MASTER THESIS

Optimisation of the software development process of MSML

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// INFORMATION

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// PREFACE

In front of you, you'll find the Master thesis: 'Optimisation of the software development process of MSML', written for the completion of the study Industrial Design Engineering. This thesis represents the end of my study years at the University of Twente, which all started with the Bachelor Creative Technology. Since childhood I have always been creative and I was obsessed with building, designing and making things actually work. Therefore, studying Creative Technology was a perfect choice and I managed to finish this study in 2019. During this study, I realised that practical thinking, realistic designs and user experience were part of my personality and interest. This is the reason I started the Master in Industrial Design Engineering, with a specialisation in Human Technology Relations. In this period, I got intrigued by graphic design, wireframing, customer/user experience, and the ways users react to specific designs. This made me search for a master assignment in the field of UX/UI design, which was found at MSML.

Initially, I wanted to study the possibility of optimising the design process, with the use of a case study on optimising one single already built application. However, plans changed during the process which resulted in a study on optimisation opportunities for the project management part of the software development process.

First, I want to thank Armagan for her guidance and support as my supervisor from the University of Twente. Without your faith in me this project would not have existed. You were able to keep me motivated and you stimulated me to finish this project in the most preferable way. I am grateful for the update moments, your listening ear and the discussions leading to new directions to follow during the project.

I am very grateful for the support I received from the company during the process, which allowed me to make determined choices in the path to follow in my graduation period. In particular, Leontine & Joyce for the guidance as supervisor during this period. Together we determined the path to follow, wherein you two left enough space for me making my own choices and decisions. The Monday morning update moments gave me the opportunity to share my findings and to discuss the obtained insights.

Apart from the supervisors from the company I would like to thank Marcel for his availability in the last phases of the project. For your critical reading and feedback on the structure and content of my thesis, even on Sunday mornings. The confidence you gave me by trusting my design, research and writing skills. Besides, all employees of MSML for their assistance, conversations and their critical feedback. It is a pleasure working with you, and I am looking forward to keep doing that as a co-worker!

My fellow students Astrid & Patrick for the valuable digital coffee moments and physical dinners. The experiences and insights we shared with each other helped me a lot in making choices in direction. Last but not least, I would like to thank my family, friends and boyfriend for the table conversations, and advice given throughout the process.

S. Antvelink
Deventer, May 30th 2022

// SUMMARY

Nowadays, it is impossible to imagine a world without the use of software. Changing processes, new technologies and standards are resulting in changing customer demands. It is hard for software companies to keep up with this dynamic society. The tools and methods used to develop software should match the changing demands of both the company and the customers. It is therefore hard to assign one specific methodology to a certain project or company.

A deeper understanding is needed to make well-considered changes to the process to make a process fit the specific needs of the customers. Therefore, in this thesis the goal is to search for the best fitting software development process, by means of finding optimisation opportunities and implementing these. Therefore the following question is established to outline the goal of this thesis: **How can the software development process of MSML be optimised?.**

To this aim, first, informative data on current situation and the customers' experiences is obtained by the use of extensive interview sessions. Then, insights on the execution of creating software at other software companies are retrieved and used in this research. Several opportunities for optimisation were revealed by comparing the current situation and customers' experiences with the process followed by other software development companies. The first opportunity could be described as adding conversations in front of the process which could prevent a mismatch between the company and the customer in terms of workflow and personality. Secondly, doing even more extensive design research to obtain deeper insights on the end-users and their needs and wishes, which could ensure research based design decisions. Another opportunity could be to split the roles of the scrum master and project manager/product owner, in order to clarify the responsibilities of each of the employees. The fourth opportunity revealed can be described as the involvement of additional testers, to validate the products on its functionality. Additional retrospective meetings, wherein feedback on the execution of the development sprints will be gathered, could be seen as another interesting opportunity to implement.

One last opportunity, adding more customer intimacy to the process, is enhanced in this research. Customer involvement is of great importance in software development, however high involvement in a project management tools could be perceived as impersonal and stifling. Increasing the customer intimacy by the addition of extra knowledge on how to be involved in the process and project management tool could lower the effort it takes for customers to be involved in the process. Hence, the focus of this thesis is the implementation of a unique optimization opportunity: customer intimacy.

The implementation of this opportunity is done with the creation of two design solutions, these will provide extra knowledge on the process and how customers should be involved in this software development process. By the use of research through design in a questionnaire to the customers, the specific needs in the type of communication medium and the content of the information are revealed. Besides, the experiences of the employees in the collaboration with the customers is taken into consideration while designing these two solutions. The design solutions eventually would lead to an increase in customer intimacy by the extra knowledge provided and above all this would lead to a better fitting process.

// LIST OF TERMS

Software development
The complete process of thinking, designing, building, testing and maintaining software solutions, which could be mobile- and web applications for example.

Agile development
An overarching method in which software could be developed, it is popular because of its adaptiveness, customer focus and early delivery. There are several agile development methods, such as SCRUM and Kanban.

SCRUM
The SCRUM methodology is an agile software development method to develop software, it works with kick-off meetings, development sprints and review sessions.

> **Sprint**
> A sprint is a typical characteristic of the SCRUM methodology. It could be defined as a period of two or four weeks wherein (parts of the) software will be developed, the activities in the sprints may include designing and programming the solutions.
>
> **Kick-off**
> The Kick-off meeting can be seen as the starting point of the collaboration. In this meeting the project will be clearly discussed with the team members, stakeholders and customers. There is a chance to ask questions to get a complete overview of the proposed software solution and its functionalities.
>
> **Review**
> The Review meetings take place after each sprint. In this meeting a demo will be provided to show the customers the end results. Feedback will be gathered and arrangements will be made for upcoming sprint(s) or the release.

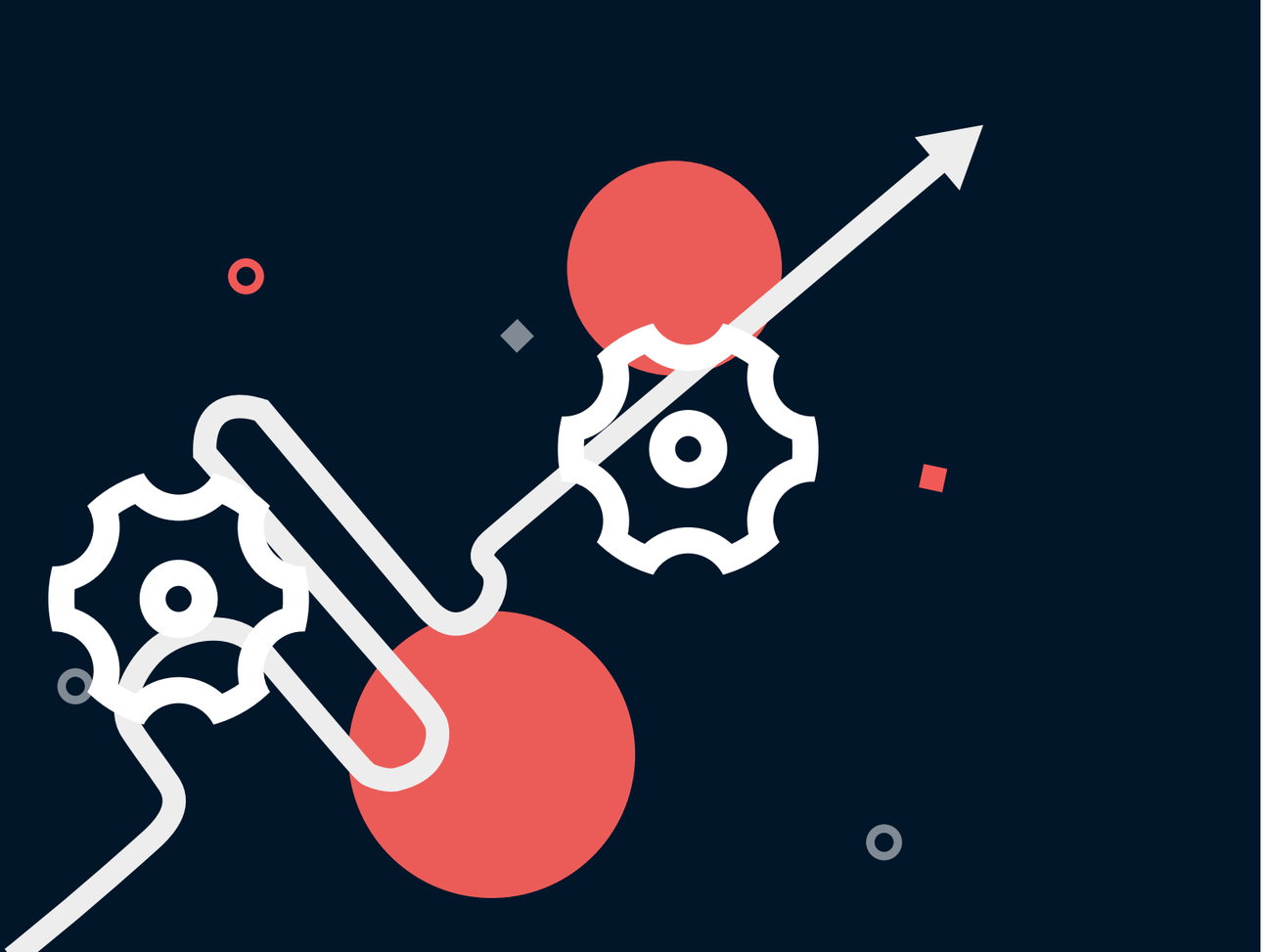
Customer involvement
In this thesis, we talk about the level of customer involvement in the software development process. With this involvement is meant the level of the attendance, amount of activities and the amount of predetermined contact points the customers are having during the process.

Customer intimacy
Customer intimacy could be defined as the level of knowledge a company has of its customers and the other way around. It is a strategy for companies wherein the relationship between the company and its customers is the key.

// TABLE OF CONTENTS

1. INTRODUCTION

In this chapter, the research context, goals, questions and the thesis outline will be described.



1.1 RESEARCH CONTEXT

The world is changing rapidly as it comes to new technologies and standards, resulting in changing customer demands. Software developers are having a hard time keeping up with this fast-moving society (Cohen, Lindvall & Costa, 2003). Software development companies try to create processes that not only respond to change but embrace it. IBM Research defines software development as a "set of computer science activities dedicated to the process of creating, designing, deploying and supporting software" (IBM Research, 2014). The process of building software programs consists of all types of writing and running software code, which is conducted by programmers, software engineers and software developers.

In past years, several software development models have been created. Some are classified as traditional software development models and others are more related to agile software development. According to Cho (2008), traditional software development models can be described as straightforward, heavyweight, methodical and structured. Traditional software development models are characterised by their predictive approach, teams work with a detailed plan in which several tasks must be completed. These methods completely depend on the requirement analysis and careful planning at the beginning of the cycle. In contradiction to this, agile software development methodologies are more focusing on the individuals and interactions instead of the tools used. Next to that, agile methodologies are concentrating on customer collaboration and on the ability to change instead of following strict planning (Cho, 2008). The agile software development methodologies are following an iterative approach while traditional methods follow a strict linear approach.

Researchers already examined the different approaches in designing and developing software, however, it is hard to assign a fixed methodology to a certain project or company. Traditional software development methods are merely used within large organisations when large systems need to be developed, due to their stability and high assurance (Cho, 2008). Environments are constantly changing, therefore a company should constantly adapt to its customer demands and market opportunities. Due to these constantly changing needs and wishes, it is necessary to stay in close contact with the customer and society. This is easier to achieve in smaller projects and within smaller companies, therefore agile software development methods are merely used in these smaller companies. Agile methodologies were developed to ensure an increase in customer satisfaction, a decrease in defect rates, and a faster development life cycle, and these methods should be a solution to the changing requirements during the development process (Cho, 2008). However, each software development methodology can be approached differently, and finding the right fitting method is more challenging than it looks.

Software development is a time-consuming process because it is complex and requires simultaneous efforts of the whole team, starting from the preliminary phase, to the design, the testing, and the releasing phase. A great amount of effort is required in each step of the software development process, especially in an agile development process and it is therefore easy to conclude that this takes time. This of course can be estimated up front by making a detailed and extensive planning. However, the customer always underestimates the effort it takes to develop software and especially they forget that project management is time-consuming as well. Because time is related to budget, it always remains a challenge in software development to estimate this in such a way that the customer's expectations will be met.

Agile software development can be seen as an alternative to the heavyweight, documentation-driven traditional software development processes. This means that within these methodologies there is more focus on the development of working software instead of heavyweight documentation. Too much documentation is time-consuming and the developers rarely trust the detailed documentation since it seems never in line with the actual code they need to develop (Nuclino, n.d.). On the other hand, while adopting an agile development methodology, documentation is still essential mainly to ensure qualitative team communication and transparency. Besides, involving the customer in the documentation tool creates transparency. This makes it easier for the company to manage the customer expectations, because the customer is able to constantly check the progress, goals, and deliverables.

Nonetheless, to create the most suitable balance, a flexible, transparent and easily accessible software documentation tool is necessary. Besides, the tools and choices should match the identity of the company, the customers, and both their missions and visions, which are these days hard to accomplish due to the fast-moving society. Boehm (2002) states that "organizations must carefully evolve toward the best balance of agile and plan-driven methods that fits their situation". Past research shows that it is not possible to just replace the current tools and techniques with new ones, these organisational changes may impact more aspects of the organisation such as structure, culture, and management practices. Therefore, a deeper understanding of current software development processes with the opportunities in terms of organisational structure is needed to make well-considered changes in the process.

1.2 COMPANY PROFILE

This assignment was carried out in collaboration with MSML, a software development company in the Netherlands. MSML is a young and small business aiming at supporting other businesses in optimising, digitising, and sustaining their processes. Together with their clients, they focus on the development and optimization of processes, data processing, and IT architecture; their aim is to make these processes more efficient and safe. MSML continuously invests in knowledge and technology, therefore the company can ensure innovative digital solutions that match the needs and wishes of their clients and the future. Their main service is to develop mobile applications and web applications, with the integration of software systems.

