales will be in yards and can be displayed in an absolute or accumulated manner.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product category mix</td>
<td>This circle diagram will show the distribution of the different product categories (CAT/COL/EXCL) in terms of yards.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brancheplant mix</td>
<td>This circle diagram will show the distribution of products on different brancheplants in terms of yards.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invoiced order details</td>
<td>A table which shows all Salesorders per customer, each salesorder needs to be specified per SKU and Data of Invoice. From each SKU it should be visible what the ordered amount, €/yard and total price is.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclusive design details</td>
<td>There should be an overview of all exclusive designs of a specific customer, together with details about the design. These details are: Date the design can be sold, Date the exclusivity will end, current quantity on stock and total quantity sold.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover details</td>
<td>This Line/Bar chart should be similar to the &quot;Sales Trends&quot; only displaying turnover (€) instead of Sales (yd)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash/digital payment distribution</td>
<td>We want an circle diagram which shows the distribution of digital and cash payments of a certain customer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production status</td>
<td>For each salesorder, an workorder should be visible in this table. Therefor we are especially interested in the planned completion date, amount ordered and the amount produced per SKU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipping details</td>
<td>If an order is being shipped to a T1 customer, this object should give the requested, actual and estimated time of arrival at critical points. The table should be specified per customer per salesorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer delivery performance</td>
<td>In essence we would like to see if we deliver our goods OTIF, on time and in full. These are defined in the following manner: On time: The date on which the SKU comes out of production should be earlier than the requested delivery date In Full: The 100% delivery of a specific SKU(SO-line) which was ordered initially</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales targets</td>
<td>This bar/line chart will show the targets of a specific month/year a customer has to make. These targets will be from the KAP's and need to be loaded from an excel.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification target</td>
<td>This will be an gauge chart which shows how far the customer is from a silver/gold/platinum status this year.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General information</td>
<td>This should be a collection of general information about the customer. The data requested is: Customer Name; Customer nr(s), Contact person(s), account owner, accountmanager, pricelist condition, delivery condition, payment condition, language spoken, customer since, Cluster, consumption market, Address</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.2.1.3 RISK ASSESSMENT

During the planning phase, a risk assessment was done using the insights of the core project team and occasional advise of other Vlisco employees. The risks were categorized in three categories representing likelihood of occurrence: low, medium and high. Low means it was not likely to happen more than once during the project duration. Medium means it was reasonable to have once or twice a month. High means it was likely to happen more than twice a month. Furthermore the phase(s) the risk was most likely to happen were determined. For each risk a proper response was made, which should minimize the risk, or minimize the effect. Overall the project was reviewed each week, so signs of risks and actual risks could be recognized and minimalized within reasonable time. An overview of the risk assessment made is in Table 8.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Likelihood</th>
<th>Phase</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>The source of desired information cannot be found.</td>
<td>high</td>
<td>Planning, High level design and Development</td>
<td>If a disproportionate amount of time is spent on a variable, the variable should not be included in the new system.</td>
</tr>
<tr>
<td>Employees have bad experience with Qlikview</td>
<td>high</td>
<td>Planning &amp; Closure</td>
<td>These employees should be identified and given extra attention during the deployment.</td>
</tr>
<tr>
<td>Employees do not give priority to my project</td>
<td>medium</td>
<td>All</td>
<td>It is possible to have management of Commercial Excellence influence these employees.</td>
</tr>
<tr>
<td>The source of desired information is classified</td>
<td>medium</td>
<td>Planning, High level design and Development</td>
<td>Do not include this information.</td>
</tr>
<tr>
<td>Data verification does not work out</td>
<td>low</td>
<td>Closure</td>
<td>If a disproportionate amount of time is spent on the verification of a variable, a notification should be made for the users how accurate the displayed information is.</td>
</tr>
<tr>
<td>The project team is not able to learn how to develop in Qlikview in time.</td>
<td>low</td>
<td>High level design</td>
<td>Ask other Vlisco employees to support the learning process and perhaps the development.</td>
</tr>
</tbody>
</table>
4.2.2 HIGH LEVEL DESIGN

The high level design resulted essentially in three products; (1) the technical aspects, describing which software is going to be used, (2) the availability of the information needed for the backlogs, and (3) the prototype interface. The upcoming sections describe these products.

4.2.2.1 TECHNICAL ASPECT

Vlisco uses two systems where employees can retain digital information from, JDEdwards and Qlikview. The former is an enterprise resource planning application, were each employee can access specific information by requesting predefined reports. The latter is a self-service data visualisation tool were employees can slice and dice information using a predefined data-set. Since the goal of the new information system is to give employees more insights into the customer data, it is better to provide employees with a predefined data-set than predefined reports, Qlikview was therefore the most suitable option.

Qlikview is software which loads data from a tabular format and converts this into information objects. These information objects can be in various appearances like pivot-tables, bar charts, pie charts and many more. Different information objects can be shown next to each other on a specific tab. A set of tabs form a Qlikview-file, also called an application. When a user is working in an application, he/she can apply filters to the data. By applying filters to the data, the information shown in the object is filtered also, this allows the user to change the information objects to only show the data which is needed.

Within Vlisco, each Qlikview application is connected to the data warehouse, that consists of information in tabular formats. The advantage of this connection is that a lot of information is updated automatically and the Qlikview application displays up-to-date information at any time. The limitation of this connection is that, only data which is present in the data warehouse is generally used. Vlisco’s policy allows only very limited usage of other information sources, like Excel, to be loaded into a Qlikview application.

4.2.2.2 AVAILABILITY VARIABLES

During the analysis of the variables, most information sources could be retained pretty fast via a source the users gave. This was always a specific system or person via which they retrieved their information at that moment. Information which proved to be unavailable systematically was general customer or market information. Also stock details proved to be difficult to find. During the search for the sources of information and calculation methods of certain numbers, it was astonishing how little was documented about the information system within Vlisco. Everybody who has been interviewed confirmed that most information was present within Vlisco somewhere, however only few were able to give directions where to search further.

The availability of all variables are presented, as variable “d”, in Appendix B and the availability of the backlogs with priority is shown in Table 6.

4.2.2.3 PROTOTYPE

The prototype was developed in Excel as a visual representation of the backlogs and to review if the idea of a simple interface would work out. All 12 pages of the prototype are shown in Appendix E, this paragraph will discuss the design choices and their results.
The background and VG logo were taken from another application of Vlisco, which contained information about products, this background was closest to the goal of making a clean sheet. Each page includes one or more desired information objects, which fulfil backlogs. These objects were often screenshots taken from other applications, or graphs made in Excel. Within this prototype two out of three kinds of data objects were used, navigation and presentation. Figure 13 shows a dropdown menu to select the customer, while Figure 14 shows a selection bar, to filter the presented data on year. These are examples of navigation objects.

Figure 15 and Figure 16 show examples of visual presentation objects, presenting information about the amounts and ratios of sold products.

Figure 17 shows an example of a tabular presentation object, showing more specific information about the sold products to a specific customer.

Besides the data objects, also some text balloons were added, which are not going to be part of the dashboard, but were used in this prototype to inform the future user about functionalities or to ask direct questions. Figure 18 gives an example of the balloon which was placed above the sales graph of Figure 15 in the prototype.
The high level design was made by dividing the different packets into multiple tabs, see Table 9. These tabs have been the backbone of the development phase. The packets were divided into eight tabs based on their commonalities. The packets that needed information from the financial department were not included in this prototype, as, in this phase, it was unclear if it would be possible to include them.

<table>
<thead>
<tr>
<th>Tab prototype</th>
<th>Packets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer information</td>
<td>General information</td>
</tr>
<tr>
<td>Sales Data</td>
<td>Sales Trends, product category mix, invoiced order details</td>
</tr>
<tr>
<td>Sales Targets</td>
<td>Sales targets</td>
</tr>
<tr>
<td>Incentives</td>
<td>Classification target</td>
</tr>
<tr>
<td>Stock</td>
<td>Stock age, Stock details</td>
</tr>
<tr>
<td>Exclusivity</td>
<td>Exclusive design details</td>
</tr>
<tr>
<td>Production status</td>
<td>Production status</td>
</tr>
<tr>
<td>Shipping</td>
<td>Shipping details, Customer delivery performance</td>
</tr>
<tr>
<td>--Not included--</td>
<td>Turnover details, Cash/digital payment distribution</td>
</tr>
</tbody>
</table>

This prototype has been reviewed by persons A, B, E, K, L, M and S. Their feedback was documented per tab and can be roughly divided into three categories: (1) missing objects or suggestions for other objects (2) naming of variables/objects (3) layout comments. This feedback was taken into account in the development phase.
4.2.3 DEVELOPMENT

The development phase started in the third week of the project and lasted for 10 weeks. During these weeks, 10 sprints were made with a review moment each Friday. The first weeks were used to become familiar with the software. The remaining weeks were used to implement the design into Qlikview, using the prototype and retained feedback. Making the application in Qlikview and receiving feedback from the users became an organic process and resulted in the application described in this chapter. Paragraph 4.2.3.1 will discuss general development choices and other remarks, while paragraphs 4.2.3.2 until 4.2.3.7 will discuss the development of the different tabs. Full page screenshots of the post-development version of the dashboard are available in Appendix F.

4.2.3.1 GENERAL

One point of attention received via the prototype was to reconsider the number of tabs and their sequence. Especially the multiple tabs in the beginning of the application appeared to be redundant, therefore they were replaced by one single tab, showing all customers included in the dashboard. The post-development version contained five tabs sorted in the order of the sales process within Vlisco. Figure 19 shows how each tab belongs to a part in the sales process.

Each tab had the same lay-out, with the navigation on top and the data on the rest of the page. The navigation section was similar across all tabs, with some tab containing specific objects to navigate there easier. Even though the data objects in each tab were different, all of them had the same appearance and style. Figure 21 is a visual representation of how the lay-out was made across the most pages.

The current selection box was the same across all tabs, it shows what the user has currently selected and allows to go to the previous and next selection. Also a “clear”-button was present in this box. Figure 20 shows how the current selection box looks like.
Analysing other applications within Vlisco, it appeared that users are getting confused when information is shown in the objects which is not relevant or even valid. In order to minimize this confusion, the customer dashboard hides objects or data, when they are not relevant to the user.

The colours of the user interface were held simple. The background was light grey, the captions darker grey and the text was black. The background within objects was always white, this should emphasise the possibility of applying filters by clicking on them. Only visual data presentation objects used colours; these colours represent a set of data points. Each different set of data point was given another distinctive bright colour, such that it would be easy to differentiate between data sets.

4.2.3.2 CUSTOMER SELECTION

The customer selection tab was the first tab, users saw. The goal was to show what the contents of the dashboard was. Different boxes showed all T1 customers in their clusters, each cluster had its own box and all T2 customers were shown in a single box. Figure 22 shows the box of all T1 customers of the Nigeria cluster. Besides the informative function, the boxes also functioned as selection boxes, the users could select the desired customer(s), which they would like to analyse; where after they could proceed to a next tab. A box in the right bottom corner showed the current selections a user made. In the bottom left corner the last moment of update was shown.
4.2.3.3 CUSTOMER INFORMATION

The customer information tab contained all general information about the customer registered in the information systems of Vlisco. A search bar at the top should make it easy to search for general information of other customers. Below is a list of all information shown in this tab:

- Customer name
- Customer number
- Other customer number
- Tier
- Vlisco award program status
- Preferred language
- Contact person
- Other stakeholders
- Customer since
- Consumption market
- Cluster
- Account owner
- Account manager
- Price condition
- Payment condition
- Delivery condition
- Country
- City
- Postal code
- Address

The layout of this tab was different from the standard as it did not show any table or visual object, but just plain text. The background behind the text was chosen dark to emphasise this was no table and thus was not clickable.

4.2.3.4 SW EXCLUSIVITY

The navigation part of this tab consists of a selection bar to select the status of designs, a search bar to search for designs, a selection box to select a customer and the current selection box. The developers were not yet satisfied with the navigation section of this tab at the end of the development phase, this was still a point of attention in the closure phase.

The data section contained 2 tables, the first had the actual information of all exclusive designs and the other contained data the test the actual information. The second table (minimized in the down left corner) was a table only for developers, so would be deleted in the closure phase. The table with the actual information was in the standard lay-out and contained the following information:

- Customer name
- Design
- Exclusivity effective from
- Exclusivity expires on
- Current status (upcoming/expired/active)
- Total quantity shipped
- Total quantity originally ordered
- Last invoice date
- Current quantity on stock

4.2.3.5 PRODUCTION STATUS

The navigation part of this tab consists of four search bars to search for: product category, product group, SO number and design. Furthermore the standard customer selection bar was present, just like the current selection box.

The data section contained 2 tables, the top one showed an overview of all order in production. The second table showed a more detailed overview of all different products and their production status. The following information was considered to be important by users when having an overview of the production orders:
4.2.3.6 STOCK

The navigation part of this tab consists of four search bars to search for: design, customer PO and two blank search bars. These blank bars were taken into the closure phase to possibly use. Furthermore the standard customer selection bar was present, just like the current selection box.

The data section was still under heavy construction at the end of the development phase; it proved to be hard to determine the source data and to derive the stock information from that. Within Vlisco there is a discrepancy about the definition of stock and the definition set in the packet list was not usable when searching in the data warehouse. Even though the information was not 100% complete, the shown values were correct. The future users would like to see the following information of the stock:

- Sales order number
- Work order number
- SKU code
- Quantity
- Price/yard
- Amount(€)
- Requested delivery date
- Age( to be added in closure phase)

Future users mentioned during the development they would like to see the age distribution of the stock. This feature was added in the closure phase.

4.2.3.7 SALES

The navigation section of the sales tab had four main parts. First three selection boxes to filter the data on timespan. Using the three boxes, users could filter the data on week, month and year. Second four search bars enabled the users to filter on product category, product group, sales order number and design. Third the customer selection box was available and fourth the current selection box was displayed.

The data section consisted of four visual data objects and one pivot table. All data objects showed properties of the finished sales orders. Two visual objects showed how the ratios of different product categories and branch plants were by using a bar chart with percentages. Figure 23 is an example of the chart showing the product category mix.
The two other visual objects were charts showing the quantity of sold products on a time scale. Figure 24 shows the two charts and the corresponding button; the button can be used to switch the charts from accumulated to absolute quantities and back. When showing the absolute quantities per month, the chart changes into a bar chart instead of line charts when showing accumulated quantities. The left chart was developed to make year-to-year comparisons of sold products, the right chart was developed to show the progress of the sales to the targets.

The pivot table was showing the details of all sales orders specified per SKU-code. The data shown in the pivot table was:

- Customer number
- Customer name
- Sales order number
- Date of invoice
- SKU code
- Quantity
- €/yard
- Total price
4.2.4  CLOSURE

The final phase of the SCRUM method was the closure phase. When this phase is finished, the product should be finished, implemented and used by users. This means there are plenty of results to show in this section. Starting with feedback received about the post-development version, followed by how this feedback results in the final dashboard. Third the user documentation is discussed and fourth the user training is shown. Last it is shown how potential users were notified about the launch of the new information system.

4.2.4.1  FEEDBACK POST-DEVELOPMENT VERSION

To test the post-development version, a trial period of one week was setup for a selected number of users. They were asked to use the dashboard besides their normal information sources and keep the following things in mind:

- Is the information displayed complete?
- Which other way of presenting the data would be even better?
- Where do you get unexpected results?

After this period a small interview was held with the participants in which their first experience was recorded. Besides talking about the application and their experience, they were also asked to show which information they liked most or was most valuable to them. By sitting next to the user and see them click through the application a lot of information was retained about the navigation through the system. During this feedback sessions, the most important subjects were: missing financial information, implementation of fast selections, design suggestions and missing parameters in tables.

4.2.4.2  FINAL DASHBOARD

In the final version of the new customer information system, all the feedback was considered and where possible implemented. This was the last version of how it was delivered to Vlisco Nederland B.V.. The next paragraphs will discuss the changes of each tab. All the screenshots can be found in Appendix G.

**General:** Compared to the previous version, all backgrounds of the information objects were given the same light grey colour as the tab background; furthermore the alignment on the left, top and right was the same in all tabs and also the alignment within tables was unified across tabs. These changes made the user interface consistent, and thus more calm and more comfortable to look at. Also this version only contains verified information, if information proves to be less reliable it shows a notification.

**Customer selection:** In this tab the order of boxes has changed. The reason is such that if new customers are added, there will be no maintenance. Furthermore some buttons are introduces which allow users to select Tier 1, platinum, gold or silver customers in one click. Finally also a new button is put in the top left corner, that links to the instruction presentation which is further explained in paragraph 4.2.4.4.

**Customer information:** This tab got a whole new look and some added functionalities. This tab now gives a total overview of what kind of customer he is and how he is doing at this moment. By adding plenty of visual data objects, the user can get information within a glance. Figure 25 gives an impression on all visual data object within this tab. At the left, three bar charts give information about the composition of products sold to this customer on the variables product group, product category and branch plant. The middle top object shows the current status of the
sales compared this year’s target, and last year’s total sales. The middle bottom object shows how the stock aging composition of the current stock is. On the top of this graph the total amount of stock is given. The right top numbers give an idea about the progression with exclusive designs over the last 3 years. The right bottom charts show how the customer is on the month and quartile target, with actual numbers. Vlisco measures their monthly target in yards, while the quartile target is measured in revenue.

The rest of the layout is made simpler with thinner lines and a light grey background. By making the general information simpler, the visual object in the bottom get more attention. Also the customer selection is changed as this was a search bar and now contains a dropdown menu.

**SW Exclusivity:** The navigation of this tab has been simplified by adding 6 buttons. This eased the process of selecting most used selections. Also the selection box for year has been added, so all exclusive designs for a certain year can be requested. Furthermore a notification has been added, explaining why some exclusive designs are shown without a customer name. This notification has been made light yellow, to make it draw attention, but not being obstructive. Within the data object one variable was added, namely "quantity produced", and the order was changed slightly to make it match with the process order.

**Production status:** Within the navigation section of the production tab, the search options have been extended. It has become possible to also search for work order number, purchase order number and SKU-code. This was necessary as these variables were also added to the tables in the data section.

**Stock:** The navigation section within this tab, now contains the same search bars as in the tab production status. It is now possible to search for: sales order number, work order number, purchase order number, design, SKU code, product category and product group. Furthermore a notification was added in the top left corner warning the user the data in this tab is not 100% complete. During the verification is appeared that stock which is reallocated (less than 10% of the total stock) does not always shows up in the data section. The data section has been extended greatly with more variables in the table and an additional 2 more visual data objects and 4 informational pieces of text. The new objects and text are shown in Figure 26.
The left visual object shows the distribution of stock age, similar to the graph shown on the “customer information” tab. The other visual object shows the stock age distribution in actionable categories. Stock older than a certain age results in a certain action from Vlisco. These categories are shown in this circle diagram. The same actionable categories are shown in the top three text objects on the right, but then with actual numbers. The last text object shows the total amount of stock a customer has. The table in this tab has been extended with the variables: Customer name, product category, and product group.

**Sales(yd):** The navigation section in the sales tab also changed with regards to the search bars, they were copied from the “production status” and “stock” tabs. Also the button to change the graphs was put in the navigation section now. The data section also went through some small changes, the two bar charts were removed (they were moved to the “customer information” tab). This made space for the table to be extended with product group, product category and work order number. The charts at the bottom changed slightly as a vertical line showed the current month and all months were shown even if there was no data present.

**Turnover & margin:** This was a newly introduced tab with the requested data from finance. In the navigation section the year and month can be selected through selection boxes, the customer can be selected by a standard customer selection box and the current selection is also presented on the top right corner. Two buttons are shown, one similar to the one in the “Sales” tab, which changes the charts from accumulated to absolute amounts and back. The other button included or excluded the fents from the data section. The notification in the top left corner warned the user that the shown numbers of the last two months are not verified by finance. Finance approves all sales order roughly 1,5 month later, which means they are always approved two months later.