The web applications and mobile applications created by MSML are currently developed through an agile software development process. MSML is aiming at close contact between the company and its client, to ensure the solution fits seamlessly with the clients' needs and wishes (MSML, 2021). Generally, the process within the company includes services like consultancy, design, development, and support (*figure 1*). To ensure a digital solution fitting the needs and wishes of the client, several consults take place. In these conversations, the goal, the main idea, and the requirements of the proposed solution will be discussed. This will eventually be further developed into a design. The designed solution will be translated into a working application after the approval of the client. The developers are used to working with Laravel and React Native while developing these applications.

The solution will be tested and changed iteratively, to make sure the application has met its requirements. This iterative process will be done in sprints. These are sets of time frames of two weeks in which different steps of the process will be executed. This 'sprint' methodology is one of the characteristics of the agile software development method called SCRUM. Finally, the application will be released when completely finished, whenever support is needed MSML is willing to help the client with solving the software problems.

Currently, as mentioned MSML is developing software through an agile development process, however, this constantly changing society is also having an impact on their process. As mentioned, the requirements, needs and wishes of the customers and employees of the company constantly change. Besides, the COVID-19 pandemic has an influence on the organisational structure, especially in terms of communication. Therefore there are several reasons for MSML to keep up with this changing society. Making changes within the process of the company can be beneficial in terms of following the best fitting process that matches as best as possible the expectations of the customers.

1.3 THESIS GOALS AND SCOPE

Customers' demands are changing due to the fast-moving society, which means close contact with the client is constantly needed. Currently, the same software development process is used each time a new project has been started, and the solution will be developed with the same set of people. This can narrow down the view on several aspects of the project. Therefore, the main goal of this graduation project is to investigate new optimization opportunities to strengthen the software development process MSML is currently applying while developing software. The following research question was established to outline the goal of this graduation project:

"How can the software development process of MSML be optimised?"

The aim is to find the right balance between a flexible and structured project approach that fits the company to higher the chance of meeting customers' expectations. Especially in terms of communication between the customer and the company, because this topic seems to have a big influence on the process and how it is being perceived by the customers. Therefore, this research project is not aiming at how to improve the process in terms of costs and speed. It focuses more on optimising the tools and techniques used in the process and on optimising the experience of customers. The focus is on the project management part of the process and therefore the tools and techniques used to specifically create the working software are not taken into account in this research. The scope of this project is on optimising the software development process with a focus on increasing customer intimacy. Generally, comparative research is conducted to find new optimisation opportunities.

1.4 THESIS OUTLINE

To optimise the process currently used by MSML, several steps need to be taken. Several sub-questions have been developed to substantiate the research questions.

1.1 How is MSML currently developing software solutions?

- Which steps are taken in the software development process and who is responsible for these steps?
- How are customers experiencing the currently used software development process of MSML?
- What are the bottlenecks in the software development process of MSML?

To be able to improve the software development process of MSML, we first have to understand how this process is currently executed. Therefore, the currently followed process of MSML will be analysed and discussed in *chapter 2. Current situation*. By conducting interviews and doing observations it will be possible to explore their way of working. Their used software development process will be visualised in the form of a map or blueprint, to get a clear overview of their followed software development process. By the use of interviews with customers, their experiences will become insightful; these will be discussed in *chapter 3. Customer experiences*. The outcomes of this analysis will be clearly categorised and explained and will lead to points to improve in the process.

1.2 What are the possibilities in optimising the software development process?

- How are other companies currently developing software solutions?
- What bottlenecks could be improved and therefore investigated in this research?
- What adjustments must be made to change the chosen bottlenecks?
- How can these adjustments be made?

Thereafter, the project will continue by doing extensive research on how and where optimizations could be made. This extensive research consists of doing research on other processes by conducting interviews with other companies in the software industry. Next, opportunities in points to improve will become clear with the mentioned analysis of the interview sessions with customers and with interview sessions with other companies related to the software industry. Asking questions about their currently used process and their experiences would give insights into opportunities, therefore these interviews will be analysed and compared to MSML's current situation. These insights will form the basis of advice on how to optimise the process, discussed in *chapter 4. Process analysis*.

1.3 How to design a solution that ensures a better understanding of the software development process of MSML?

- What are the needs of the customer within this software development process?
- How could the needs of customers be translated into a design solution?

The advice given should be translated into a design solution. In order to do this carefully the questions above need to be answered. On the basis of the insights into customer experience and other processes, the needs of customers within the process could be clearly identified. These will form the basis of the requirements for two practical design solutions with the aim to clarify MSML's plan of approach and the essence of using the specific project management system called Jira. This design solution will hopefully lead to a better fitting process and increased customer intimacy which is discussed in *chapters 5 and 6*.

In order to check whether the design solutions address the problem of less personalization within the software development process, there is a need for an evaluation. Opinions of peers are obtained to check whether or not the designs will have a positive effect on customer intimacy in *chapter 7. Evaluation*. *Figure 1* shows an overview of the research questions and where you will find the answers to these questions.

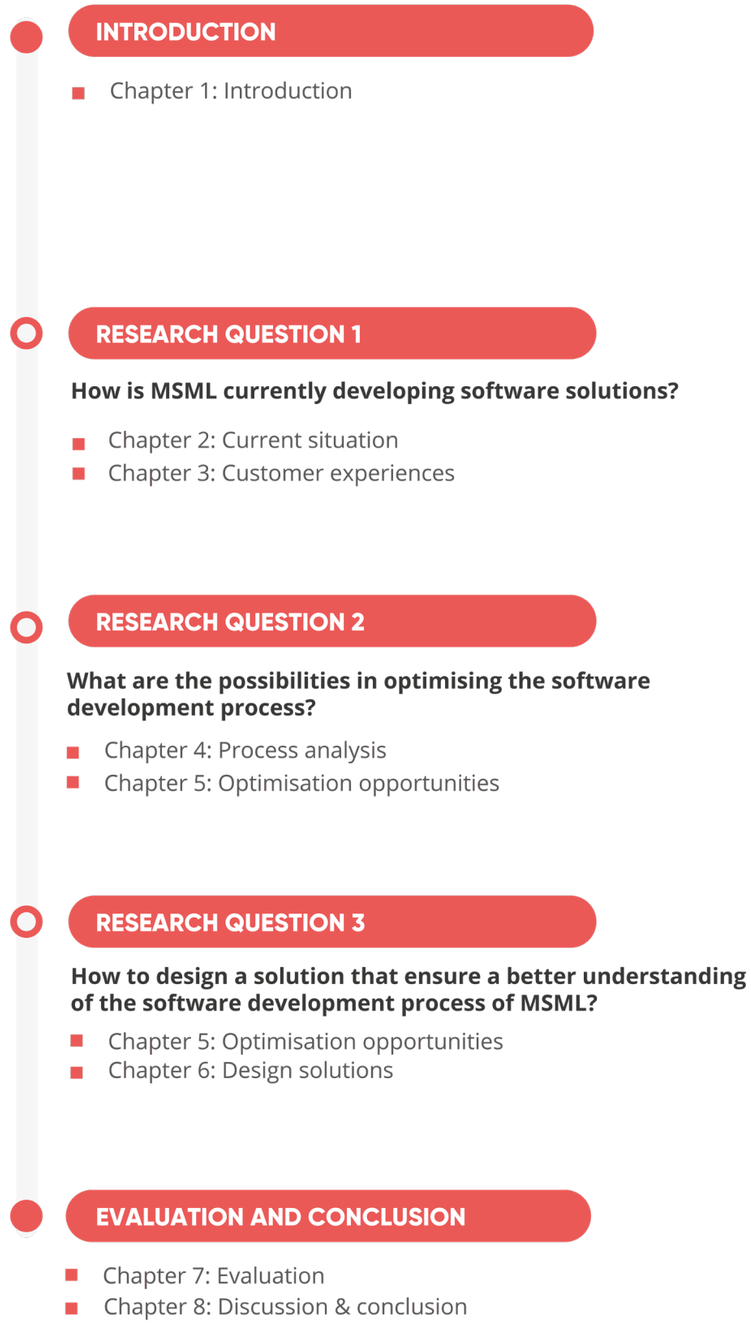


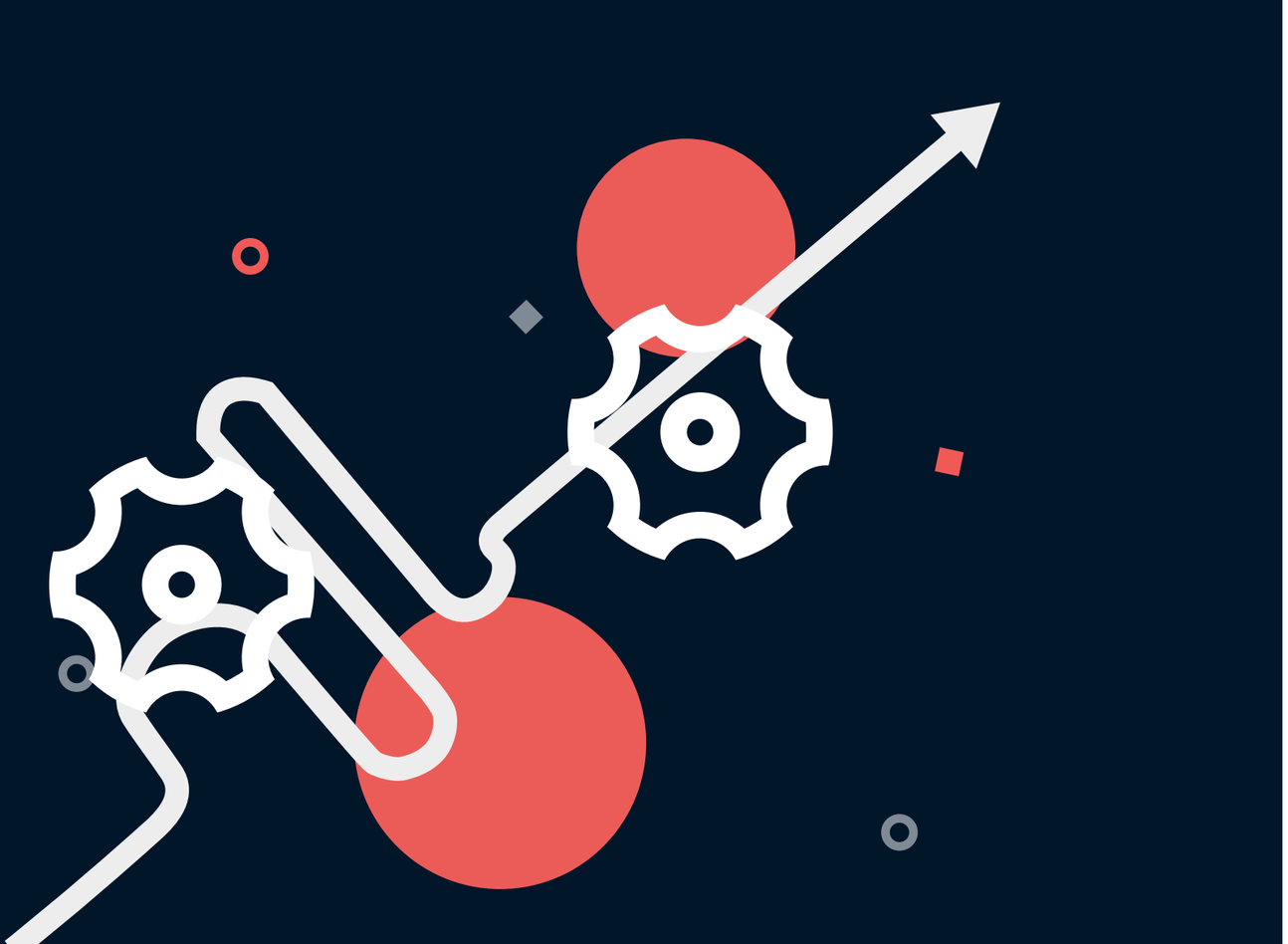
Figure 1: Thesis overview

2. CURRENT SITUATION

In this chapter, process mapping is used to understand the current situation of the organisation. Getting an understanding of the process will lay bare potential aspects for improvement. This chapter will answer the following question: 1.1 How is MSML currently developing software solutions?. To get to an answer on this question the following sub-question is posed:

- *Which steps are taken in the software development process and who is responsible for these steps?*

The other substantiating sub-questions will be discussed in chapter 3. Customer experiences.



2.1 INTRODUCTION

To get a detailed overview of the current software development process MSML is going through while developing a software solution, it is beneficial to make a process map. A process map is the result of a technique of using flowcharts to illustrate the flow of a process.

Process mapping allows for the identification of the actual flow or sequence of events in a process, which is useful for both individuals and teams. Process mapping provides support for better understanding, evaluation, and control of the process, project, and resulting solution. It allows us to improve, streamline and redesign business processes to realise organisational efficiencies. Measuring a process can help with improving and predicting its quality and performance. As a result, appropriate and informed decisions can be made as early as possible during the software development process (Meidan et al., 2018; Lucidchart, 2021).

Due to the changing market needs, upcoming technologies and the changing infrastructure influence the product development and its use. The software development process is constantly evolving. Therefore, measuring the process is becoming more and more important (Meidan et al., 2018). Questions such as, “What activities are done by who?”, “When do people perform best?” and “How is the process being experienced by others?” are going to be discussed in this chapter.

2.2 (AGILE) SOFTWARE DEVELOPMENT

In order to make well-considered changes in the process of MSML along with the changing market needs and wishes, it is necessary to get a complete understanding of the current situation. Getting an understanding of this situation is only possible while the complete background of agile software development and especially the SCRUM methodology is explored.

The Software Development Life Cycle (SDLC) is a general description of how to develop software, which describes the activities performed in the six stages of the software development process. The set of stages together aim to define all activities required to develop and maintain software (Stoica, Mircea & Ghilic-micu, 2013). An explanation of each stage is given below (Burak, n.d.).

1. *Planning*: The first stage consists of brainstorming and organising. In this stage the initial idea will be carefully thought out in terms of project scope, cost-related issues, and a detailed planning will be made to make sure the project is finished within the time predicted.
2. *Analysis:* Analysis is performed to define the project in more detail and to set the specific requirements. This is useful for the development team to get a deeper understanding of the project scope, which is essential before starting with the design. It also helps the development team to identify the risks, so that risk mitigation strategies can be worked out from the very beginning.
3. *Design:* The design stage is the stage wherein the actual conceptualization of the project is created. This can be seen as the visualisation of the specific project requirements.
4. *Implementation:* The implementation stage is about converting the design documentation into actual software by writing code. In this stage, the developers have to make sure the solution meets the requirements set earlier.
5. *Testing and refinement:* In this stage, it is time for testing and doing refinements,

to finetune the software created. Verification and validation are important in ensuring the solution is completed successfully. When the solution is completed, the software is ready to be released. This can be a staggered or a straightforward release depending on the complexity of the software.