Within the data section one table was shown together with two visual data objects. The visual data objects were copies of the ones in the “sales” tab, with the difference of showing euro’s instead of yards. The table had a different setup than other tables, as it is not possible to look into financial information at sales order level. The variables shown in the table are:

- Customer name
- Product group
- Quantity
- Turnover
- Costprice
- Gross margin(€)
- Gross margin (%)

### 4.2.4.3 USER DOCUMENTATION

For the sake of documentation, all users which were allowed to the new system were documented. The list contained the employee name, employee number and the required license. In total this list contained 21 people of which five were considered heavy users. Considering the anonymity of the samples and users this list is not published in this thesis.

### 4.2.4.4 USER TRAINING

After the final version was finished, one general presentation was held, which launched and introduced the dashboard together with its functionalities. The heavy users of the dashboard received a one-to-one walkthrough, such that all possible ambiguity and doubts with these core users could be taken away. For all other users a 32 page presentation was created which gave an extensive explanation of the dashboard, its use and functionalities. This instruction presentation was available at the intranet and via the new information system itself. Every time a new user registered on the new system, he/she receives the advice to look at this presentation.
4.2.4.5 DEVELOPER TRAINING

As the new information system also needs maintenance, a new developer needed to get instructions about the dashboard. A five-page document was made, which contained the most important information the new developer should know, it is included in Appendix C. The document contains six sections: goal, design, structure, maintenance, other remarks and suggestions.

Most interesting to mention are the design rules setup in this document. They represent the way the dashboard has been designed. The design was based on the literature in section 2.2.2, but during the development the following guidelines became most applicable for the current system:

- Have a clear distinction between the navigation and data presentation sections.
- Hide objects if they are not of any use.
- Only show information if it is correct.
- Show text and numbers as black letters in tables with a light-grey background and darker lines.
- Use bright colours to display line-graphs and bar-charts.
- Minimize design for maximum information exposure; every object/line/word should be functional.
- Use clear and logical titles, especially since users are not familiar with terms from the data-base.
- Use buttons for fast or complicated selections.
- Try to have clear names in the "current selections" box (After selecting All Tier1 customers, users only want to see the customers they selected in current selection, not the variable "Tier").
- If there can be any ambiguity about the information displayed in an object, use the "Help" text to clarify what is displayed in the object.
- Listen to the users and encourage co-creation.

4.2.4.6 MARKETING

Besides the buzz created by developing the new customer information system, a general email was sent to all the potential users of the new customer information system, including the higher management and employees in Africa. The email is shown in Appendix C. The email contains a clear message about the use of the new customer information system, an overview of what is possible and an explanation where to find it. The goal of this email was such that people got interested and took a look at the new customer information system.

4.3 EVALUATION RESULTS

The evaluative interviews were held six weeks after the deployment with persons A-D and F from Table 1; all interviews took place at Vlisco in Helmond and took between 20 and 35 minutes. Except for the interview with person C all interviews were in Dutch, with this person the interview was held in English. All interviews were conducted using the guide in Appendix A.3. The results of these interviews are divided into three major themes with each two or three sub-themes as shown in Table 10. Each subtheme has its own section, which shows a table with the most influential quotes and thereafter a summary of the theme. Section 4.3.1 will present the findings about the usage of the dashboard. Section 4.3.2 presents the findings about the effect of the deployment of the dashboard. Finally section 4.3.3 will present the findings about the theme "Future of IS"
TABLE 10 THEMES POST-INTERVENTION RESULTS

<table>
<thead>
<tr>
<th>Major theme</th>
<th>Sub-themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage</td>
<td>Reasons for (not) using; Uses of the dashboard</td>
</tr>
<tr>
<td>Effect of the intervention</td>
<td>Effect on business; Effect on customers</td>
</tr>
<tr>
<td>Future of IS</td>
<td>View on extending IS; Customer access to information; Future improvements</td>
</tr>
</tbody>
</table>

Before the usage-paragraph starts, a general remark about a change in function of one of the interviewees. The function of person C has changed during the deployment of the new customer information system, this caused that this person does not have regular contact with customers anymore and is no longer qualified as intensive user of the new customer information system. However her opinion was still very valuable due to her experience and therefor the interview was still held. As a result of the function change of person C, person F was added to the sample since this subject took over the activities with the customers and could therefor relate to the usefulness of the new customer information system.

4.3.1 USAGE

The new customer information system is being frequently used by the persons identified as intensive. Their usage differs from once a week to multiple times a day. The management is estimated to use the new customer information system once or twice per month. Outside of the department the new customer information system is not being used.

4.3.1.1 REASONS FOR (NOT) USING THE DASHBOARD

The most influential quotes are shown in Table 11. A summary of the results on the theme “Reasons for (not) using the dashboard” is given in the rest of this section.

The reasons mentioned in this chapter are unanimously mentioned by all respondents. They refer to the new customer information system as being very user-friendly and containing the most important information account managers need. This also has to do with the fact that, as some respondents mention, all important points discussed in the orientation-interviews were included in the dashboard, they were surprised how even some small details were integrated into the dashboard. This ability of translating the business needs into an IT product proved to be used well.

Furthermore the new customer information system is really supporting account managers when they are preparing contact moments with customers, as it makes them understand their customers. It helps them to feel more comfortable during meetings as they know their statements are being supported by correct data. Even though the same people also mention that they do not use specific information since it is not correct or they notice some data being wrong. However one user made a valid point that the more he used the new customer information system the more confident he became about the data.

One other reason to use the new customer information system is because it contains data which was very hard, if not impossible, to obtain without the new customer information system.

As expected some parts of the dashboard are more used compared to others, interviewees mentioned multiple times that they did not use parts of the dashboard as they are not applicable to them or it contains information they already know by heart. Most information and parts mentioned were meant for people meeting with customers less frequent, often colleagues from other departments. As mentioned before, other departments do not use the dashboard yet; two reasons are brought up by the respondents. First, considering the sales information, other
departments need the same information, however with different parameters and on a different level. Second the general information is not needed very frequently, this means the adoption of a new source of information will be slower, interviewees expected when time passes by the dashboard will also be adopted by other departments as a source for general customer information.

One user indicated that she did not use the data from the finance tab since there is a warning about not using and communicating the data without approval of the finance department. It looked to her as it was not reliable. This indicates it did not became clear during the implementation that this sign mainly means financial information always needs to be checked before making decisions with this information.

Finally some users indicated they could not use the dashboard for all customers as some (smaller) customers order and produce via the internal selling organisation Europashop which is not included in the dashboard. As several clients of subject D and F order via Europashop, they cannot track the production status and stock position of these customers.

**TABLE 11** RESULTS THEME: REASONS FOR (NOT) USING THE DASHBOARD

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&quot;The dashboard works very easily, it is a very easy source for information&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;All information I requested from the beginning is in the dashboard. If the dashboard didn’t do what I would like to, I wouldn’t use it&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;We had one fierce conversation, where I could tell everything I would like to see. I liked your approach&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;A great feature is to calculate the price per yard which is easy to calculate right now!&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;Even small details mentioned in the beginning of the development were inserted into the dashboard&quot;</td>
</tr>
<tr>
<td>D</td>
<td>&quot;I used to have a different mind-set about Qlikview, but it is so easy to use now&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;I can now easily see what the expected finish date of a product in production is&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;With the dashboard I know where to find information, it is easy. It is more clear and user-friendly than other applications&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;The dashboard is so easy, I know by heart which buttons to push to get to certain information&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;The information which is available now, is displayed in an easy way and exactly in the format how we need them.&quot;</td>
</tr>
<tr>
<td>A</td>
<td>About Stock data: &quot;This data is not yet complete&quot;</td>
</tr>
<tr>
<td>C</td>
<td>&quot;One other point I noticed is that data of the assortment with regards to product group was not correct, so I don’t know if it’s the data which is wrong?&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;Is the stock information already useable in the dashboard?&quot;</td>
</tr>
<tr>
<td>B</td>
<td>When discussing the reason of use: &quot;I want to have my facts up-to-date, to make sure I know everything when having a discussion, this makes sure I can understand situations better&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;While using the tool, I notice all information is right, this comforts me when using the tool&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;Earlier it was impossible to have an overview of the stock ageing on a customer level&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;If I wanted to collect information about the stock in general I can give a direct answer now. Earlier this was impossible to do&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;I don’t use ‘Customer information’ often, but besides that I use all tabs&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;I don’t use ‘Exclusive details’ and the top section of ‘Customer information’, as I know that information better by heart.&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;I don’t use ‘Customer information’, regular as this information is common knowledge for me&quot;</td>
</tr>
<tr>
<td>A</td>
<td>When discussing why other departments are not using the dashboard: &quot;Other department need the information on another level, they are more interested in colour-codes for example&quot;</td>
</tr>
<tr>
<td>D</td>
<td>Does not use the data from finance as there is a notification mentioning Finance is not responsible for actions taken with the numbers.</td>
</tr>
<tr>
<td>D</td>
<td>&quot;Sometimes it is a problem I have to look up the order while it is under Europashop&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;I cannot use the dashboard to the full extent for customers ordering with the Europashop&quot;</td>
</tr>
</tbody>
</table>
4.3.1.2 USES OF THE DASHBOARD

The most influential quotes are shown in Table 12. A summary of the results on the theme "Uses of the dashboard" is given in the rest of this section.

TABLE 12 RESULTS THEME: USES OF THE DASHBOARD

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>“The sales data is the most useful information I guess, this in combination with the setup of the dashboard proved valuable”</td>
</tr>
<tr>
<td>B</td>
<td>“I notice, I use it mainly for sales information. Also ‘Finance’ has proven useful. So I mainly use ‘Sales’ and ‘Customer information’ now to see the details and see how the mixes look like.”</td>
</tr>
<tr>
<td>D</td>
<td>“For my customers, I use it to look how their progress is with the sales volume, such that I can stimulate more sales”</td>
</tr>
<tr>
<td>F</td>
<td>Uses the dashboard for operational data retrieval. Sources mentioned are: “production status”, “historical sales data” and “Stock status”</td>
</tr>
<tr>
<td>A</td>
<td>“It is mainly incidental ad hoc use. I use it daily with several questions, but don’t have a routine where I use it.”</td>
</tr>
<tr>
<td>A</td>
<td>“I often search for details of a single product, design or order”</td>
</tr>
<tr>
<td>A</td>
<td>“I do regular analysis of stock ageing to see the week by week changes”</td>
</tr>
<tr>
<td>F</td>
<td>Answering if the dashboard is used in a routine: “I use it when I need specific information”</td>
</tr>
<tr>
<td>F</td>
<td>“This question can come from myself, my manager or from a customer”</td>
</tr>
<tr>
<td>A</td>
<td>“I don’t use ‘Customer information’ often, but besides that I use all tabs”</td>
</tr>
<tr>
<td>B</td>
<td>“I barely use the order details, this is mainly for more operational questions”</td>
</tr>
<tr>
<td>B</td>
<td>“I don’t use ‘Exclusive details’, as I know that information better by heart.”</td>
</tr>
<tr>
<td>A</td>
<td>“Less operational, but more strategic uses are to compare the stock or sales of different customers”</td>
</tr>
<tr>
<td>B</td>
<td>“A great feature is to calculate the price per yard, which is easy to calculate right now”</td>
</tr>
<tr>
<td>B</td>
<td>“I use the dashboard to search for year-to-year information, but also to look what happened last week”</td>
</tr>
<tr>
<td>B</td>
<td>“I can make great comparisons per distribution channel. To look what the most profitable channel is”</td>
</tr>
<tr>
<td>B</td>
<td>“When another department asks for information about a certain region, I can always provide this very fast, with all necessary details”</td>
</tr>
<tr>
<td>F</td>
<td>“When my manager wants more information about the sales in a geographic region, I provide this very easily.”</td>
</tr>
</tbody>
</table>

From the interviews it became clear there are two main uses of the new customer information system. One is looking up operational sales information which tracks specific sales orders or products through the process. This is mainly done to solve ad-hoc problems and answer questions from customers and other departments. The other main use is analysing the past sales of customers or groups of customers. These analysis can contain year-to-year comparisons, or profitability analysis of specific customer- or product-groups. These strategic analysis are used in communication with higher management, other departments, but also as preparation for contact moments with customers. The examples and facts retrieved from the new customer information system proved to be very useful in all sorts of communications.

4.3.2 EFFECT OF THE INTERVENTION

The effect of the intervention can be categorised in two categories, the effect on the business and the effect on the customer. First the results about the effect on the business will be presented. Next the results about the effect on customers are presented.
The most influential quotes are shown in Table 13. A summary of the results on the theme “Effect on the business” is given in the rest of this section.

TABLE 13 RESULTS THEME: EFFECT ON THE BUSINESS

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&quot;I had no access to the turnover data before the deployment&quot;</td>
</tr>
<tr>
<td>B</td>
<td>Answer on the question if different or new information is used: &quot;Yes, I use the sales mixes of customers better now. Also I am more into the price/yard now. I don’t use a lot of new information, but I use information more often because of easy accessibility&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;the dashboard eased the process by making the operations of account managers more easy&quot;</td>
</tr>
<tr>
<td>A</td>
<td>Answer on the question if the contact with colleagues changed after the deployment: &quot;No&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;Often [the management] wants to get facts. The dashboard makes it easy to communicate them quickly to them.&quot;</td>
</tr>
<tr>
<td>D</td>
<td>Answer on the question if the contact with colleagues changed after the deployment: &quot;I have the same amount of conversations with my colleagues&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;I can answer the questions of my manager very fast now&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;The dashboard supports me in the communication with my manager&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;I do think the efficient knowledge we have allows the account managers to have more grip on their customers&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;what we earlier thought we knew, we now actually know by the use of the dashboard&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;The dashboard allows account managers to prepare properly for meetings&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;The time I save from using the dashboard can be spent on other activities to support customers&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;The dashboard frees time which the sales department earlier spent on getting information.&quot;</td>
</tr>
</tbody>
</table>

As described earlier, the dashboard is now mainly used by people with direct regular customer contact, so the effect also mainly focusses on the sales department. The interviewees mentioned three main effects of the new customer information system. First, they have access to information they earlier could not access directly, or took so much time it was not worth the effort. Most information was accessible via other department or colleagues, however these were mostly cobbled-together solutions with sometimes unreliable results. However the interviewees did not notice any change in contact with colleagues. They relate this to the fact that the information requests were often done during other conversations.

Second, the account managers experience they are better aware of the status of their customers now. They are now better aware how the target progress of each customer and/or cluster is, as well how much orders are being produced at the moment and what the current stock of a customer is. Most of this information was present earlier in a less accessible manner.

Third, due to the better accessibility of customer information, account managers have considerably more time to do other things. In the end this also should benefit the customer.
4.3.2.2 CUSTOMERS

The most influential quotes are shown in Table 14. A summary of the results on the theme "Effect on the customers" is given in the rest of this section.

TABLE 14 RESULTS THEME: EFFECT ON THE CUSTOMERS

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>&quot;They are very happy the dashboard has been implemented. Earlier they never heard about targets and now they are getting enthusiastic about it&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;To my opinion the effect on the customer is minimal. I think he receives faster answers on specific questions, but if you ask them if they notice any change, the answer is probably &quot;no&quot;. This is because these specific questions are only a small part of the communication&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;To my opinion, the effect for customers will be limited. One reason is because I share to little information from the dashboard with my customers&quot;</td>
</tr>
<tr>
<td>C</td>
<td>&quot;If you have data available you can discuss with them and optimize the processes with advantages for both parties. You can actually discuss numbers instead of feelings.&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;The dashboard allows account managers to prepare properly for meetings with customers&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;The better information supply towards customers helps them to know their current position&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;My experience is that customer appreciate if you know the facts. This causes you to react faster and to be able to argument better. I don’t know if this is always best for the customer, but in the long run it is positive for both parties&quot;</td>
</tr>
</tbody>
</table>

When discussing how the dashboard effect the customers and how they could notice the change, the interviewees responded divided. One interviewee actually said the customers noticed the implementation of the dashboard due to the frequency they are reminded about their targets. This frequency differentiated greatly among different sales people; as the targets are more easy to find and progress is easier to track, this difference in frequency has become smaller. Other employees doubt the fact if customers would notice the difference, they do agree on the fact the customers retrieve faster answers on specific questions, however this is such a small part of the interaction, customer would not be aware of the change. Again other interviewees mentioned that the dashboard gives them the possibility to discuss numbers more often with the customers instead of feelings. In the end the better knowledge of account managers should result in advantages for the customers as well.
4.3.3 FUTURE OF IS

The last theme discussed during the interviews was the vision and future of information systems (IS), first the interviewees views on extending IS will be presented, followed by the suggestion of the employees to share information with the customers and finally some future improvements on the current dashboard are presented in the last paragraph.

4.3.3.1 VIEW ON EXTENDING IS

The most influential quotes are shown in Table 15. A summary of the results on the theme "View on extending IS" is given in the rest of this section.

**TABLE 15 RESULTS THEME: VIEW ON EXTENDING IS**

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>When discussing the extension of the current IS: &quot;It is not necessary for me, I am up-to-date with my customers as I see them once or twice per week. If I want to know anything, I receive it immediately&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;The dashboard which you implemented will be like a foundation for future systems for the sales department&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;Yes I think it is valuable to extend the IS further. To my opinion the dashboard is a fundament for sales information used in daily operations. But I can imagine plenty of things which would also be good information to know to steer on.&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;Currently I think our systems are pretty good in providing data, next step is convert it into information&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;We don't need more data, but we need more information&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;Extending an IS should serve a goal, to solve problems which restrain us from getting better results&quot;</td>
</tr>
</tbody>
</table>
| C      | "first you need to define that need and then you know what approach you need to take. We have so much data, we just need to know what do we want to do with it. I think we don't need more things like that[dashbaord] I think we need to create THE system, but I know that is not the same for everyone."
| A      | "I and other people within this organisation really miss a system where we can register every time we have contact with a customer." |
| F      | "At this point, Vlisco misses a CRM system, containing customer profiles and registration of all contact moments with customers" |
| F      | "I would like to see more information from other departments" |
| F      | Examples of information from other departments are: Customer service/care, sales support, production performance |
| F      | "Maybe it is possible to make prognoses of scenarios, to show other departments the impact of decisions on the number of lost sales" |
| F      | "at this point we lose sales because of small issues [like not knowing if our stock is up-to-date]. The sales we lose due to this is not recorded anywhere, but seems substantial to me." |
| C      | "I think it is a great tool for our traders, and the next level is to share the progress towards their target with them. Also to let them come over and analyse the turnover results with them."

One employee, which hardly ever used digital customer information before, mentions she does not need more information of her customers. Especially as she mostly serves the smaller customers which come by weekly, this causes a low information demand from the system. The majority on the other hand believes investing in IS is a good investment, as long as it serves a specific information demand. With the new customer information system, the sales department has a basic but good tool in place to retrieve information about the sales. A good follow-up with regards of customer information would be to create a system where all contact moments with the customer are registered and basic information of each customer is present, this would allow to personalize the service to the customer and to unify the communication with the customers.

With a more broader view, the following was discussed by one respondent. If these kinds of analysis would be done throughout the whole organisation and the information would be combined across different silos, it should be possible to do some simple what-if analysis. From these analysis the effect of certain activities on processes can be analysed to identify bottlenecks.
Most of the interviewees mention that a nice next step for Vlisco would be, to share information with the customer. There were some differences among the interviews about the way of sharing information, but they are all convinced that customers can benefit from having access to (parts of) the information. The next section will elaborate on this.