6. *Maintenance:* In this final stage, the developed software needs to be updated and fine-tuned when needed. This stage is called the maintenance stage, wherein the product is upgraded and fine-tuned according to real-world feedback on its performance.

Every software development model is created for certain objectives and purposes. It, therefore, follows a series of steps unique to its type. Most of the software development models created are built on Software Development Life Cycle (SDLC) and its six stages. However, it should be taken into consideration that one methodology is not one size fits all. A software development model should be shaped or adjusted to the needs of each particular project and of the software development team (Berg, 2020).

Since the early 1990s, agile software development methods have been developed and have since then evolved. With the Agile Manifesto (Beck et al., 2001) the newly evolved methodologies were merged into a set of software development methodologies called agile software development methods, since there was a need for an alternative to the documentation-driven, heavyweight traditional development processes. The agile development methodologies together are in line with the twelve principles developed by Beck et al. (2001):

1. Satisfying the customer by early and continuously delivering valuable software.
2. Being able to change requirements even late in the development process to benefit the customer's competitive advantage.
3. Frequently delivering software, from the early start of the project until a couple of months later.
4. Daily collaboration between business people and developers during the project.
5. Help motivated individuals to let them feel comfortable. Build your project around these individuals.
6. Conveying information can be done efficiently and effectively within a development team through face-to-face conversation.
7. The primary measure of project success is working software.
8. Sustainable development is a priority in agile processes. Maintaining a constant pace while developing software is required.
9. Agility can be enhanced when attention to technical excellence and good design is continuously being achieved.
10. Another important principle of agility is simplicity: "The art of maximising the amount of work not done" (Beck et al., 2001).
11. Self-organising teams are able to gain the best architectures, requirements, and designs.
12. Continuously reflecting on the process, and optimising the process by adjusting behaviour accordingly.

Agile methodologies are merely used in the development of complex projects, because of their adaptiveness. These methodologies focus on collaboration, flexibility, continuous improvement, and qualitative results. In comparison to the traditional methods, agile methods are more responsive to change, are focussing more on working software, customer collaboration, and the individuals (Nuclino, n.d.). There are several agile software development methods available, examples are Adaptive Software Development,

Feature Driven Development, Crystal Clear, SCRUM, Rapid Application Development, and Extreme Programming (Stoica et al., 2013).

2.2.1 SCRUM METHODOLOGY

SCRUM is one of the agile methodologies that are developed to ensure flexibility and efficiency in the development of complex and uncertain software. The method uses standards such as collaboration, accountability, and iterative development to develop, deliver and sustain complex software products. SCRUM is built on its five principles, commitment, focus, openness, respect, and courage (Franken & van Solingen, 2014). It uses different roles and events in the process, by which it differs from other agile methodologies (Muslihat, 2018).

The SCRUM methodology uses self-organising teams consisting of several roles and responsibilities. Such a self-organising team consists of a product owner, scrum master, and a development team. The product owner is having the responsibility for the product through the eyes of the stakeholders. This person especially represents the customers. The scrum master is more or less the organisational leader. He or she is responsible for the way the SCRUM method is being implemented throughout a project. Lastly, the development team is responsible for delivering a working software product and consists of a group of different professionals, namely developers and designers (Muslihat, 2018).

SCRUM is executed in so-called sprints, which are certain periods of time (1-4 weeks) in which parts of the software will be developed. Each sprint starts with sprint planning and ends with a sprint review and retrospective meeting. All requirements and wishes will be gathered and listed on priority in the product backlog and is one of the responsibilities of the product owner. In the sprint planning there will be discussed which features are going to be developed during the coming sprint. Most of the time the highest prioritised features on the product backlog will be developed first. While planning the upcoming sprints the development team estimates the time that is needed for each task and the planned tasks will be moved from the product backlog to the sprint backlog. During a sprint each day a SCRUM meeting takes place in order to check what the team members are doing and in order to help each other when problems occur. Besides, arrangements are being made between the product owner and its development team about what it means when a product backlog item is finished when a task is ready to release. At the end of each sprint, a sprint review takes place in order to demonstrate the finished results to the product owner and stakeholders and of course to receive the needed feedback. After the sprint review, a retrospective will be held to pause and discuss what went well, and agree on what could be improved in further sprints (Franken & van Solingen, 2014).

2.3 PROCESS MAPPING

It is beneficial to visualise the process in order to understand the process of MSML for this research and the organisation. This can be done in several ways; different process mapping methodologies can be used. In this section, the methodology used to map the software development process of MSML is clearly described.

To fulfil our defined goal of finding aspects to improve in the software development process of MSML, a cross-functional process map will be created. This type of map is useful when the relationships between the key development roles and the potential process failures need to be identified (Athuraliya, 2021). Besides, it is also used to call attention to how a process flows across the boundaries of the organisation.

Cross-functional process maps help you to see the department and the phase in which an activity occurs. To conclude, to investigate the current situation MSML is in, we are aiming at creating a cross-functional process map.

A cross-functional process map consists of different swimlanes representing the different departments/stakeholders involved in the process. It uses different building blocks to symbolise different functions, for example, a rectangle represents activity in the process and a diamond symbol represents a decision. The stadium shape is used for the start and end points of the process and the arrow is representing the connection and direction.

2.3.1 GOAL AND SCOPE PROCESS MAP

Generally, the main purpose of process mapping is to gain a better understanding of a process (Lucidchart, 2021). Before starting to map the process, it is important to first understand the scope of the process that is going to be mapped and what the actual goal is of mapping the process.

The specific goal of this process map is to facilitate improvements in the process. The process map should give a clear overview of the current software development process, which makes it easy to pinpoint the specific areas that need changes. This can be improvements in decision making or more practical changes such as changing roles. The process that is going to be identified starts at the point where the potential customer is having its first contact with the company MSML. This is also the starting point of the process map created. A decision was made to create a process map of the full process to get a complete picture of how MSML is working.

2.3.2 INTERVIEWS AND OBSERVATIONS OF EMPLOYEES MSML

In order to create a process map, it is necessary to obtain the information needed. In the past obtaining process information could only be achieved by way of three methods; self-generation, one-on-one interviews, and group interviews (Damelio, 1996). Nowadays, more methods exist to obtain information. Examples of methods that could be used are observations, discovery workshops, business analysis design, existing work analysis, and importing existing process material (Cousins, 2021). In this research, a decision was made to use observations and interview sessions to obtain the information needed. First, interview sessions with employees will give first impressions on how they are working and how they experience their process. Next, observing the employees in the company while working with them will deepen our understanding of the process.

To extract insights about the currently used process, a decision was made to start with semi-structured interview sessions and doing observations. Semi-structured interviews are a method to conduct interviews for which the interviewer only prepares a few pre-determined questions, the other questions are not planned in advance. This type of interview allows the interviewer to compare the interviews objectively with interviews of other participants, and it also provides the opportunity to spontaneously explore topics specifically related to that particular participant (Pollock, n.d.). Conducting semi-structured interviews can result in retrieving the independent thoughts of each participant. One of the drawbacks of semi-structured interviews is that it is time-consuming. Especially transcribing the interview can take a lot of time, because the interview consists of open questions (Adams, 2015).

Observations are being made in a global manner; the researcher is constantly collaborating with the company and thus constantly observing the employees. This collaboration means

participating in the stand-ups on Monday and Wednesday to get to know what projects are going on and participating in design sprints and meetings to extract insights on how the different departments are making decisions.

The main goal of these interview sessions and observations will be the same:

- **To obtain insights into the process currently used by MSML.**

The sub-goals of the interview sessions can differ for each participant, because of their different functions in the department and thus their differences in roles they need to fulfil. Therefore, the interview questions can also be slightly different for each interview session. The main questions can be found in *Appendix A*. These interview sessions and observations can hopefully help in answering the sub-question: *"Which steps are taken in the software development process and who is responsible for these steps?"*.

After conducting the interview sessions the interviews will be clearly transcribed. This interview data will be combined with the insights from the observations and will eventually be translated into a visualisation of the process at MSML.

2.4 PROCESS MSML

A first visualisation of the process could be created with the use of the outcomes of the interview sessions and observations done with employees of MSML. This visualisation is iteratively validated with the employees and finalised. The complete process visualisation is shown in *Appendix B*. The currently used process is clearly described in this section.

Generally, MSML is using an agile software development methodology, to be more specific they mainly use the method called SCRUM. To make this development process fit the company and its customers, the process is shaped along with the composition and roles of the employees of the company. This means that only parts of the SCRUM method are used. MSML is working in so-called sprints, with a single design sprint of four weeks and several development sprints of two weeks to finish a project. In *figure 2* an overview of the process is shown. A project starts with exploring the wishes and needs of the customer. Next, a design will be created. This will be done in approximately four weeks and is an iterative process itself. Thereafter, in sprints of two weeks, the software solution will be developed and tested, and in the end the product will be launched.

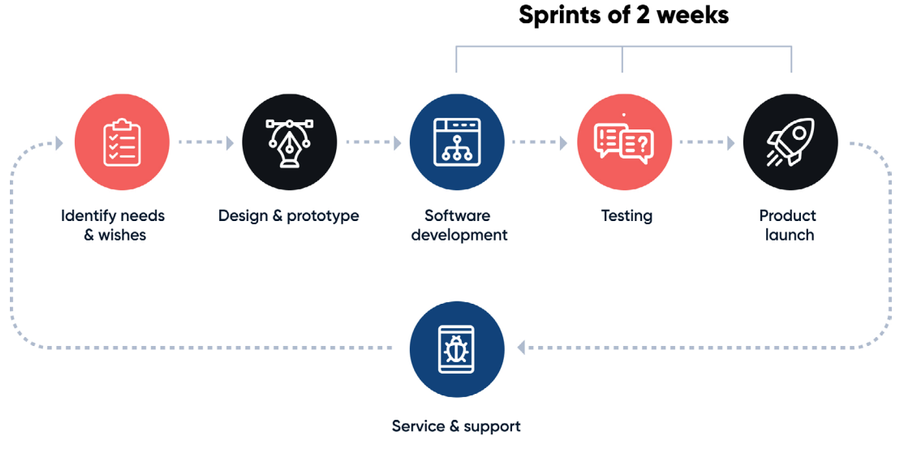


Figure 2: Overview of the Agile/SCRUM development process used by MSML.

After a couple of sprints, the product is ready to release and whenever new bugs and problems occur, these will be solved by the support department of MSML. When new solutions or extensions are needed the process will start again with an identification of the wishes and needs. Within this process, each Monday and Wednesday so-called stand-ups take place to discuss problems within the team and to help each other out. These sprints and stand-ups are typical characteristics of the SCRUM methodology.

This chapter uses the following terms referring to the different phases of the software development process: sales, project, design, development, and support. These phases can also be seen as the different departments of the company and the stakeholders of a single project. However, in a single project, there is another stakeholder involved, namely the customer. These stakeholders are involved in the visualisation. The process map can be seen in *Appendix B*. The employees of MSML fulfil different roles within the process, and each department has its representatives. The sales department, for instance, has one specific representative. However, when needed this employee is assisted by another employee who also fulfils a role in the project department. The project department consists of two representatives who both have the role of scrum master and product owner. These roles will be explained further on in this research. Next, there is still only one UX/UI designer on the team, which means that there is one representative for the design department. The development team and the support team are somewhat bigger. This team consists of approximately six to seven people. However, there are several projects running at the same time while different support requests are coming in. This means that this team is divided into smaller teams to work on the separate projects or on support requests. The tasks and responsibilities of these departments will become more clear in the description of the process.

The process can start in two ways. In one case it starts when a company or an individual consumer has the specific need for a software solution. They try to come in contact with MSML through chat on the website, their network, or recommendations of others. The prospect can also fill in the online survey on the watkosteen.app, a platform created by MSML. The other way to start the process begins at MSML. The sales department is hunting for new prospects by trying to connect to them through their network, giving a reaction to the people who filled in the survey on watkosteen.app and by going to events. The sales department will try to respond to this prospect through a call or an email, which will hopefully be experienced positively. Next, an (online) meeting with the prospect is scheduled to examine the problem and possible solutions. The project department is also involved in this meeting to contribute. This meeting is needed for the salesperson to set up the epics, the manageable parts the solution will be divided in. When the solution is divided into these themes called epics, they will be discussed with the project and development departments to validate the feasibility of this project and of the proposed solution.

After validation, the salesperson will present a quotation and checks it with the project department. This quotation will be sent to the prospect when finished. The prospect decides whether or not they want to work with MSML. At times some consultations are needed to come to an agreeable quotation for both parties. The quotation will be signed by the company and the prospect when both parties agree. The prospect will from now on be called the customer in this research. Furthermore, an introduction meeting is scheduled to transfer work from the sales department to the project department. Besides, in this meeting, the main goal of the project department is to investigate the flow of the proposed solution, which eventually can be worked out after this meeting.

After this transition meeting, one of the employees within the project department is assigned as the project manager and is carrying the responsibility for that project throughout the process. The flow of the proposed solution is clearly worked out and translated into user stories. These stories can be seen as the epics divided into even smaller parts. The user stories can be seen as the tasks that need to be done in the sprints. These will therefore be written before each new sprint starts. Thus, for an upcoming sprint, the user stories will be written in the sprint before the start and will be validated with the customer.

In some cases, when a new project has been started, a design is needed. In that case, the UX/UI designer participates in the process, a kick-off meeting is scheduled with the project manager to start the design sprint. In this meeting, the created flow, user stories, goals, and expectations of the upcoming sprint will be discussed. The UX/UI designer can now start designing the solution. This is done by going through the user stories created. The finished user stories will be checked by the development team on technical feasibility and by the project department regarding the question whether the design meets the user stories written. The finished and validated stories will be forwarded to the customer and he or she will also check the finished designs. When all user stories have been finished and validated the design sprint will be ended with a review meeting with the project manager, customer, and in this case the UX/UI designer. In this review meeting, a demo of the designed prototype is given and the experiences of the customer are being discussed.