4.3.3.2 CUSTOMER ACCESS TO INFORMATION

The most influential quotes are shown in Table 16. A summary of the results on the theme "Customer access to information" is given in the rest of this section.

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>&quot;Sharing more information with our customers will benefit the route-to-market and thus also the consumers&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;I believe by sharing information with our customers, we train them and make it possible to become a professional organisation ourselves&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;The dashboard eased the process of sales between account manager and customer from the account manager perspective. A logical sequel would be to ease it also on customer perspective by sharing information&quot;</td>
</tr>
<tr>
<td>D</td>
<td>&quot;For some customers it would be useful to have access to this information themselves&quot;</td>
</tr>
<tr>
<td>D</td>
<td>&quot;It would be useful for customers to look up their own information. Especially if the account manager is not available&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;Vlisco could share a filtered form of market information. This shows we not only sell fabrics, but also provide our customers with information&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;To my opinion, a customer would benefit if he sees sales data of himself, but also from the market. Market information could provoke him to buy more&quot;</td>
</tr>
<tr>
<td>B</td>
<td>Mentions the following being important for customers to know: Available products, stock, order details, production status, year-to-year comparisons, target status, upcoming events.</td>
</tr>
<tr>
<td>A</td>
<td>&quot;When sharing information with customers it should be visually oriented. He should see pictures instead of VL-codes&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;I think the customer would value a visualisation of data. In fact I think most charts from your dashboard should be available to my customers.&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;I don’t believe in handing them a similar dashboard at this point, they are not used to use information in making decisions.&quot;</td>
</tr>
<tr>
<td>B</td>
<td>&quot;I believe you have to start with handing them a one-page document twice per month, with some of the parameters. From there on the supply can be extended when they have the need&quot;</td>
</tr>
<tr>
<td>F</td>
<td>&quot;The sales data we have now, is also interesting for the customer. Reports should be made of them to send to the customer&quot;</td>
</tr>
<tr>
<td>A</td>
<td>&quot;Information can only be shared if verified&quot;</td>
</tr>
</tbody>
</table>

First of all, sharing information with the customers is an important step in creating a professional route-to-market. It was mentioned in an interview that the current dashboard eased the step from (key) account manager to distributor on the side of the account managers, the next step would be to also ease the transition on the side of the distributors. It would be beneficial to them to have access to basic information whenever they need to, even if their account manager is not available at that moment.

At this point customers retrieve zero information from Vlisco, while Vlisco may fulfil a role of information suppliers towards their customers. However all interviewees agreed upon the fact that this sharing of information should be build up slowly, and started with a monthly or biweekly update of their sales and stock. By making them aware of the facts where KAM’s are looking at and how useful information can be, customers can retrieve more information further in the process of information sharing. Another important comment made by two respondents is that customers need different interface than is needed internally. Customers are more practical minded and especially value visuals and images in contrast with the product codes in the current dashboard.
4.3.3.3 FUTURE IMPROVEMENTS

The most influential quotes are shown in Table 17. A summary of the results on the theme "Future improvements" is given in the rest of this section.

TABLE 17 RESULTS THEME: FUTURE IMPROVEMENTS

<table>
<thead>
<tr>
<th>Source</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>“The current dashboard contains a tab with some KPI’s, but in the future this should be extended with all KPI’s to get a total overview of the customers”</td>
</tr>
<tr>
<td>B</td>
<td>“I think a topline dashboard with the most important ratios can be added to this dashboard.”</td>
</tr>
<tr>
<td>D</td>
<td>“I would love if the account of Europashop could be added also.”</td>
</tr>
<tr>
<td>F</td>
<td>“Adding the production statuses of Europashop would be a great addition to the current dashboard.”</td>
</tr>
<tr>
<td>F</td>
<td>“It would be great if the stock of Europashop can be added.”</td>
</tr>
<tr>
<td>F</td>
<td>“While discussing the complaints process: “My manager and I would like to know what the complaints are about, how many complaints are already made, how many were approved and disapproved. It would be great if such an overview could be given in the dashboard.””</td>
</tr>
<tr>
<td>F</td>
<td>“If I want details about complaints now, I need to request them. I would like to have them somewhere transparent, the dashboard would be a good place.”</td>
</tr>
<tr>
<td>B</td>
<td>“A good financial position with all incoming and outgoing transactions per customer, this I need to ask with the financial department.”</td>
</tr>
<tr>
<td>F</td>
<td>“mentions the general customer information should be more detailed for new customers.”</td>
</tr>
<tr>
<td>D</td>
<td>“The ordering system is a very redundant software, you can order every product we ever made. When I enter a product which cannot be delivered, it does not warn me. It would be a gigantic improvement if this could be done. It would save me a lot of work.”</td>
</tr>
</tbody>
</table>

Considering the new customer information system as a foundation for future developments of collecting, analysing and sharing customer information, the interviewees elaborated broadly on what could be improved and added in the future. Both key account managers have the desire to have a ‘topline dashboard’, which includes the most important KPI’s of each customer. Before this can properly happen within Vlisco, the management should decide what the KPI’s are for customers.

One problem mentioned in the usage-chapter was that Europa-shop was not implemented in the current dashboard. According to several users, the dashboard would become even more useful when this entity would be added. From the perspective of the dashboard builder this should be possible with minor adjustments.

One other useful addition according to the employees would be to have an extra tab with complaints. At this point the complaints procedure it far from transparent. For account managers it would be really valuable to have an overview of all complaints together with their status. This helps account managers to come up with a good refund for complaints. It would make it easier for the account manager to deliver good service to the customer if an instant overview of complaints would be present.

Furthermore there were some suggestions about making available the current financial position of the customers, together with the ten last transactions on his account. As mentioned earlier in this report this was considered shortly in the beginning of the design, however there was fierce resistance from the finance department. Still it would be a great addition to the current system to monitor the customer even better.

The last improvement somewhat aside from the new customer information system is the ordering system. It was mentioned by two respondents it could be updated significantly. The most concrete example was the fact that the ordering system does not recognize items which are unable to order due to exclusivity or out-of-stock.
At the beginning of this research, four questions were aimed to be answered

(1) How should a new customer information system be designed to satisfy the information demand of the sales department in a company which is shifting to customer centricity?

The design of the new customer information system proved to be successful. During the post-intervention interviews the users praise the design, functionality and user-friendliness. The design principles evolved through the implementation phase, but always based on the literature of section 2.2.2. Finally the following design principles used most applicable to the new customer information system:

- Have a clear distinction between the navigation and data presentation sections.
- Hide objects if they are not of any use.
- Only show information if it is correct.
- Show text and numbers as black letters in tables with a light-grey background and darker lines.
- Use bright colours to display line-graphs and bar-charts.
- Minimize design for maximum information exposure; every object/line/word should be functional.
- Use clear and logical titles, especially since users are not familiar with terms from the data-base.
- Use buttons for fast or complicated selections.
- Try to have clear names in the “current selections” box (After selecting All Tier1 customers, users only want to see the customers they selected in current selection, not the variable “Tier”).
- If there can be any ambiguity about the information displayed in an object, use the “Help” text to clarify what is displayed in the object.
- Listen to the users and encourage co-creation.

(2) How does the development, implementation and deployment of the customer information system affect the adoption of this system?

During the course of this study and the development of the new customer information system, it proved very valuable to listen closely to the final users. Keeping in mind the TAM variables: “intention to use”, “perceived usefulness” and “perceived ease of use”. The perceived usefulness was attempted to increase by listening well to the future user and by asking for feedback. By keep asking the question: “Is this how you would like to have it implemented?” future users perceived the information system was custom-made and thus useful. The perceived ease of use was attempted to increase by having a unified and user friendly design, and by giving instructions to all users, but core users in specific. No specific attempts were done to manipulate the “intention to use” as all core users already had the intention to use any system better than their previous information sources.

Even though no control cases were present during this research, the evaluating interviews showed all core-users use the new system and are enthusiastic about it. This means there is only implicit evidence the applied method worked.
(3) How does implementing a customer information system impacts the business in a company which is shifting to customer centricity?

Within this case, the business experienced three major effects of the new customer information system (1) employees have access to information which was unreachable earlier, (2) the account managers experience they are better aware of the status of their customers, and (3) the new customer information system saves time for account managers.

(4) How does implementing a customer information system impacts the customers of a company which is shifting to customer centricity?

Within this case, the customer’s experiences are only measured through the opinion of their contact persons. These persons are not unified about what impact the new information system has. This difference in experiences is caused by a differences among procedures account managers practiced before the deployment.

5.2 CONTRIBUTIONS

The contributions of this research can be divided into two parts, like the information systems research framework of Hevner et al. (2004). This framework states IS research and its contribution can be divided into two categories. Rigour and relevant contribution, as this study has a design science approach, it follows the cycle of a relevant contribution. This means the contribution was aimed at extending new methods and prove the utility of IS and management theories.

5.2.1 SCIENTIFIC CONTRIBUTION

This research is a demonstrative case of how SCRUM and requirements engineering can be combined in practice to deliver a useful information system for business. Were Schwaber (1997) mentioned a list with all needs should be composed, the guidelines of X. Liang & Guo (2011) allowed this process to be executed systematically. The requirements engineering guidelines of X. Liang & Guo (2011) have not been studied in a practical environment before. Within this research, they proved to be very valuable in selecting the most realistic requirements which also were valuable to the end user. In order to do this properly, the prioritisation was done according to four variables. It would be progressive to say these variables are the only and best variables, however they form a good start for further research in expanding these guidelines.

Furthermore the research findings are in line with Jayachandran et al. (2005), which found that a better information system, does not mean by essence a better customer relationship performance. However this study does demonstrates the effects a new customer information system can have on the business. It shows that the implementation had an effect on the accessibility of information. Furthermore it provide the sales people with a higher awareness about the status of their customers.

5.2.2 MANAGERIAL CONTRIBUTION

This design study delivers a step by step explanation of the application of scientific methods to develop a new customer information system. Despite the many failures in IS implementations this research shows a successful implementation and the conditions it was realised in. This case can serve as an example for other companies/departments who want to implement a new customer information system. Within this study the incorporation of the users’ feedback during all phases proved very helpful and was appreciated during the evaluative interviews.
There is also a managerial impact within Vlisco itself. Besides delivering a new customer information system, the research shows what the effect of the new system is and shows how this investment worked out. According to the users, the development was successful and worth the time and energy invested. This case can support the management in discussions about extending other information systems by showing a successful case. Furthermore this research suggests some further improvements of the information infrastructure and also suggestions for further development of the new dashboard in section 5.4.2.

### 5.3 LIMITATIONS

The findings in this study are strongly not generalizable as it was a single case study and the intervention happened during a re-organisation of a complex organisation. However during the collection of data, care was taken to improve the internal validity by using multiple sources and using data triangulation where possible and expose the data where results was drawn from.

It was not possible to use data triangulation with the post-intervention measurements, this can cause generalizability issues and an instrumental bias.

Since data collection was only performed inside the company, the actual effect of the deployment on the customers was hard to measure. Even though employees are well aware of their customers, they were an indirect source of information.

The research has been performed inside the sales department and is specific for a customer information system. The results may be not applicable to other departments or different information systems.

### 5.4 FUTURE

#### 5.4.1 RESEARCH

Future research could focus on a more generalizable method to measure the impact of a new customer information system; especially the impact on the customers can be examined further. This should also help to determine to which extend a new customer information system contributes to the customer-centric strategy of a company.

Furthermore doing a longitudinal study, where multiple cases are examined and comparisons can be made, can help designing a more general design of the optimal customer information display.

Within this research four variables were used to prioritize the requirements. It is well thinkable that other resources like money also play a role in the prioritisation. The future research could create some standardized parameters which proved commonly effective in prioritising requirements.

A new design research could examine how this company sensitive information could be best shared with the customers of the company. From the interviews it became clear that it is impossible to share all information with all customers, this means there should be a kind of filtering and different display method in order to share the information in a safe way.
From the research some suggestions were made to develop the dashboard further:

- Make a one-page overview with all KPI's per customer
- Add Europashop to the current dashboard
- Make the complaints more transparent by including them in the dashboard
- Reconsider the way of retrieving information from the financial department
- With small changes, the dashboard could become more useful for other departments

Besides the improvements for the dashboard, also other information system improvements were put forward:

- Professionalise the ordering system
- Make data available for customers
- Combine information from several systems/departments
6 REFERENCES


APPENDIX

APPENDIX: INTERVIEW GUIDES

This appendix contains the interview guides used in the research. Two guides were developed for the observation measurements and also to support the development of the customer dashboard. One guide has specific questions for users of the dashboard which demand information; the other has specific questions for the employees supporting the sales department by supplying information. A third interview guide was developed to do the post-intervention interviews, which has specific questions to track changes in processes and business.

A.1 INTERVIEW GUIDE 1: OBSERVATION-INTERVIEW WITH POTENTIAL USERS

General information:

The persons being interviewed, are part of the sales-team or closely related to this team and have direct contact with the customer. During the interview it is most important to ask open questions and comfort the interviewee. The goals of the interview should be kept in mind when going into an in-depth discussion. Indicators of interesting topics to go more in-depth are phrases like “Never”, “always”, “it couldn’t be possible that” and emotional signs like relief, frustration and joy (Gibbs, 2008). At the end of this guide, some probing questions are included to retrieve more information from any answer.

Length: 45 minutes
Language: Dutch or English
Documentation: Note-making

General introduction:

- I am Ricardo Jacobs, I am doing my internship and graduation project at the department Commercial Excellence of Peter Janssen. The main subject within my project will be a better information supply towards the sales department.
- The purposes of this interview are to:
  - Introduction between involved parties
  - Receive complete understanding in your function within the company
  - Explore the sales process
  - Explore the current processes involving customer information
  - Create awareness of what is going to be developed
  - Explore your specific information demand
- So as I said before, I am Ricardo, I come from Eindhoven and study at the TU/e doing a master in Innovation Management. The main goal within my master thesis is to graduate with a subject which does not only has a scientific contribution, but also gives value to business or a company. By making a dashboard within Vlisco I am convinced this will work out.
- Please introduce yourself.
  - Where are you from?
  - What educational background do you have?
  - What is your passion?
- Explain to me what you do within Vlisco?
  - Which department do you belong?
  - What is your function?
  - What are your most frequent contacts within Vlisco?
With which customers do you have regular contact?
What do you like most about your function?
What is the least favorite part of your job?
What is your goal within Vlisco?

Sales Process:
• Can you explain to me how the sales process goes within Vlisco?
  o What are the different actors within this process
  o What are the different stages within the process?
  o Where are you present within this process?
• What contact points does a customer have?
• If the process should be optimized in terms of quality and speed, where should this happen?
  o How would this increase the speed/quality

Customer information
• If we look at the sales process, can you explain the customer information which is collected during each phase?
• Can you explain to me which phase needs specific customer information?
• How is the storage and distribution of (customer) information organized within Vlisco?
• Is there other information vital to the sales process?
  o What is the source of this information?

Dashboard demands
• Now we are going to discuss the parts you would like to see in the dashboard
• What are the most used sources of information you use now?
  o And if we limit ourselves to digital sources (Qlikview and JDE)
• If we look at existing qlikview applications, which information do you use most?
  o If you could change the presentation, how would you like it?
• Which reports you have to make cost you excessive amounts of time?
  o Can you walk me through the process?
• Do you have any specific information you know of, which you would like to see in the dashboard?
• Which of the Qlikview applications currently available do you like most?
  o Why?
• Considering the current Qlikview applications, what don’t you like?
  o Within which application?
  o Do you think this is due to Qlikview, or due to design?

Closing questions
• Which persons do you consider to be important in your information supply?
  o What information do they supply?
  o What is their role in the supply?
  o Which should be interesting to talk to?
• Are there other things I should be aware of when creating this dashboard?
• Do you have any questions regarding this interview?

Closing comment
• We reached the end of the interview, thank you for your time, I assume we will see each other around during my internship.

Probing questions:
• Can you elaborate on that?
• How do you mean?
• Can you give an example?
• It is rather unclear to me, can you explain it otherwise?
• What is your opinion about that?
General information:

The persons being interviewed, are part of the sales-team or closely related to this team and have direct contact with the customer. During the interview it is most important to ask open questions and comfort the interviewee. The goals of the interview should be kept in mind when going into an in-depth discussion. Indicators of interesting topics to go more in-depth are phrases like "Never", "always", "it couldn't be possible that" and emotional signs like relief, frustration and joy (Gibbs, 2008). At the end of this guide, some probing questions are included to retrieve more information from any answer.

Length: 30 minutes
Language: Dutch or English
Documentation: Note-making

General introduction:

• I am Ricardo Jacobs, I am doing my internship and graduation project at the department Commercial Excellence of Peter Janssen. The main subject within my project will be a better information supply towards the sales department.
• The purposes of this interview are to:
  o Introduction between involved parties
  o Receive complete understanding in your function within the company
  o Create awareness of what is going to be developed
  o Explore the current processes involving customer information
  o Explore your specific information supply towards sales-people
• So as I said before, I am Ricardo, I come from Eindhoven and study at the TU/e doing a master in Innovation Management. The main goal within my master thesis is to graduate with a subject which does not only has a scientific contribution, but also gives value to business or a company. By making a dashboard within Vlisco I am convinced this will work out.
• Please introduce yourself.
  o Where are you from?
  o What educational background do you have?
  o What is your passion?
• Explain to me what you do within Vlisco?
  o Which department do you belong?
  o What is your function?
  o What are your most frequent contacts within Vlisco?
  o Do you have (regular) contact with customers?
  o What do you like most about your function?
  o What is the least favorite part of your job?
• What is your role with regards to the sales process and customer journey?
• What is your goal within Vlisco?

Information supply:

• Within your function inside Vlisco, you supply information towards the sales department. Can you explain why and how you have contact with the sales department?
• What information do you supply to the sales department?
• What are your sources of information?
Other questions:
- Do you think my dashboard could be of use in your work?
  - Which adjustments should it need, to be of use?

Closing questions
- Are there other persons within the organization which could be of relevance to my project to your opinion?
- Are there other things I should be aware of when creating this dashboard?
- Do you have any questions regarding this interview?

Closing comment
- We reached the end of the interview, thank you for your time, I assume we will see each other around during my internship.

Probing questions:
- Can you elaborate on that?
- How do you mean?
- Can you give an example?
- It is rather unclear to me, can you explain it otherwise?
- What is your opinion about that?
General information:

The persons being interviewed, are part of the sales-team or closely related to this team and have direct contact with the customer. During the interview it is most important to ask open questions and comfort the interviewee. The goals of the interview should be kept in mind when going into an in-depth discussion. Indicators of interesting topics to go more in-depth are phrases like “Never”, “always”, “it couldn’t be possible that” and emotional signs like relief, frustration and joy (Gibbs, 2008). At the end of this guide, some probing questions are included to retrieve more information from any answer.

Length: 45 minutes
Language: Dutch or English
Documentation: Voice-recordings and note-making

General introduction:

• Six weeks ago, I finished my internship and implemented the customer dashboard into Vlisco. In order to complete my master thesis and to complete the implementation, I will talk to you and several of your colleagues.
• A general note, if you have no restrictions, this interview will be taped to ensure quality of my research. The tapes will not be shared with anyone within Vlisco.
• The purposes of this interview are to:
  o Discuss the extent to which the dashboard has been used in the past 6 weeks
  o Discuss what promoted or hindered the usage of the dashboard.
  o Review the customer dashboard and its functionalities
  o Discuss if and how the usage of the dashboard affected daily activities and other processes.
  o Discuss other effects of the dashboard.
• Is there any significant change in your function or within the company since the last time we spoke? Changes which could influence the processes you are part of within Vlisco.