When the design sprint is finished, there will be most of the time a two-week break before the first development sprint starts. It depends on the complexity and size of the project to determine how many development sprints are needed. However, each sprint will follow the same process. The user stories are written and checked in previous sprints by the project manager and the customer. This means that the sprint can be started with a kick-off meeting. The project manager, UX/UI designer, and the development team participate in the kick-off meeting to discuss the designs in the user stories that have to be worked through. Further on, the developers finish their tasks and these will eventually be validated by the project manager and customer. When all user stories are finished, the development sprint will again be ended with a review meeting. Several development sprints will take place to finish the software solution. These sprints are done in a time span of two weeks and after each sprint a two-week break is scheduled.

After these procedures, when the software solution is fully developed, the product will be released and the project will be transferred to the support department. This department will fix bugs and problems when these occur during the time the product is in use. Whenever an extension to the product is desirable, the project will be handed over to the sales department to start the process again.

2.5 PROGRAM USE MSML

2.5.1 SLACK

The web application Slack is used as a communicative workspace tool. It mainly offers communication between team members. You can send direct messages and you are able to make channels wherein you can communicate in a team. Slack also offers you the ability to upload and share files, which can also be integrated into other applications such as Google Drive and Jira. Slack can be used as a web application, but also as a desktop application and mobile application (Slack, 2022).

2.5.2 FIGMA
Figma is an interface design application used for team-based collaborative design projects. It can be used for all kinds of graphic design work, such as wireframing websites, designing mobile app interfaces, prototyping designs, and crafting social media posts (Figma, 2022). The benefit of this application is the ability it offers to work directly out of your browser. This means that you can work from any device without having the need for specific licences. Figma is merely used by the UX/UI designer to create clickable mock-ups of the software solution. The customers can click through the mock-up and give comments on specific parts of the mock-up by adding a pointer on that specific part.

2.5.3 JIRA
The software Jira ensures project management for agile development teams. At MSML, the customers are also involved in Jira; they have access to their own project and its overview. This overview is the so-called SCRUM board and consists in this case of five lanes (*figure 3)*. The different lanes indicate the status of the tickets and the task that needs to be done to fulfil a sprint. The different statuses tickets can have are “To do”, “In progress”, “Test”, “Customer (accept)” and “Done”. People, employees, and customers can be assigned to specific tickets whenever actions are needed. In case a developer needs to complete a task, the concerned ticket will be assigned to the responsible developer. The tickets need to be tested by the project manager and customer respectively and then these tickets could also be assigned to the project manager and customer when needed. Within tickets you can ask questions, give a reaction to each other, and use tags to send notifications to that specific person. Besides, this program also gives an overview of all tasks that should be done in later sprints, in the so-called “backlog”. In short, it gives an overview for the company and its customer of their project.

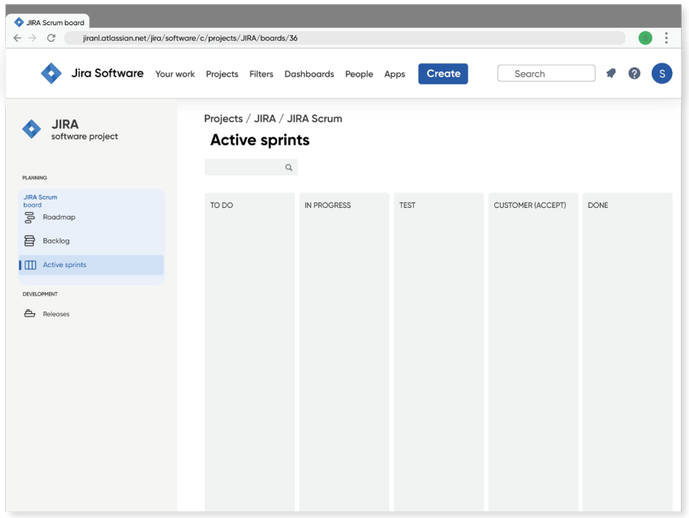


Figure 3: Illustration of the Jira SCRUM board.

2.6 ROLES IN THE PROCESS OF MSML

2.6.1 SALESPERSON
The salesperson at MSML is responsible for acquiring new customers, broadening MSML’s network, writing quotations, and all other things related to a project’s financials. There is only one representative of sales active at MSML; he or she is constantly busy trying to reach new potential prospects.

2.6.2 PROJECT MANAGER, SCRUM MASTER & PRODUCT OWNER
In most cases, a project manager at MSML also has the role of product owner. The role of scrum master is assigned to one of the developers and this person is responsible for implementing the scrum methodology in the right manner. These responsibilities are writtenly assigned to these developers, however the project manager mostly takes responsibility for this role. Thus, the division between those roles is not always that clear. Besides, this project manager/product owner is focusing on the end goals in terms of the product. The product owner is adapting the needs and wishes of the stakeholders to create the best possible product and he or she is responsible for the list of tasks in the product backlog (van Lier, 2021; Team Scrum Academy, 2020). As a project manager of MSML, you are the linchpin between the company and its customer and you constantly keep an eye on the process, the team, and the planning.

2.6.3 UX/UI DESIGNER
The UX/UI designer is responsible for both the visual aspect of the design and the usability aspect of the design. The designer at MSML creates mock-ups by identifying the end-user, doing research, and searching for examples. The UX/UI designer is aiming at taking all needs and wishes of the customer into consideration. Besides this he or she tries to optimise the user experience positively, this can be in terms of navigation or placement of buttons.

2.6.4 FRONT-END AND BACK-END DEVELOPERS
Lastly, the developers are responsible for doing their development tasks entrusted. Next to that, they constantly try to check ideas, plans, or designs on their technical feasibility. Furthermore the developers need to deal with support requests coming in from customers after the product release.

2.7 CONCLUSION
This chapter addresses the following sub-question:

- *Which steps are taken in the software development process and who is responsible for these steps?*

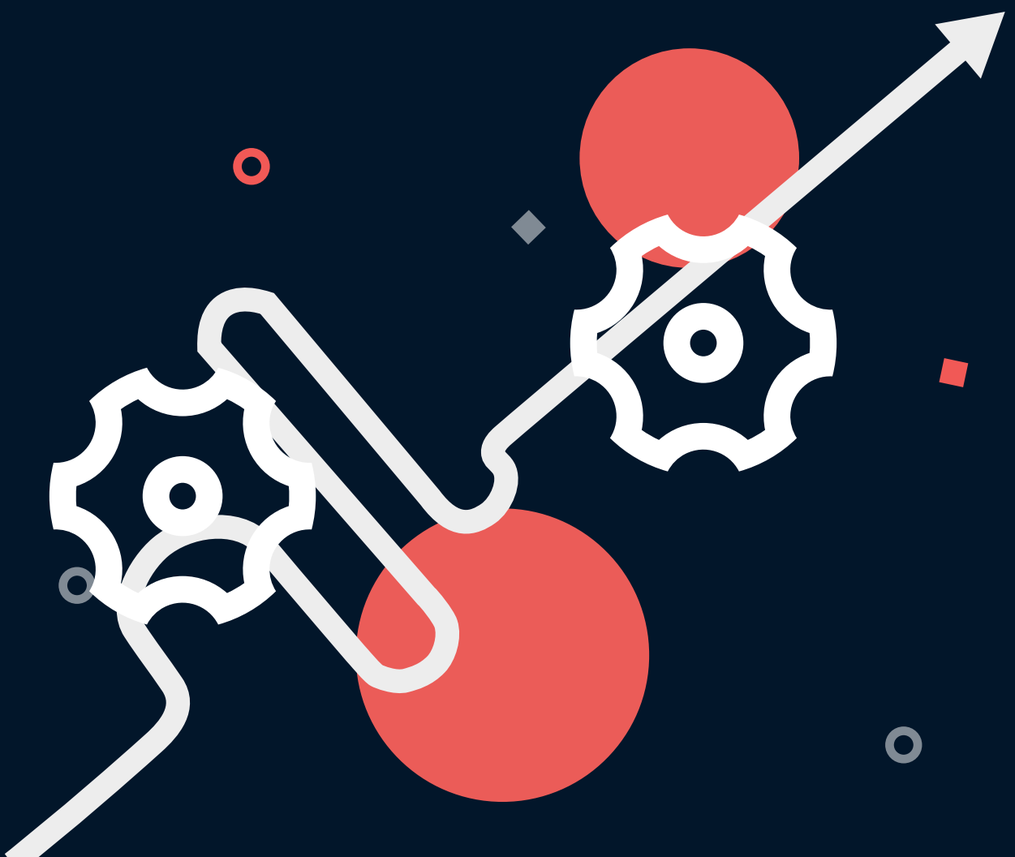
Allowing us to answer the research question: 1.1 How is MSML currently developing software solutions? in chapter 3. Customer experiences.

The process of MSML is built upon the different departments and their representative roles. There is a salesperson responsible for acquiring new prospects and two project managers who perform a double role as scrum master and product owner. The team also consists of a set of developers, front-end and back-end developers. MSML is currently applying a SCRUM methodology while developing software. This means that MSML works in sets of sprints. In these 2-week development sprints, the several imposed tasks will be completed by the assigned team working on that specific project. With the help of the communication tool Slack and documentation tool Jira, the SCRUM methodology can be easily occupied. Especially the program Jira helps the project managers, developers, and customers to monitor the progress of its project.

3. CUSTOMER EXPERIENCES

The customers are asked to share their experiences with the process of MSML. These obtained experiences in combination with the analysis of the current process will be categorised into relevant and irrelevant bottlenecks for this project. This chapter will answer the following question: 1.1 How is MSML currently developing software solutions?, This is done with the conclusions of previous chapter in combination with the following sub-questions:

- *How are customers experiencing the currently used software development process of MSML?*
- *What are the bottlenecks in the software development process of MSML?*



3.1 INTRODUCTION

The software development process through the eyes of the company is clearly defined in the previous chapter. To find points to improve within this process, it is necessary to understand how the customers experience this process. A positive customer experience is of great importance, because it promotes loyalty and helps you to retain customers (Bordeaux, 2018).

Meeting the customers expectations could add to this positive experience, however what are the exact expectations of the customer of MSML? Are these easily understood and could these expectations easily be met? In order to increase understanding, the customers are being asked to obtain insights in their experiences and expectations. This chapter discusses the experiences customers are having with the software development process of MSML.

3.2 INTERVIEW AND ANALYSIS METHOD

In order to get a complete overview of MSML's currently used software development process, interviews were conducted with some of their customers. Interviews with the customers would possibly give insights into how the process is being experienced and what could be done differently.

3.2.1 INTERVIEW METHOD

To extract insights about the currently used process and how this is experienced by the customer, semi-structured interview sessions were conducted with some customers of MSML. The participants used in the sessions and the methodology that is being used to analyse the semi-structured interviews are being discussed in the following sections. The interview sessions are being recorded to ensure no data will get lost. The main goal of these interviews is: to obtain insights into the experience of customers with MSML. Each customer is different and has different purposes for working with MSML. Therefore the questions can be a little different (*Appendix C*). This also means that the sub-goals of each interview will be different. All sub-goals are defined below:

- **To obtain insights into the contact points between the customer and the company.**
- **To get a better understanding of their needs and wishes as a customer of MSML.**

These goals are related to the sub-questions of this research and will be answered in this chapter. Hopefully the goals can contribute to answering the sub-questions: *"How are customers experiencing the currently used software development process of MSML?"* and *"What are the bottlenecks in the software development process of MSML?"*.

3.2.1.1 PARTICIPANTS INTERVIEWS CUSTOMERS MSML

To arrive at a complete understanding of the experiences of the customers, the different categories of customers all need to be included in the interview sessions. Three types of customers can be distinguished for MSML, business-focused customers, consumer-focused customers, and government focused customers. Business-focused customers can be seen as customers who are having a business-to-business relationship with MSML. These companies are somewhat bigger and therefore only a department consisting of a limited group of employees is working with MSML. This in contrast with consumer focused customers; this type of customer most often concerns a start-up company which means that the owners of the start-up are in close contact with MSML. Lastly, MSML is working

with one government focused customer, which can be regarded as a business customer because the communication and thus relationship with MSML is more or less of a business nature. The big difference between business-focused customers and consumer-focused customers is that consumer-focused customers are regularly less experienced in working with software development companies and following such processes requires a lot of effort, representing personal time and money. Concluding, these two types of customers are being approached for the interview sessions that are being held, because of the differences in human interests while collaborating with MSML. Each participant is asked to fill in an ethical approval to ensure the data obtained is available for this research. In this form information about this study is given and some questions are asked about their preferences as it comes to anonymity.

3.2.2 ANALYSIS METHOD

After conducting the interview sessions, the sessions need to be analysed in such a way that the outcomes can be used for this project. Therefore, in this section, the methodology of analysing the interview sessions with the customers will be described. As mentioned before, the interview sessions are being recorded to ensure that all the data can be used when analysing the interviews. Analysing the interview sessions is an important part of the project because a proper analysis makes it easier for other people to understand the conclusions and makes the results more trustworthy (Mortensen, 2020). Different methods could be used to make sense of all the data obtained, and a choice has been made to use a thematic analysis combined with affinity diagramming with an overall inductive approach.

According to Mortensen (2020), a thematic analysis consists of six clear steps to clearly identify the patterns of themes in the interview data. These six steps are defined as: "Familiarization, Generalizing initial codes, Searching for themes, Reviewing themes, Defining and naming themes, and Producing the report" (Mortensen, 2020). These steps are globally followed during this analysis; however, some hints of affinity diagramming are added to this method. The thematic analysis method can be used for different kinds of studies and is thus flexible in its usage. This method can be used for the two types of research; exploratory or inductive research and deductive research (Mortensen, 2020). Exploratory research or inductive research is a type of research in which the patterns and themes are still unknown, so there will be a need to search for patterns in the data set. Deductive research can be seen as the opposite, which means the themes are set in the research, and therefore it is known what is searched for while analysing the data (Gabriel, 2013). The aspects that can be improved should be found in this research, therefore this research can be considered as having an inductive approach. This means the interview sessions will also be exploratively analysed, which implies an inductive approach will be used.