Dashboard usage:

• Have you used the dashboard in the past 6 weeks?
• How often do you use the dashboard per week, on average?
  o Do you use the dashboard in a daily/weekly routine?
• Can you explain to me the reason for you frequent/infrequent use?
  o Can you give me your opinion about what should have happened during to implementation to increase the usage afterwards.
  o Can you explain to me how different steps in the implementation increased your urge to use the dashboard?
• Can you give me some examples of when the dashboard proves to be useful?
• Can you give me some examples of when the dashboard misses functionalities?
• How often do your colleagues mention the dashboard as their source of information?
  o Specific information more common?
  o How did they retrieve it?

Dashboard review:

• What are the most useful features of the dashboard?
  o Explain details about the filter you use and how you apply the filters.
• Which features do you not use?
What suggestions do you have to improve the dashboard at this moment?
  o Think about design, functionalities, accuracy, accessibility and more.

Changes due to the dashboard:
  • How does the customer benefit from this dashboard?
  • Do colleagues from other departments also use information from this dashboard?
    o Do they have access to the dashboard itself?
    o Can you give me examples?
  • Did contact with certain colleagues decreased or intensified due to the implementation?
    o What is the reason behind this in your opinion?
  • Can you give examples about information which is retrieved faster after the implementation?
    o Can you walk me through the differences in information retrieval (process)?
  • Do you use information now during your work, which you didn’t use before the implementation?
    o If you look back, how could you have, if possible, retrieved this data before the implementation?
  • Customer information is necessary for internal and external processes, can you elaborate on examples of both where the customer dashboard had a positive or negative influence?
  • How did the dashboard effect your relation with the customers?
  • In which way does the dashboard creates the highest value for Vlisco?

Closing questions:
  • How do you think about investing more into the retrieval and display of information?
  • What information would increase the value for the customer most?
  • Is there anything else you want to add?

Closing Comment:
  • Thank you for your time and feel free to contact me for further questions about this interview or about the project within Vlisco.

Probing questions:
  • Can you elaborate on that?
  • How do you mean?
  • Can you give an example?
  • It is rather unclear to me, can you explain it otherwise?
  • What is your opinion about that?
### APPENDIX: OVERVIEW BACKLOGS

<table>
<thead>
<tr>
<th>Backlog</th>
<th>Description</th>
<th>Packet</th>
<th>Format</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock age</td>
<td>A quick overview of the age distribution in the stock</td>
<td>Stock age</td>
<td>Histogram</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>1,5</td>
<td>22,5</td>
</tr>
<tr>
<td>Stocklist details</td>
<td>All details of the stock present</td>
<td>Stock details</td>
<td>Table</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>Amount of products</td>
<td>The amount of ordered products at category level</td>
<td>Sales trends</td>
<td>Histogram</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>1,5</td>
<td>18</td>
</tr>
<tr>
<td>Invoiced Order details</td>
<td>Detailed overview of all orders received at SKU-level</td>
<td>Invoiced Order</td>
<td>Table</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>1,5</td>
<td>18</td>
</tr>
<tr>
<td>Customer delivery turnover</td>
<td>Do we deliver the ordered products in time and complete?</td>
<td>Customer delivery performance</td>
<td>Stacked histogram</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1,5</td>
<td>16,5</td>
</tr>
<tr>
<td>turnover</td>
<td>The turnover Vlisco gets from a customer</td>
<td>Sales trends</td>
<td>Histogram</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Producing orders</td>
<td>What is the Expected date of completing this order and what is the Workorder number.</td>
<td>Production status</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1,5</td>
<td>12</td>
</tr>
<tr>
<td>Company name</td>
<td></td>
<td>General information</td>
<td>Text</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Classification</td>
<td>The Class which Vlisco has assigned to this customer. Example: T1 gold</td>
<td>General information</td>
<td>Text</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Exclusivity details</td>
<td>The details of all current exclusive orders of this customer</td>
<td>Exclusive design details</td>
<td>Table</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Category Mix</td>
<td>The proportions to which product groups and categories are being ordered</td>
<td>Product Category Mix</td>
<td>Histogram; Gauge meter</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1,5</td>
<td>9</td>
</tr>
<tr>
<td>Rebate Revenue Bonus</td>
<td>The progress towards the revenue-level to receive a bonus discount</td>
<td>Sales Targets</td>
<td>Gauge meter</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0,5</td>
<td>7,5</td>
</tr>
<tr>
<td>Sales targets</td>
<td>The comparison between actual sales and the sales targets</td>
<td>Sales trends</td>
<td>Table</td>
<td>5</td>
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<td>0,5</td>
<td>7,5</td>
</tr>
<tr>
<td>average price registration number</td>
<td>The average price price per yard</td>
<td>Turnover Details</td>
<td>Histogram</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0,5</td>
<td>6</td>
</tr>
<tr>
<td>Location</td>
<td>The address for mail</td>
<td>General information</td>
<td>Text</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>6</td>
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<tr>
<td>classification target</td>
<td>Progress towards the classification target</td>
<td>Classification target</td>
<td>Gauge meter</td>
<td>1</td>
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<td>6</td>
<td>0,5</td>
<td>4,5</td>
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<tr>
<td>Sales territory</td>
<td></td>
<td>General information</td>
<td>Text</td>
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<td>6</td>
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<td>4,5</td>
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<tr>
<td>Exclusivity</td>
<td>Does the customer have the possibility to order exclusive designs?</td>
<td>Exclusive design details</td>
<td>yes/no</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>0,5</td>
<td>4,5</td>
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<tr>
<td>Upcoming Deadlines for Customers</td>
<td>See Marten’s user requirements</td>
<td>Deadlines</td>
<td></td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0,5</td>
<td>3</td>
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<tr>
<td>Shipping details</td>
<td></td>
<td>Shipping details</td>
<td>Table</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>P&amp;L statement</td>
<td>Profit and Loss statement</td>
<td>Sales trends</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Sales forecast</td>
<td>The comparison between the actual sales and the forecast</td>
<td>Sales trends</td>
<td>Table</td>
<td>1</td>
<td>2</td>
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<td>0,5</td>
<td>2,5</td>
</tr>
<tr>
<td>Ordering plan</td>
<td>The ordering plan discussed with the customers</td>
<td>Sales trends</td>
<td>Table</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0,5</td>
<td>1,5</td>
</tr>
<tr>
<td>Exclusivity planning</td>
<td>how is the ordering process of the exclusive products compared to the planning</td>
<td>Exclusive design details</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0,5</td>
<td>1,5</td>
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<tr>
<td>Account owner/manager</td>
<td>The Vlisco Employee responsible for the contact</td>
<td>General information</td>
<td>Text</td>
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<td>0</td>
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<td>0,5</td>
<td>1,5</td>
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<tr>
<td>Top 10 designs</td>
<td>What are the top 10 designs ordered by the customer, based on yards</td>
<td>Sales trends</td>
<td>Table</td>
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<td>0</td>
<td>1,5</td>
<td>1,5</td>
</tr>
<tr>
<td>Order Entry</td>
<td>Does the customer request his orders in time and complete?</td>
<td>Production status</td>
<td>Stacked histogram</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>0,25</td>
<td>1,25</td>
</tr>
<tr>
<td>Production performance</td>
<td>The comparison between actual production and planned production</td>
<td>Production status</td>
<td>Stacked histogram</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0,5</td>
<td>1</td>
</tr>
</tbody>
</table>

71
<table>
<thead>
<tr>
<th>Category</th>
<th>Question</th>
<th>Type</th>
<th>1</th>
<th>0</th>
<th>0.25</th>
<th>0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price list</td>
<td>What is the name of the Pricelist which this customer receives. Example: Tier1 (Eur/USD)</td>
<td>General information Text</td>
<td>1</td>
<td>0</td>
<td>0.25</td>
<td>0.75</td>
</tr>
<tr>
<td>Placed orders</td>
<td>All orders which are placed, but not still produced</td>
<td>Production status Table</td>
<td>1</td>
<td>0</td>
<td>0.25</td>
<td>0.75</td>
</tr>
<tr>
<td>Payment details</td>
<td>specified per order what the price of the order is and if it is payed.</td>
<td>Turnover Details Table</td>
<td>1</td>
<td>0</td>
<td>0.25</td>
<td>0.75</td>
</tr>
<tr>
<td>Complaints</td>
<td></td>
<td>General information Table</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0.25</td>
</tr>
<tr>
<td>Forecast</td>
<td>How accurate does the customer predicts its needed orders</td>
<td>Ordering Stacked histogram</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Capacity to produce order</td>
<td>The amount of capacity which is reserved for a specific customer</td>
<td>Production status Table</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>SKU request</td>
<td>The comparison between planned SKU request capacity and SKU requests from companies</td>
<td>Production status Histogram</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>cash/digital payment distribution</td>
<td>The distribution of cash payments against non-cash payments</td>
<td>Cash/digital payment distribution Graph</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Contact person</td>
<td>The language of most communication</td>
<td>General information Flag &amp; tekst</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Language spoken</td>
<td></td>
<td>General information Text</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Company size</td>
<td></td>
<td>General information Text</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Customer since</td>
<td></td>
<td>General information Date</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Sales operations</td>
<td></td>
<td>General information list(yes/no)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Channels served</td>
<td></td>
<td>General information list(yes/no)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Service</td>
<td></td>
<td>General information list(yes/no)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Payment</td>
<td>Which method of payement is allowed and at which point in time(Cash/credit/in advance/on delivery)</td>
<td>General information Text</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Delivery</td>
<td>Where are the goods usually delivered. Example: FCA Antwerp</td>
<td>General information Text</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Stock insurance</td>
<td>Does the customer have Stock Insurance</td>
<td>General information yes/no</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Discretionary discounts</td>
<td>Does the customer get discretionary discounts</td>
<td>General information yes/no</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Obsolete stock</td>
<td>Is it allowed for the customer to have obsolete stock?</td>
<td>General information yes/no</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>never out of stock</td>
<td>Does this customer have a “never out of stock” certainty</td>
<td>General information yes/no</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Assortment acces</td>
<td>To which assortment does this customer have acces?</td>
<td>General information Text</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Price ladder</td>
<td>How does the price ladder looks like with this customer</td>
<td>Market information Stacked histogram/ gauge</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Value chain management</td>
<td>What is the role of this customer in the value chain?</td>
<td>Market information Text</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
</tr>
</tbody>
</table>
Goal