To analyse the interview sessions the decision was made to start by familiarising oneself with the data, which can be done by re-listening the interviews and transcribing them. Transcribing the interview sessions allows for working with the data and can therefore be considered a necessary task to do. The benefit of transcribing interviews in person is that a start is made in making oneself familiar with the data obtained. In this research a decision has been made to literally transcribe the interviews, so each "euh" and "uhu" is taken into account while transcribing, to make sure no interpretation mistakes could be made while using the data further on in this research. The interviews will be anonymized after transcribing them and from now on the participants are represented by the letters: A, B, C & D.

As a next step all transcripts are read and all the important information is cut out. Thereby, these parts can be specific paragraphs or just simple quotes that might be of interest to this project. To eliminate certain irrelevant parts, the cut paragraphs will be read through and even divided into smaller sections by cutting them again. This step is not specifically described in the thematic analysis method by Mortensen (2020); however, this can be used to familiarise oneself with the data. Next, when all transcripts are cut into relevant small sections, the data will be thematically organised. This is where affinity diagramming comes in; every single section will be read through and it will be divided based on the topic it is most related to. Thus, after each section the same question will be asked: "Is this similar to the first one or is it different?". This procedure will eventually be discussed and when the answer is "Yes" it will be placed in the first group, otherwise a new group will be created (Dam & Siang, 2020). When all sections are divided into different groups these will be reviewed. This means that we will iteratively look through the sections and discuss if they are placed in the right group. After grouping all sections, it is needed to clarify the themes by naming and defining them. This is necessary to get the themes clear for oneself and for the readers and with the named and defined themes a coherent story can be written in the report. All of these steps can be globally considered as conducting a thematic analysis. However, as mentioned above, some small parts of affinity diagramming are added to make it fit this specific research and the researcher.

Analysing the interview sessions is being done with the help of one employee of MSML, to speed up the process and to ensure a fresh perspective on the data. Since the researcher conducted the interviews and will have opinions on several parts, the research outcomes could be biassed when the researcher is analysing the data on its own. However, the same goes for the employee who is collaborating in the thematization session. Because of the fact that the employee is part of the process and is thus in close contact with the customers, it could be that this employee will have her own opinion on several sections of the interview sessions. To lower these risks of bias, the interviews conducted with participants who were in close contact with this specific employee will be first analysed by the researcher, and eventually these will be discussed and divided into groups. Furthermore, the data will be respected and an effort is made to represent the interviews as honestly as possible, to make it easier for others to trust the validity of the results.

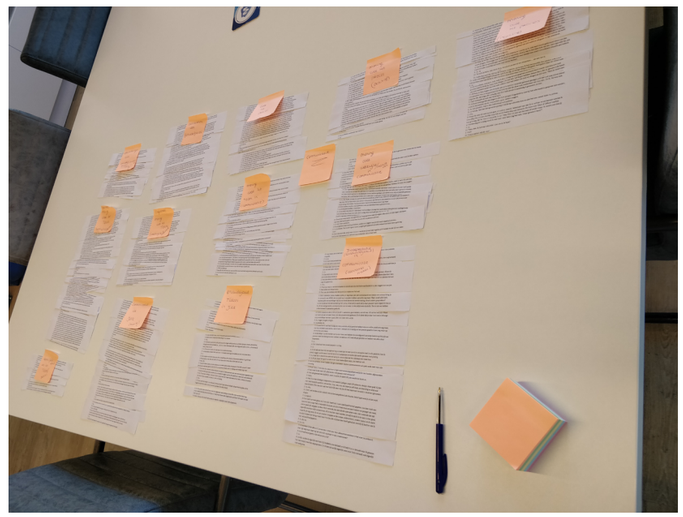


Figure 4: Dividing the sections into relevant groups.

3.3 RESULTS

A selection of four participants was made with the help of two employees of MSML. The decision was made to conduct interviews with two consumer-focused customers and with two more business focused customers, to get a clear understanding of both parties and to obtain all possible information. This was done by setting up a recruitment mail and sending it to the four possible participants. That way the participants were being recruited. All participants agreed to participate in the study and filled in an informed consent to secure some agreements on participating in the study and using the obtained data in the study. Once all agreements were signed, the interviews took place. The interviews consisted of a set of semi-structured interview questions (*Appendix C*). The interview sessions resulted in open conversations about their experiences with the team and the process of MSML. These interviews eventually are clearly analysed, which is explained in the following section.

In order to draw conclusions from the set of data that has been collected by conducting interviews with the customers of MSML, this data is analysed. As mentioned in the methodology, the four interviews conducted are first transcribed in detail. Next, these interviews are printed and divided into paragraphs by cutting them. Only the most important and relevant parts are being cut out and even cut into smaller sections when needed. Then, the thematization session starts, and each cut section will be read through and discussed. Eventually, the sections will be assigned to the group it is most related to. The groups are then reviewed and each group will be iteratively checked regarding the feasibility of the sections for that specific group. When finished, the themes that are created are named and defined to clarify them to the readers. By combining the several smaller sub-themes created in the first place, two main themes arose which were named: 'Communication' and 'The process'. These two main themes will have their relevant sub-themes and will be clearly discussed in the next section, *3.3.1 Results*.

3.3.1 RESULTS

Next, after analysing these interviews and presenting the outcomes to the company, some sub-themes came up. Therefore these results will be further analysed into smaller sub-themes, which will be clearly explained in *3.3.1.2. Results second analysis*.

3.3.1.1 RESULTS OF THE FIRST ANALYSIS

A summary of the experiences divided into the topics 'The process' and 'Communication' can be read in the table below and on next pages (*Table 1*). A detailed analysis of the results can be found in *Appendix D*.

About the process

First contact with MSML	+ Overall pleasant first contact + Immediately felt familiar with MSML + MSML is straightforward and honest in abilities

Table 1: Customer experiences insights

About the process

Orientation (Identify needs & wishes and flow)	+ Clear and sympathetic communication + MSML is thinking along, willing to help you, and asking a lot of questions - Not enough conversations to see if there is a match - Sometimes unclarities showed up about all possible and implementable features
Design and prototype	+ Overall, the design phase went smoothly + Great communication + MSML understands your goals and brand - Less informed on what should be delivered in terms of design (miscommunication) - Make sure you do not make assumptions, instead ask questions before digitally agreeing on tickets
Development and support	+ Efficient way of developing + Clear communication, MSML is straight to the point + Informal communication - Differences in way of communicating to the customers or this is perceived differently - Interpretation differences occur in checking user stories, therefore the user stories are willing to be discussed in physical sessions instead of discussing these online
General	+ Positive about the process and end results + Expectations on the end result were in all cases positively realised + High willingness to take on new challenges + Enough internal knowledge to solve problems and they know what they are talking about + Informal and commercial at the same time - Main contact person was not available without mentioning this - Unpleasant situations were needed to get the project on track again - Expectations on costs were not fulfilled, however good communicated towards the customers

Table 1: Customer experiences insights

Communication	
General	+ Developers' communication clear and straightforward + Project managers' communication comprehensive and customer-focused + Contact with the same set of people + MSML is willing to improve customer relationships - More personal attention and communication desired
In Jira	+ Pleasant system, clear overview + Communication with developers is clear, short, and straightforward in Jira + Tickets ensure small and doable things to test - Descriptions of tickets can be interpreted differently - Communication through the ticketing system feels less customer-oriented - MSML is not deviating from the process, which is, of course, safe but in some cases, it feels less customer-oriented

Table 1: Customer experiences insights

To conclude, it can be noticed that it is hard to divide all insights into the specific process phases since some experiences occur once by one specific customer. However, while analysing the outcomes a clear distinction between consumer-focused customers and business-focused customers became visible. In terms of communication, especially consumer-focused customers do expect more personal communication, such as a simple call or message when questions arise.

Consumer-focused customers are investing in their own idea, their own time, and thus their own money, which could be one of the reasons why these customers expect more personalised communication. Besides, sticking to the process and thus documenting in Jira, also feels less customer-oriented. This was also mentioned by the consumer-focused customers. In contradiction, business-focused customers mentioned that the type of communication and amount of communication was perceived as pleasant all the time. These customers also appreciate the way things are documented in Jira and how questions can be asked easily in Jira. Overall, an interesting but obvious difference between these types of customers could be noticed.

Besides, after introducing the outcomes to the company in a presentation, different ideas for improvements came up. The input obtained from the employees of MSML resulted in new improvement directions to think of and therefore it was decided to divide the outcomes into more specific sub-themes. These themes are more related to the nature of the experiences.

3.3.1.2 RESULTS SECOND ANALYSIS

As mentioned above, the outcomes will be divided into more specific sub-themes to specify the directions of the aspects that can be improved. The following themes could be distinguished by going through the outcomes again: 'Flexibility', 'Clarity', 'Personalization of communication', and 'Ease of communication'. You can notice that these themes merely are relatable to improvement in terms of communication, since we can conclude that all outcomes of the interview sessions are related in some way to communication.

Flexibility

The flexibility in the process can be defined as the means by which the company is deviating from the process. This can be in terms of communication and documentation. According to the participants MSML is holding on to the process that should be followed and it feels like everyone should operate within the lines of the process. Of course, it can be assumed that not deviating from the process is safe for the company. In this way everything will be documented and you lower the risks things can get lost.

The same goes for the flexibility in communication. The company is having its standards in the amount and ways of communication, which could be perceived as clear. However, some participants mentioned that they would like to have more frequent communication and communication in other ways. They keep mentioning the impersonal feeling they perceive while communicating through Jira. Next to that, one participant suggested that more conversations during the selection procedure would prevent the company from a mismatch with its customer. It can of course happen that the company and its customer do not fit on a personal level; more conversations make it able to see this mismatch in advance.

Clarity

As the participants mention that several things were being perceived as unclear in terms of documenting and communicating, 'clarity' is the following theme that will be discussed. First, according to the participants, there were some unclarities in terms of the process. Especially as a consumer-focused customer you are not always able to know how software is being designed and developed. Questions such as: "What is UX/UI design?" and "What is done in the UX/UI design part of the process?" came up during the process. Besides, in some cases, it was not clearly communicated which features could and could not be implemented in the solution, which resulted in unpleasant situations in the end.

In terms of the clarity within the tickets in Jira, the participants mentioned that the tickets ensure small and doable things to test. Unfortunately, still, sometimes things were not that clear within the tickets, things were interpreted differently. The participants mentioned that the tickets were sometimes written in such a way that it could be understood differently, which increases the risk of making assumptions. As a customer, you assume that your interpretation is right, while the company interprets it differently. This type of misunderstanding results in unpleasant experiences, which could and should be avoided.

Personalisation of communication

Personalisation of communication is one of the sub-themes and concerns the way in which the communication between customer and company is personalised. This does not mean the flexibility in the frequency of communication and the medium through which it is communicated, but this includes how MSML is communicating with its customers. It can be stated that the way this company is communicating to its customers is perceived as open, sympathetic, straightforward, and honest. As a customer, you immediately feel familiar with MSML and you notice that the company is willing to improve customer

relationships. MSML is thinking along and is willing to help you by asking a lot of questions to make sure everything is clearly discussed. To conclude, MSML is trying to be as personal as possible in direct communication, whilst it is not through any digital communication.

Ease of communication
Ease of communication is defined as to what extent the communication is going easy and fluent. Generally speaking, MSML has a lot of internal knowledge to solve problems. They have a high willingness to take on new challenges and they know what they are talking about. The developers at MSML communicate clearly, short and straightforward, while the project managers are more comprehensive and customer-focused. Communication with the same set of people is being perceived as pleasant because you become familiar with this small group of people. Whenever things went wrong, the company was able to communicate this clearly and in a professional way according to the participants. However, according to the participants, communication through Jira is not always perceived as being easy. For some, asking questions through Jira was being experienced as an obstacle; these participants would rather ask questions by having a simple call or sending a message. This methodology of asking questions through Jira is part of the process and thus one of the standards within the process of the organisation.

3.4 DISCUSSION

Due to the limited number of interview sessions, it cannot be assumed that these occurrences happen more often, and therefore the most important and most often mentioned information is bundled and used in this research. As can be seen, each paragraph in the first part of the results above ends with a set of positive and negative experiences. To ensure the outcomes give a reliable view of the process, these points are bundled and assessed again in the second layer of analysis. Out of these themes and sub-themes, some ideas for creating a better customer experience came up.

First, being more flexible in terms of the amount of documentation and communication can be taken into consideration. This means that MSML should deviate from its predefined and strictly followed process and from the amount of documentation in Jira. However, this can result in several different processes for the customers, since the processes can be different in ways of communication, frequency of communication, and planning. From now on, the needs and wishes of the customer in terms of this communication and planning are more taken into account. Besides, this means that the company will lose some control over the process and it will be more difficult to follow the process since it will not be the same for each customer. It will be harder to remember which process and planning belong to which customer. Therefore it should always be figured out what was discussed in the beginning phases of the project. Whenever a customer is willing to communicate more through physical meetings, you should guard against simply forgetting because less will be documented in Jira. Less documentation as a result of less communication through Jira can eventually lead to making mistakes. In short, there should be a good balance between on one hand a personalised process approach and on the other hand a standardised process approach. Adding more flexibility increases the risk of making mistakes, but it also ensures a more personalised process.

Secondly, it can be beneficial to get to know the prospect before starting a collaboration, thus being more flexible in the beginning phases of the project. In this way, you prevent yourself and the customer from having a mismatch at a personal and professional level. Of course, it can happen that after collaborating for a while you notice that there is a mismatch between the company and the customer. Through more conversations prior to signing the contract, you can investigate if there is a personal as well as a professional match between these two parties. It will strengthen the relationship, which probably will lead to an overall more pleasant perception of the process you and the customer will go through. The downside of having more conversations before signing a contract is that there is time and money needed to execute this.

Thirdly, it would be better for both the customer and the company to lower the risk of experiencing a lack of clarity during the process. Therefore, a detailed explanation of the process of MSML can lower the chance of misunderstandings. According to the participants the program Jira is merely perceived as impersonal and difficult to learn in a short period of time. Therefore, the program Jira should be represented as a helping tool in creating the best possible software solution. Thus, trying to avoid possible ambiguities by explaining how to collaborate in the (Jira) process of MSML would be beneficial.