The goal of this dashboard is to provide information about the T1 and T2 customers in a simple intuitive way. More specifically it can have three purposes:

- Users get fast, up-to-date information about the current status of an order.
- Users can get a global idea of the customer profile.
- Users can track the performance of a customer using historical Sales data and targets

Design

By having a consistent simple design, the dashboard stays clear and users can easily navigate. The dashboard has been designed to be user-friendly while hardly limiting their possibilities to slice and dice the data. To maintain this, certain rules applied during the design process:

- Have a clear distinction between the navigation and data presentation sections
- Hide objects (Selection boxes/charts/tables) if they aren’t of any use
- Only show information if it is correct
- Show text and numbers as black letters in tables with a light-grey background and darker lines
- Use bright colours to display line-graphs and bar-charts.
- Minimize design for maximum information exposure; every object/ line/ word should be functional
- Use clear and logical titles, especially since users are not familiar with terms from the data-base (think of terms like, QTY_Shipped)
- Use buttons for fast or complicated selections
- Try to have clear names in the “current selections” box (After selecting All Tier1 customers, users only want to see the customers they selected in current selection, not the variable “Tier”)
- If there can be any ambiguity about the information displayed in an object, use the “Help” text to clarify what is displayed in the object.
- Listen to the users and encourage co-creation

Structure

Initially the dashboard is built from the Qlikview application “Sales Vlisco NL” which is modified and filtered to reach the current application. The initial goal was to include only variables which add something to the dashboard. During the development phase it seemed somewhat hard to keep up with this philosophy, since it is time-intensive. In the document “Informatiebehoeft” the most used variables are summed up with their purpose in the dashboard. This document was used as a start to build the dashboard, and it contains the initial objects I was planning to make.

In order to reduce the amount of data which is loaded into the application, the data is heavily filtered. Below, I summed up all the filters which are done during the loading:
• Customer data is only loaded if the customer number matches one of the customer numbers in the xls-file "CustomerProfile_QV.xlsx" and if the column Tier in this xls-file is "1" or "2".

• SalesOrderDetail data is only loaded if the customer number matches one of the included customer numbers

• SalesOrderDetail data is only loaded with an invoice date later than 01-01-2010

• WorkOrderDetails are only loaded if they have a matching SalesOrder in the Dashboard

• Exclusive designs are only loaded if ExclPeriod=003 or 006 or 009 or 012

• Table AccountLedger is from Finance. It is filtered to retain only the turnover and costs, the following filters were used:
  o ObjectAccount: 8001; 8002; 8003; 8005; 8006; 8007; 8010; 8014; 8071; 8073; 8075; 8201; 8203; 8206; 8207; 8214; 8271; 8273; 8275; 8290; 8291; 8292; 8820; 9560; 9561; 9562; 9563
  o LedgerType: AA

The ObjectAccount filter can be adjusted in the file: "AccountLedger_Filter.xlsx"

• The productgroup is filtered and renamed by using the file: "ProductGroup_Filter.xlsx"

This list of filters is not exclusively, since data can also be filtered before it is loaded into the application. This filtering can only be checked by the IT department. xxxxxxxxxxxxxxxxxx is the most knowledgeable person about these filters.

**Maintenance**

When owning the Qlikview application there are several tasks which need to be done with a regular interval.

**New users**

When a new user wants access to the application, IT will send the owner a request of approval. The Customer dashboard already contains some sort of guide which is loaded from Sharepoint, this means an instruction is not necessary for each new user.

**Customer properties**

During the development I noticed users value the correctness of the data more than the presentation. Especially facts about the customers in the tab “Customer Information” are easily spotted if they are wrong or need to be changed. If this data is not correct users will doubt about all information within the dashboard. Most customer properties are retrieved from JDE, if these are incorrect please contact xxxxxxxxxxxxxxxxxx. However a limited list of properties is retrieved from an Excel document called "CustomerProfile_QV.xlsx". The properties in here need to be changed by the owner.

At the same time this document is also the filtering of which customers are included into the Qlikview-application. This means if customers need to be deleted or added, please delete their data or fill in the data in the .xls-file.

**Sales Targets**

During the development of the dashboard it was impossible to not include the Sales targets of each customer. Unfortunately these targets are not in any system and are only registered in the Key Account Plans(KAP’s), this means each half year these targets need to be extracted from the
KAP’s. For the year 2015 a template has been made for the KAP’s which also includes a tab to export the targets in the correct format. This list of targets needs to be copied (Text only) to the file “Sales_Targets_QV.xlsx” (\Kratos\prd\QV.Customer_Dashboard_Vlisco\Data).

There are some remarks to keep in mind during this exportation.

- The customer number is used by Qlikview to link the targets to the proper customer. It is possible some KAP’s use other customer numbers than the active accounts.
- The template assumes there are no new product groups introduced. These need to be added manually if it applies.
- WBP1 and WBP2 are assigned to the productgroup Wax Block Print and the distinction is made in a separate column behind the targets.

Questions/requests

Users will have various requests and questions which they will ask the owner.

Other Remarks

There are some remarks which are useful to know when working with the Dashboard. I summed them up in the following bullets:

- The Stockage is rounded upwards, this means if the stock has an age of 5 months and 2 weeks, it is displayed as 6 months.
- The variable `vHideTab` hides tabs which are currently not ready or not designated for users.
- If a Sales Order Line contains a QuantityShipped, it doesn't means the order is already shipped.
- The Dashboard does not contain financial data before 2012.
- The data in the Excel data-sources can be modified and added. If any changes in the headers and columns need to be done, please contact IT, since this requires changes in the (hidden) script.
- If a SalesOrder has no WorkOrder and no Requested Delivery Date the Ordertransaction Date is copied into the field of Requested Delivery Date.
- The exclusivity table has the strange property of not being able to have a dimension from the table “CUSTOMERDESSINEXCLUSIVITY” and display information from “SALESORDERDETAIL”.
- The Targets in general have a different way of categorizing FENTS than the Sales data. Concrete within the Targets FENTS are included in the Product category, while the SalesOrders have the value “Fents & Tabs” in the Product group.
Suggestions

It would be optimistic to state the current dashboard is perfect and can't be improved further. During my project, users did several requests and suggestions which would be very useful, but couldn't be managed within the scope and time-frame of my project. I made a list with all suggestions I have to improve the usability of the dashboard.

<table>
<thead>
<tr>
<th>Suggestion</th>
<th>Details</th>
<th>Issues/comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stock trends</strong></td>
<td>A graph which shows how much stock (ready to invoice) a customer has over time.</td>
<td>At this moment “Stock of a customer” is a pretty vague subject. Before this suggestion can be implemented, there should be a clear definition.</td>
</tr>
<tr>
<td><strong>OTIF</strong></td>
<td>The delivery performance of Vlisco can be displayed in terms of On Time and In Full.</td>
<td>The definition of OTIF was still vague by the time my project was running, therefore it was hard to include it. When the definition is clear in all departments, it should be fairly easy to implement.</td>
</tr>
<tr>
<td><strong>Cash/Digital distribution</strong></td>
<td>The percentage of Cash (Pin/Kontant) and Digital payments of a customer.</td>
<td>There is no variable which indicates this distribution clearly. If this is going to be implemented, ask finance about the variable “Account Number Bank” this indicates the bank account to which the money is transferred, this is different for cash and digital payments.</td>
</tr>
<tr>
<td><strong>Cancelled orders</strong></td>
<td>An overview of all products which were ordered by a customer but couldn't be produced for any reason (Technical issue, exclusivity,...)</td>
<td>I had no time to deepen into this subject</td>
</tr>
<tr>
<td><strong>Combine customers</strong></td>
<td>Some customers have multiple accounts. It would be extremely useful if the data of these customers can be combined.</td>
<td>Technically I know this is possible when loading the data into Qlikview, however I had no time to explore the effect of this modification on the organisation. Another option is to include an extra variable which is the (combined) customer name. It would be similar to how I assigned the customers to a cluster, with the only difference that most of these (combined) customer names only contain a single customer account.</td>
</tr>
<tr>
<td><strong>Merge Tab Sales and Turnover</strong></td>
<td>The Sales and Turnover tab present roughly the same data. The users requested several times, to introduce a button to combine them and create a</td>
<td>The datasources of this information is very different, therefore it becomes very difficult to present them in the same object.</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Include the amount of Rebate</td>
<td>When a customer reaches its target, they receive a certain rebate. For the KAM and customer it would be extremely useful to see how much this rebate would be.</td>
<td></td>
</tr>
<tr>
<td>Include LE1 and LE3</td>
<td>Similar to the Targets from the KAP’s the LE’s can be shown in the same graph.</td>
<td></td>
</tr>
<tr>
<td>Add re-engraves &amp; channel exclusivity</td>
<td>Besides SW-exclusivity, re-engraves and channel exclusivity are useful to see which products a customer can order in the near future.</td>
<td></td>
</tr>
<tr>
<td>Pictures of exclusive designs</td>
<td>Pictures of exclusive designs would make it easier to select the proper designs for certain customers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The rebate system in 2014 was so complex and variable it was impossible to include this into the dashboard. When the system is more mature/stable in 2015, it could be a very simple but useful addition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>These LE’s are also presented in .xls-files, which makes it very time-consuming to import them into Qlikview.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This data is only present in .xls-files wandering around at S&amp;OP. Furthermore these exclusivities have different properties from SW-exclusives which desires different tables.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I had no time to investigate this option, I know Qlikview offers possibilities to load pictures depending on selections and expressions.</td>
<td></td>
</tr>
</tbody>
</table>
E  APPENDIX: PROTOTYPE CUSTOMER DASHBOARD

Introduction
Customer information
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Shipping (1)
Customer selection
Customer information
Exclusivity
Production status
Customer Information
Production status
Turnover & Margin (Absolute graphs)
Turnover & Margin (cumulative graph with multiple years)