3.5 CONCLUSION

This conclusion will answer the following question: 1.1 How is MSML currently developing software solutions?, This question will be answered with the help of previous chapter and the following sub-questions:

- *How are customers experiencing the currently used process of MSML?*
- *What are the bottlenecks in the process of MSML?*

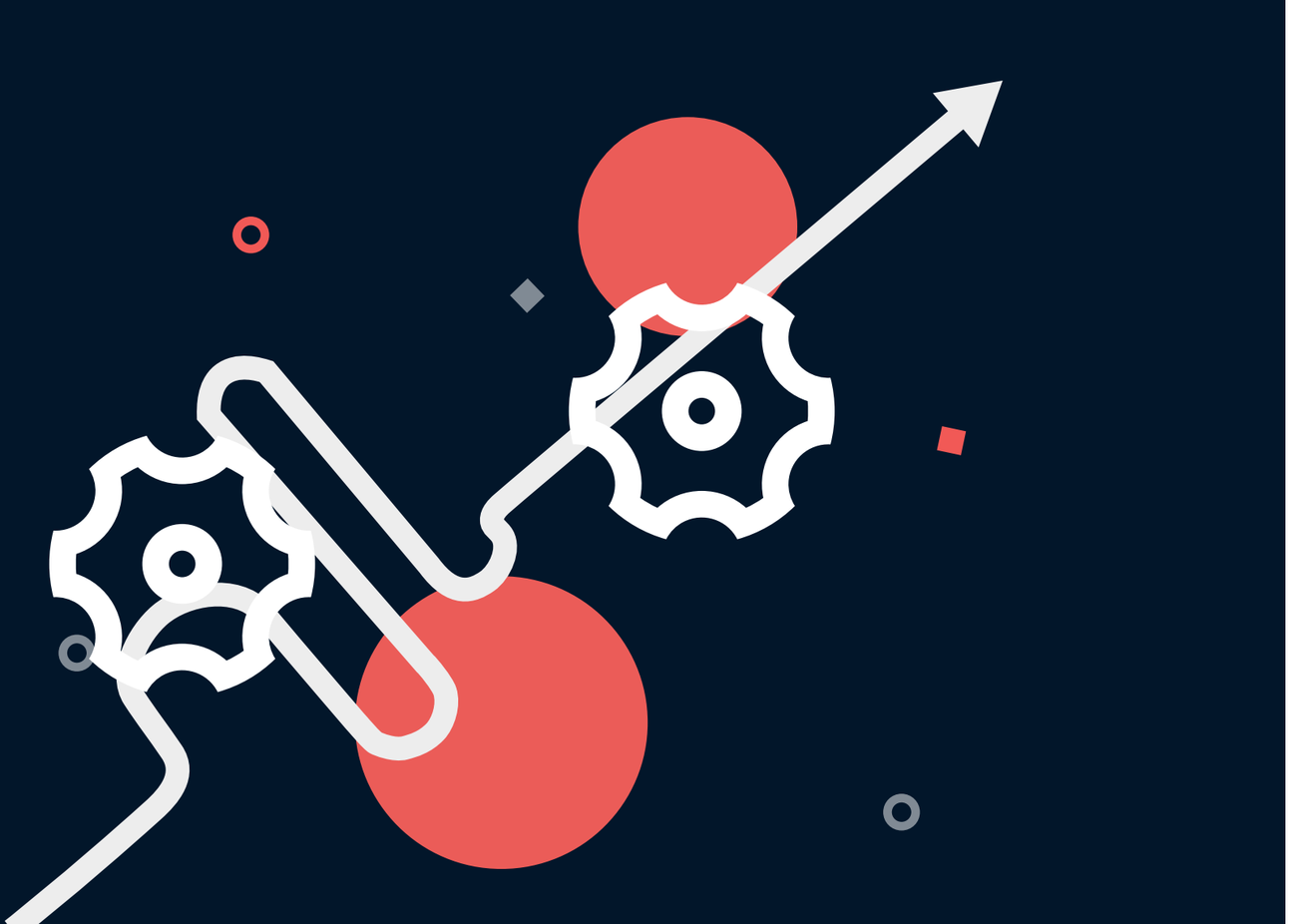
Overall the process is being perceived as pleasant, both according to the customers and the employees themselves. However, some differences in the way the process is being perceived became visible. There is a difference in perception between the customer-focused customers and business-focused customers. Generally, customer-focused customers would at times like to receive more personal attention, in terms of communication. In some situations, a call or simple message would be appreciated instead of asking all questions through the digital systems. Nevertheless, we can conclude that also the business-focused customers have their complaints about the program Jira which is, according to them, difficult to learn. Almost all customers mentioned that a lot of things are being communicated through Jira and thus documented within Jira. It can be said that MSML is really sticking to its own process, although its customers are at times willing to deviate from this process to ensure personal communication. This means, asking questions in physical meetings instead of doing this digitally within Jira. Thus, in terms of flexibility, MSML could create a better balance to ensure enough documentation and enough personal communication.

Generally, according to the customers, MSML is open and honest in both their digital and physical communication. Unfortunately, sometimes things about the process and within tickets were perceived as unclear. Interpretation differences could occur while testing the tickets on their digital description. Therefore the customer would prefer to discuss the tickets in a physical demo meeting instead of online. Apart from this, some things were unclear about the process, when and what should be delivered as it comes to design, and what is the exact definition of UX/UI design? To conclude, more clarification on the process and the use of tickets in Jira could be given to overcome such unclarities. In short, the process is generally perceived as pleasant, however in terms of flexibility and clarity the process could use change.

4. PROCESS ANALYSIS

This chapter will give a look into the processes other companies go through while developing software. Besides, these processes will be clearly analysed and compared with one another to retrieve opportunities for optimization. The following questions are being answered in this chapter: 1.2 What are the possibilities in optimising the software development process?,

- *How are other companies currently developing software solutions?*
- *What bottlenecks could be improved and therefore investigated in this research?*



4.1 INTRODUCTION

Last chapter gave a clear overview of the current situation, current process, tools, roles and how it is being experienced by others. Four interesting topics have been discussed: flexibility, clarity, personalization of communication and ease of communication. Each topic is related to communication between the customer and the company, and therefore thus interesting to deepen out within this chapter.

It can be concluded from the previous chapter that MSML, in terms of flexibility, could create a better balance to ensure enough documentation and enough personal communication. They obviously try to follow a certain standard, a structured approach. In this chapter, we will take a look at how others develop software, the benefits and downsides of these methods and how parts of these methods could evolve in opportunities for optimisation.

4.2 INTERVIEWS SOFTWARE INDUSTRY RELATED COMPANIES

Semi-structured interviews were conducted in order to obtain insights into other software development processes followed by similar companies related to the software industry.

4.2.1 INTERVIEW AND ANALYSIS METHOD

To ensure that we obtain enough data in order to compare the process of MSML with the processes of other software-related companies, semi-structured interviews will be conducted. Semi-structured interviews provide the possibility to have open conversations and discussions about the opportunities in optimising the process.

4.2.1.1 INTERVIEW METHOD SOFTWARE INDUSTRY RELATED COMPANIES

These interview sessions are being held to answer the following sub-question from *chapter 4. Process analysis*: *"What are the possibilities in optimising the software development process"*. To achieve this, the following goal has been set for the semi-structured interviews:

- To obtain insights into other software development processes.

These interview sessions will address the other sub-questions of this chapter: *"How are other companies currently developing software solutions?"* and "*What bottlenecks could be improved and therefore investigated in this research?"* The following sub-goals are set in order to make sure all the needed information is extracted from the interview sessions with other software development related companies:

- To obtain insights into their experiences with changing software development processes and the reasons behind making several changes.
- To obtain insights into the bottlenecks they experience and how they try to solve them.
- To obtain insights into the contact points/communication between the company and its clients.

To achieve these goals during the sessions specific matching questions are being created, the asked questions can be read in *Appendix E*.

These interview sessions will be conducted with companies related to the software industry, comparable to MSML. There are no strict characteristics required for the participating companies because all data that can be obtained about other software development processes and bottlenecks could be beneficial for this research. These participants are also asked to sign an ethical approval to inform them about what is being done during the interview sessions and to ask them to what extent they are willing to participate in the study.

4.2.1.2 ANALYSIS OF INTERVIEWS WITH SOFTWARE INDUSTRY RELATED COMPANIES

The conducted interview sessions will be recorded in order to be able to transcribe the sessions in detail. Besides, it lowers the chance that interview data can get lost and it ensures the possibility to relisten the interviews. As mentioned above in the analysis of the earlier conducted interview sessions with customers, it is necessary to familiarise oneself with the data. This will be achieved by transcribing the interview sessions in detail, to lower the chance of interpretation errors further on in this research. The sessions will be carefully anonymized, the companies in this research are represented by the letters: E, F, and G.

The analysis of the interview sessions will start with reading through each transcribed interview. Eventually, interesting insights such as the scale of the company, the process steps, roles, and other interesting findings will be highlighted. In order to make a comparison between the processes, each process step of each of the participant's processes will be clearly described. To easily compare the processes, the descriptions of each step are placed in a grid. The comparison and other highlighted insights can easily be divided into the already existing themes.

4.2.2 THE INTERVIEW SESSIONS

Five different companies were approached. The societal benefits of participating in this research were emphasised while approaching them and it was made clear that the participation can also address the experienced bottlenecks in their own process. They were approached by email and eventually three from the five approached companies agreed to participate in this study. The participating companies filled in the ethical approval to make sure the obtained data could be used in this research.

After signing, the semi-structured interviews took place. These were long extensive conversations about their thoughts on their own used process and the possibilities in optimization. A lot of data was collected. These companies should however be considered as competitors and therefore the participants could have omitted information. Since it can be assumed that the companies want to help each other, all data was taken into account within this research. The interview sessions were recorded and clearly analysed.

4.2.3 ANALYSIS

The interviews were clearly transcribed anonymously and eventually all data of importance has been summarised into a grid to easily compare different processes with each other. The data is divided into the different phases used in the previous chapter: first contact, orientation, design and prototype, development and support. The other processes are discussed in the next section: *4.3 Software development processes*.

4.2.4 RESULTS

The interview data resulted in insights in other processes, tools and points to improve in software development project management. Eventually these insights were again divided into relevant themes based on the created comparison between the processes. A clear description of these insights and themes is given in next sections. The compared phases of the processes of company E, F and G are summarised and described in detail in *Appendix F*.

4.3 SOFTWARE DEVELOPMENT PROCESSES

4.3.1 THE PROCESSES

Generally, all participants work through an **agile development process**. One participant also has characteristics of the Kanban methodology included in their development process, while all other participants mainly use SCRUM. Some of the participants mentioned having daily stand-ups. One company is working in simultaneous sprints with the whole organisation, while the others work in project groups. The assumption could be that this difference is in relation to the scale of the companies. Next to that, participant G mentioned that their team is not always working in determined sprints, because they want to adapt to the customers wishes and resources such as time.

The selection procedure and first conversations can be predominantly seen as the same for all companies. However, one of the companies does have a different focus in requiring new prospects. This company elaborately focuses on creating a long relationship on a personal and professional level before starting a collaboration. This while other companies are trying to help everyone with developing their proposed solution, regardless of company scale or relation. This does not mean that this single company does not try to help everyone, or that the others are not willing to build a relationship. The interview sessions only suggest that this single company focuses on first creating a steady relation before starting the collaboration. Their selection procedure is influenced by whether there is a match or not. The companies mentioned that they have several conversations in the selection procedure. Besides, one company specifically mentioned that they try to create a detailed plan in the first phases of the project. According to them, this plan is written in such an extensive way that the customer could even waive from signing the contract and start developing the solution at a competitor. Next, elaborate designs were inserted in the quotation before starting a project. This is done by two of the participants to convince the prospect to collaborate with each other.

The orientation phase starts in all cases with several conversations in which the mission and vision of the customer is being discussed. In one case there is a strategist available to investigate this. While in the other cases it is mostly the project manager or a team who is having the responsibility for these orientations on the needs and wishes of the customer and end-user. This is done by asking simple but critical questions and ignoring the proposed solution in the first place to make sure the best fitting solution is found. Two out of three companies are using extensive design research with methods such as creating personas, customer journeys and sending out questionnaires to the end-users. These companies determine in the beginning whether this extensive research is needed.

Furthermore, one of the participants mentioned that **designers** will be hired when this is needed. These designers are not heavily involved in their process, because they are not part of the company and the project team. This is in contrast to the other companies. One company is even having both UX-designers and UI-designers involved in the process to design the solution. Whenever there is enough budget, the design phase will be split into a UX-part and a UI-part. You can say that they invest a lot of time and money into this phase of the project, which supposes a design-driven focus. According to another participant, every part of the process is considered equally important, there will be no special focus on the design phase of the process.

At most of the companies the process also consists of a **transfer meeting**, to transfer work from sales to development. This is called a project kick-off. One company is having this project kick-off meeting with the complete project team, including the salesperson

and the customer, to strengthen the warm relationship with the customer. Some trust is needed since the customer in this case is not always involved while developing the software.

All participants mentioned have recurring **kick-off meetings and/or refinement meetings** at the start of each development sprint. One participant mentioned having pre-refinement meetings and refinement meetings. In these refinement meetings the product owner is spreading information about what should be developed first and the designer is demonstrating their clickable prototype to clarify the user stories. To make sure the data, designs and information is there before the start of a sprint, they arrange a pre-refinement meeting in front of this refinement meeting.

As mentioned above, not every participating company is working in predefined **development sprints**. This company determines whether to work in sprints or not on the preferences of the customer, using the SCRUMban methodology. They can imagine that some of the customers are not always having enough time or other resources to constantly validate developed functionalities, which could lead to delays in the process. The process to follow will be determined in collaboration with the customers, to make sure the expectations from both parties are clear. The other participating companies are using primarily the SCRUM methodology. All participants mentioned that the developers work with written tasks, explained and divided in users stories. This is not always the case with the designers; one participant mentioned that the designers do not specifically work with extensively described user stories. Some of their designers are willing to work from scratch, these designers only want to know the main functionalities the solution should consist of. It is therefore chosen to not fully elaborate the user stories, while other designers are preferably working with the use of extensively written user stories. The first option gives the designers more freedom in designing, while the second option provides more guidance.

Each participant mentioned that they have **testers** employed to validate the functionality when certain parts of the solution are developed. There are more differences in the testing procedure. Two participants mentioned that the customer is not involved in the sprint. Thus, the customer is not testing the parts of the product during the sprint. Testing will be done each time after a development sprint in a two-week test period, so when all preferred functionalities are developed. Another participant mentioned that after the testers are finished with testing, the customer and eventually the end-user will have time to test the product before release. After release, when the product is finished, the customer is able to test the product for a period of two weeks as guarantee.

All participants mentioned having a **demo meeting or review meeting** at the end of a sprint to show the result, to give feedback and discuss the following sprint(s). Next to that, one participant mentioned that after a couple of sprints a retrospective takes place. The goal of this meeting is to receive feedback on the overall flow of working in sprints. One company mentioned having this review meeting with the whole organisation, instead of having it with the specific project group. Lastly, the support phases are not broadly discussed, because this is not within the scope of this research.

4.3.2 TOOLS AND TECHNIQUES

In terms of tools and techniques used within the processes, there are some differences. Especially, the frequency in which communication with the customer and documentation takes place differs between the participating companies.

Different tools are being used for different purposes during the process, with one participant mentioning using Jira. However, Jira is only used by the developers, the designers do not specifically work in Jira and thus they are not always working with extensively written user stories. Another participant mentioned that they are using a somewhat similar program as Jira called Microsoft Azure DevOps. For communication within the project team or organisation tools such as Slack, Microsoft Teams and Google Meet are used by all the participants.

Programs such as Jira and Azure DevOps are used within the organisation to document. The customer is however not always involved while using these programs. One participant mentioned that the customer is never involved in this project management tool during the development of the software solution. This is deliberately so, because this participant mentioned that the user stories will be written in a technical language, which is, according to them, too difficult for a customer to understand. This company is trying to prevent the customer from asking too many questions about unfinished tasks, therefore the customer is not involved in the project management tool. According to another participant, the involvement of the customer in such a program is dependent on the project and the customers' resources. It can thus happen that the customer is not willing to work with Jira since this is too difficult for them. However, the customer in this situation is involved in the Slack channel to be kept updated and to give feedback.

Throughout the process one company mentioned to update their customer through shared Excel sheets, Word documents and Emails. Another company is using Slack, calls and emails, sometimes documents are being shared through Google Drive. The communication tool is dependent on the customers' wishes, however, they prefer to communicate through one specific platform to make sure the documents are all in one place. The frequency of moments of contact between the customer and the company also differs. This depends on the project and the customers' wishes. The customers are able to discuss this in advance and they will determine the frequency and medium with which they will communicate themselves. Sometimes the customers want to have a meeting once a week, while others prefer a meeting once per month to update each other on the developments. One company mentioned that only the designers and front-end developers are having contact with the customer, the back-end developers are not in contact with the customer. Not through calls or emails and neither by way of a ticketing system.

4.3.3 ROLES AND RESPONSIBILITIES

Other companies mentioned to have several assigned roles in their processes. Roles such as a project manager, delivery manager, product owner, scrum master, UX-designer, UI-designers, mobile developers, front-end developers, back-end developers, testers and customer success specialists were mentioned by the participants.

One company mentioned that in some cases it occurs that one person is responsible for both the roles of **product owner** and **project manager**. While another company mentioned having the same person for the role of **delivery manager** and **scrum master**. The delivery manager has the same function as the project manager and this person is responsible for managing the timeline and resources such as the budget. The product owner is responsible for the wishes of the customers, and is thus focusing on prioritising functionalities on the backlog. The scrum master is focusing on the execution of the scrum methodology in his/her team. There is a difference in interest and focus points. It is considered hard by them to keep sight of both the interest of the team

(project manager & scrum master) and the interests of the customers (product owner). These double roles are having contradicting interests, which can lead to conflicts in making decisions in the process. Therefore, two of the companies decided to split the roles of the scrum master and project manager and the roles of project manager and product owner. One company mentioned that it is sometimes not possible to split these roles because of the company's scale. Next to that, one company mentioned that in most of the projects the product owner is delivered from out of the customers' organisation and is thus an external stakeholder. This means that they do not have to worry about these double roles.

One company mentioned having **UX designers and UI designers** employed. They divide the UX and UI part of the design phase. The UX designers are responsible for the flow of the application, thus also for creating the wireframes. The responsibility of the UI designers is to create the visual designs, they are into the colours and typography of the designs.

All companies mentioned having **testers** employed; these people validate the created software on its functionality. One company calls them customer success specialists, while the others refer to them as testers. The customer success specialist is not only testing the functionality of the created functionalities, they are also responsible for the support phase of the projects. In two out of three companies, the project manager does not seem to test the created functionalities, since the project manager does have a certain set of knowledge in the project that can have influence on the way things are being tested.

4.4 DIFFERENCES WITH THE PROCESS OF MSML

The analysis of the processes of other companies gave optimisation opportunities to look at. In this section the differences with the process of MSML are being described. The most interesting differences are considered as the best opportunities to optimise the software development process at MSML. A comparison is made on the most interesting differences, the companies are places on a scale from 'Low' to 'High' and can be seen in *figure 5*. The topic of customer involvement and flexibility is in the thesis combined and re-used as one optimisation opportunity. The level of design focus and scale of the company are also re-used, which both will be discussed in this chapter.

The SCRUM method has also been used in the process of MSML, however, there are some noticeable differences. Stand-ups in project groups are done only twice a week with the whole organisation instead of each day. This is certainly because having a meeting each day is not necessary due to the short lines between the employees and project groups. The company mentioning having these stand-ups each day is somewhat larger in scale and works with several different project groups. For this company it is therefore important to keep each other updated, thus daily stand-up meetings are wished.

The selection procedure and first conversations were according to the insights quite similar, however MSML is not completely focusing and selecting customers based on the match and fit. They are willing to help one another and therefore also look at the relationship. This relationship regarding building and upgrading during the project is for MSML just as important as it is for other companies. Designers are employed at MSML and **design research** is done in an extensive way. Nevertheless, this part of the project does not seem to have the main focus. It is therefore in line with the companies who mentioned that each of the project phases is of great importance to the project.

The project kick-off/transfer meeting also involves the customer and the salesperson. Pre-refinement meetings and retrospectives do occur at one of the participating companies. This does not take place at MSML, nor at the other companies. Nevertheless, the recurring **kick-off meetings** and **review meetings** are performed in the same way. One company however mentioned doing these review meetings with the whole organisation. At MSML this is done with the customer and the project group in order to show the developed functionalities, receive feedback, discuss new arrangements, its challenges and its risks.

The designers and developers work with user stories, written by the project manager and supplemented with the needed information or data by the product owner. In some cases the product owner, when not at the stakeholders' side, is the same person as the project manager. There are **no specific testers** employed at MSML and it is therefore the responsibility of the product owner/project manager to validate the developed functionalities in alignment with the user stories, the customers' wishes. The product owner/customer is able to validate the results in the same way within the development sprints. This is done within the project management tool Jira, which means the customer is involved in this tool. This is not always the case with the other companies.

Within the organisation, **programs** such as Slack and Google meets are used to communicate with each other. Communication about specific user stories is especially done within the comments of the user story itself in Jira. This confirms the way MSML is documenting; most things are written down in the project management tool, notes are made during meetings and further processed in Jira. Whenever there are specific questions to the customer these will preferably be asked through the project management tool Jira, sometimes online meetings through Google Meet are scheduled or they will simply arrange a call. Due to the communication with the customer through Jira, the developers are able to ask questions to the customer. The communication tools, and tools to update the customers differ significantly between the participating companies.

The **frequency and moments of contact** between the customer and the company is related to the level of involvement, especially at MSML. They arrange and discuss the

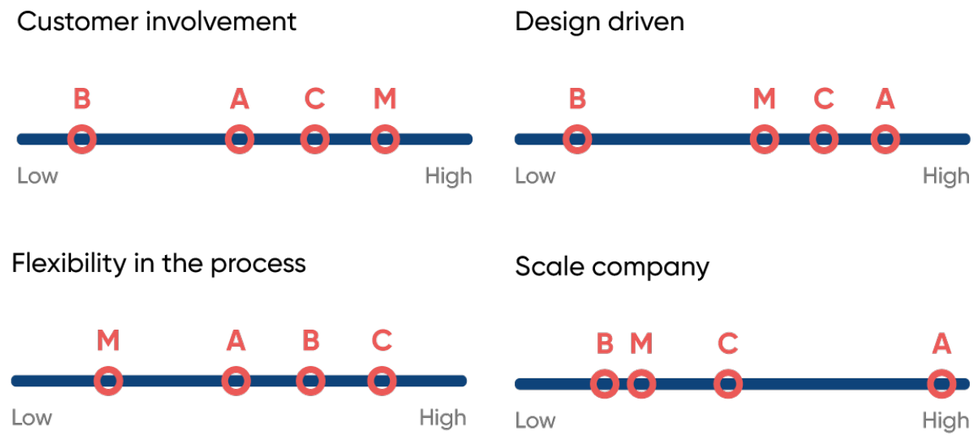


Figure 5: Differences between companies in terms of customer involvement, design driven focus, flexibility and scale of the company.

predetermined meetings such as the project kick-off and review meetings in advance of the process. Due to the need for answers to questions and the need for validation in the project management tool the customer should be available in the periods of development. The communication with the customer seems fixed because of this predetermined involvement of the customer in Jira.

This while other companies are more flexible in terms of the path the customers should follow in the software development process. The more freedom given regarding choice of communication mediums, the higher the chance a customer is not involved in the project management tool. This is because it can be imagined that involvement during the project is requiring a lot of effort on customers' side. The flexible approach gives the customer the freedom to choose their preferences, especially in terms of communication and process flow. Such an approach will provide personalised communication, meaning that fewer resources are needed, which ensures that the process is likely to be perceived as pleasant.

This difference in **flexibility** regarding the process assumes a higher customer involvement, especially in MSML's process. The two extremes of the approaches, of being flexible and being structured during the process, are compared and summarised in *figure 6*. When the customers choose not to be involved in a project management tool, information or questions should be asked to the customer via an intermediary, the project manager or product owner. This means updates are given indirectly and possibly through different mediums. Direct contact between the customer and the developers via a ticketing system is thus not always provided, which is instead provided at MSML.

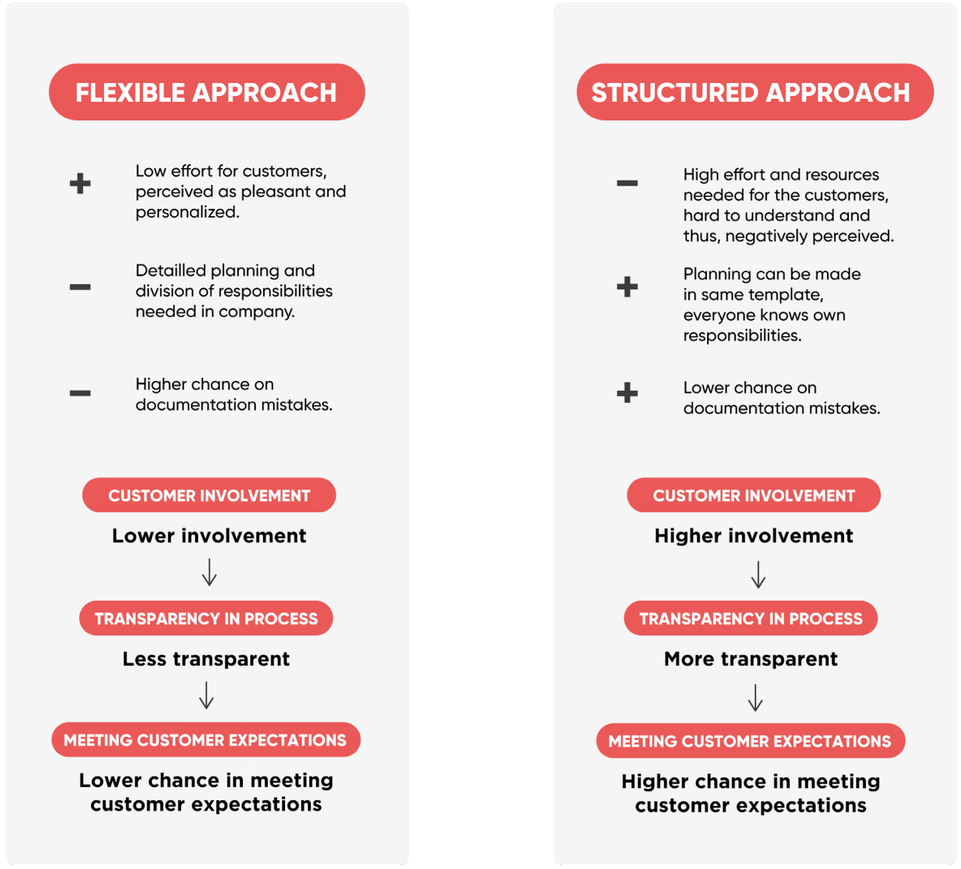


Figure 6: Ideation of the extremes of the two approaches: Flexible and Structured approach.

The extreme opposite, the structured approach, would be defined as strict and ordered. The customers are simply following the determined process that was created in advance, which means time is expected from the customer every now and then. This generalisation and pressure on the customer could be perceived as a less customised approach, possibly leading to resistance against the structured process, especially due to the lower level of freedom. This will eventually lead to the need for the company to offer support to the customers in the process. These approaches are the extremes of both sides and are based on the assumptions made based on research outcomes. The flexibility of choice in involvement and thus communication differs between the participants. All participants nonetheless seem to follow a more flexible approach than MSML.

The **roles and responsibilities** are more or less the same as in MSML's process, although there are no testers involved in MSML's process. The roles of project manager and product owner could not always be split. Whenever there is no product owner available at the customer's side, the project manager performs the role of product owner. As mentioned, the project manager is validating the delivered functionalities.

4.5 OPTIMISATION OPPORTUNITIES

Based on the difference between the processes some interesting opportunities can be explored, such as adding customer intimacy, additional conversations in selection procedure, doing extensive design research, dividing roles differently and additional project team meetings. The implementation of these opportunities will be described in *chapter 5. Implementation of opportunities.*

4.5.1 ADDING CUSTOMER INTIMACY

The customers of MSML mentioned the impersonal feeling they perceive while communicating through Jira, their project management tool. Apart from that, some of the participants would like to communicate more frequently and through different mediums. These experiences could be easily connected to the outcomes above, wherein we can see that other companies are giving more freedom in terms of communication/ documentation mediums and eventually the frequency of contact. It would be the easy way to suggest adding more flexibility to the process would lead to an improvement,

Figure 7: The five opportunities found and the paragraphs in which these will be discussed.

but this flexibility also seems to have its downsides. In the structured approach MSML is following, the customers are closely involved in the process, which is of great importance. Therefore, this company is less inclined to step out of their structured process. The disadvantages of flexibility in the process can be outweighed by the advantages of high customer involvement. In this research, a decision was made to stay structured in terms of following the strict path with predetermined tools and techniques.

Flexibility can be defined as "the ability to change or be changed easily according to the situation" (Cambridge Dictionary, 2022). Flexibility can be used in the preliminary phases of the software development process by giving the customer the freedom to make choices on their own regarding the following process. Adding flexibility is generally perceived as pleasant to the customer, because of its customised approach. The structured approach on the contrary gives the customer predetermined arrangements to follow during the process. This approach is perceived by customers of MSML as less customised, thus impersonal.

At first, flexibility in the preliminary phases of the project means that it is necessary to create a detailed plan with the discussed arrangements according to moments of contact and communication mediums. Sometimes a customer is not willing to have a lot of contact or update moments. This increases the risk that the lead time of the overall project and thus the planning should be extended. Besides, it could be hard to remember which customers belong to which communication mediums and what their respective frequencies of communication are. So, it is important for the companies to make strict planning schedules, adapted to each customer. The creation of these individual plans and arrangements can be time-consuming for a company. Approaching this preliminary phase in a structured way ensures a more general plan and thus usability for more than one customer. There is no specific need for individual plans, since each customer is following the same structured process.

Secondly, when each project is differently organised, the roles and responsibilities could differ in each project. Imagine that it could be hard for each employee to recognize their responsibilities for each project and to remember when and what to communicate through which medium to a customer. In some cases, the product owner is solely responsible for the communication, while in other cases there is direct contact between the customer and the designers and/or the front-end developers. Whenever there are differences in these responsibilities between the specific customers, it could be hard for each employee to determine when to ask questions or to give updates. This probably would be easier in a structured process, where the responsibilities and communication mediums are the same in each project line.

Thirdly, letting the customer choose how to participate in the project leads to the assumption that the customer is not that involved in the process and mainly not involved in the project management tool used. Imagine that this involvement will take a lot of time and effort, therefore they probably prefer not to be involved. Researchers (Cho, 2008; Cho, Huff & Olsen, 2011) mentioned that most of the customers have other things to do than talking to developers all the time. It seems hard to get the customers involved as much as the companies want because of these time issues. Not involving these customers in a program such as Jira could cause other issues, such as not being able to manage the customers' expectations.

Cho, Huff & Olsen (2011) stated that it can cause problems for the company whenever

there is low customer involvement in the projects, because the developers need to be sure what features and functions they have to deliver. In a structured approach, the company tries to involve the customer from the start of the project. According to Dadfar, Brege and Sarah Ebadzadeh Semnani (2013) evidence is found regarding positive effects when the customer gets effectively involved in the software development process. Positive effects such as greater productivity and customer satisfaction have been mentioned.

In nearly all companies there is a product owner who investigates the exact needs and wishes, although the stakeholder is the one who knows best. When not involved, the customer is not able to read the written user stories. When the customer is not in the project management tool, we can assume that the customer checks the product when the discussed functionalities are developed. This is disadvantageous for the company, since this gives uncertainty regarding the amount of feedback and work they will receive after this test period. This can be more work than expected, leading to longer lead times, which means that more money is needed.

In addition to that, in the flexible approach other mediums, such as email, are used to give updates about the project and the customers are free in their choice of medium. Giving updates by sending large bunches of information via email for example, will probably result in a large amount of feedback from the customer. Communication through such mediums can create chaos whenever the feedback is received in one go. This feedback should eventually be processed and forwarded to the development team, and should therefore be documented correctly, which ensures a second layer of communication. The information should be correctly communicated to the rest of the team in order to process the feedback received. In the structured approach, the decision is made to work with a project management tool in which the customer receives updates via the SCRUM board. The whole organisation, including customers, is merely communicating through this system, and questions are asked in the user stories these questions belong to. In this way everything will be clearly and immediately documented within the transparent tool, transparent for both the customers and the whole company.

In short, indirect contact between the customers and the developers and thus low involvement can result in late responses, higher chance of differences in interpretation and eventually a higher chance of delays in the process. This will eventually lead to a lower chance in meeting the customer expectations, especially in terms of planning. The problem of managing the customers' expectations is experienced by all participating companies, and is mentioned as a main problem according to company F: "It's all about the planning, honouring the agreements, and conveying the expectations in the right way". For a customer it is hard to understand that software development and especially project management is a time-consuming process. Direct contact between the customer and the development team in for instance a project management tool could lower the chance of these differences in interpretation and could ensure faster response times. Furthermore, it would stimulate the developers to achieve their goals (Clearbridge mobile, 2020). When involving the customer in the project management tool, testing could be done during the development sprint. Thus, feedback can be inserted and resolved before the end of the sprint, and this means no extra work is required.

Letting the customer be able to ask questions and see the progress in such a project management tool, can make it easier for the customer to understand the fact that software development is a time-consuming process. According to Clearbridge mobile (2020), transparency, by open communication about the progress between both the

stakeholder and project manager and among the internal project team, thus involvement, helps eliminate the surprises of for instance longer lead times. This gives the customer a better understanding of why the things did not go as planned or why functionalities have been replaced by further development cycles. It is an opportunity to look at how to add customer intimacy, while at the same time not following a flexible approach. The strategy of customer intimacy is a combination of two factors; customer knowledge and flexible operation. Companies excelling this strategy know their customers in a very detailled way and are able to respond to their needs (Treacy & Wiersema, 1995). Currently, out of previous analysis we can say that MSML is embracing this strategy. However it seems for the customers hard to see the benefits of this involvement in the process. The addition of extra knowledge from MSML's side could lower the threshold to be involved, this is seen as adding customer intimacy to the process.

4.5.2 ADDITIONAL CONVERSATIONS IN THE SELECTION PROCEDURE

In terms of the selection procedure, one of the customers did have the feeling of having too little conversations to get to know each other before starting the collaboration. One company mentioned that they first build a strong relationship before starting the process. This could, as mentioned earlier, be an opportunity for MSML to start having more conversations in order to investigate whether there is a match on personal and professional level. In the current situation there is a possibility of having a mismatch in terms of the process that has to be followed.

4.5.3 EXTENSIVE DESIGN RESEARCH

Being design driven as a company means in my perception that your solution is built upon the designs as the base. This means the design phase is considered as an important part of the process. One company specifically mentioned having this design driven focus. Their process is split into an UX design part and an UI design part when budget-wise possible. Their strategists try to do design research such as making customer journeys, to get an extensive understanding of what is needed. The UX/UI designers conduct, when possible, end-user research, before making the design decisions to make sure the choices are built on real-life feedback. Questions about the end-users' current processes and how these end-users would like to see and use it provides insights, before making the design decisions. Next, end-user research is done when the clickable prototypes are ready; the end-user can give feedback in the demo meeting before the solution will be developed. MSML is also doing design research in terms of creating customer journeys, although this research shows it could be done in an even more extensive way. This is therefore also an opportunity to take into account in this research.

4.5.4 ROLE AND RESPONSIBILITY DIVISION

The comparison between the various processes shows that roles and responsibilities could be divided in a different way. Research suggests to split roles because of their contradicting natures. One possibility could be to assign the role of scrum master to one specific person within each project group. This would decrease the responsibilities of the project manager/product owner, because at MSML it is sometimes hard to see the division between these roles. Sometimes these responsibilities are not clear according to the employees. The scrum master in this case would focus on the execution of SCRUM within its project team, meaning the product owner could lay more emphasis on the relationship between the functionalities and the customer. Furthermore, another opportunity could be the employment of testers who validate the developed functionalities. Currently the product owner/project manager is checking the developed functionalities on correctness.

4.5.5 RETROSPECTIVE MEETINGS

One other company is executing retrospective meetings. This is done in addition to the recurring review meetings. This meeting takes place after a couple of sprints and its aim is to discuss and receive feedback on the previously executed sprints and takes place with each project team in order to improve things internally before starting the next sprints. Researchers mention that it is hard for companies to implement all parts of the SCRUM method into their process (Schwaber & Sutherland, 2017). The reflective meetings can be seen as a prominent tool in learning from an experience and is an important factor of team effectiveness (West, 1996; Dybå et al. 2014a; Ellis et al. 2014 as cited in Przybyłek et al. 2021). These recurring reflective meetings are likely to result in team members who are able to see the long-term consequences and to respond to a wider range of environmental cues (West, 1997 as cited in Przybyłek et al. 2021).Therefore, adding retrospective meetings could be an interesting addition to MSML's process.

4.6 CONCLUSION

The following questions will be answered in this chapter:

- *How are other companies currently developing software solutions?*
- *What bottlenecks could be improved and therefore investigated in this research?*

In the conclusion of chapter 5. Implementation of opportunities, the research question and other sub-questions will be addressed.

To conclude, most companies are following the SCRUM methodology in order to develop software, and so does MSML. Most of the process steps are relatable. It is nevertheless interesting to investigate other perspectives that could result in opportunities for improvement. MSML is not as flexible as the other companies. All companies mentioned that the medium in which they communicate throughout the process is for the customer to choose in advance of the process. Where other companies are flexible in terms of communication and documentation, MSML seems more strict and structured. The flexibility given to the customer also comes with disadvantages, especially for the company. Adjusted arrangements should be made according to planning and responsibilities within the company and these could be hard to remember for each of the employees and could be time-consuming in terms of the creation of individual plans. Not involving the customer in a project management tool could cause less documentation, low transparency and could make it eventually more difficult to manage the customers' expectations. Transparency and customer involvement during the process is a really important part of the software development process. It shows customers the current state of the project, the goals of each sprint and the future steps that will need to be taken. This creates a better understanding of why certain user stories are being rescheduled, and thus why software development is such a time-consuming process. The opportunity related to these arguments is to increase customer intimacy in terms of providing even more knowledge instead of adding flexibility to the approach.

Additional conversations in the selection procedure could prevent a mismatch regarding ways of working. The third opportunity would be to add even more extensive design research to the end-user, which would provide design choices based on research outcomes. Roles could be divided in different ways, especially splitting the roles of scrum master and project manager/product owner in order to explicitly divide the responsibilities belonging to these roles. Testers could be involved in the process to validate the products on its functionality. Retrospective meetings could be added to receive additional feedback internally.

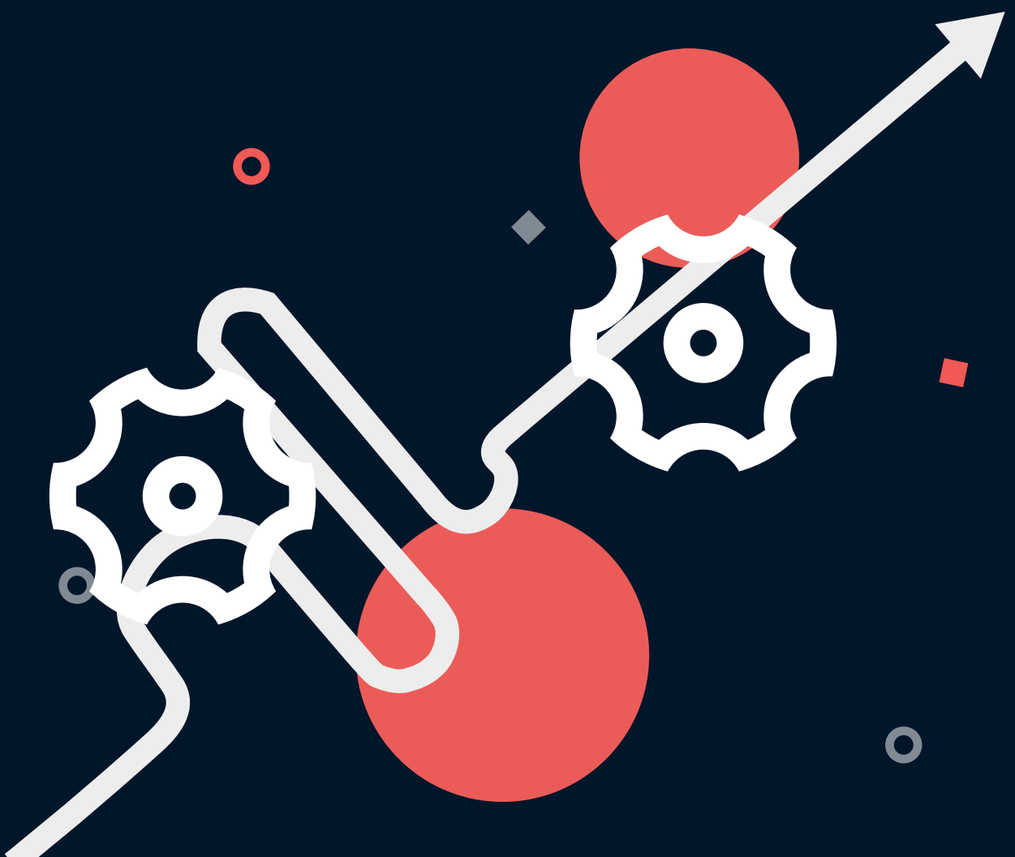
5. IMPLEMENTATION OF OPPORTUNITIES

This chapter explains how to implement the opportunities for optimization given in the previous chapter. It also describes how design solutions could be used to create transparency in the way MSML is working and the benefits of this for the customers. Two different research questions, with its sub-questions will be addressed in this chapter: 1.2 What are the possibilities in optimising the software development process?

- *What adjustments must be made to change the chosen bottlenecks?*
- *How can these adjustments be made?*

1.3 How to design a solution that ensures a better understanding of the software development process of MSML?

- *What are the needs of the customer within the software development process?*
- *How could the needs of customers be translated into a design solution?*



5.1 INTRODUCTION

At times it seems hard to understand that software development is a time-consuming process. Managing the customer expectations is harder than it looks, especially when using a flexible approach in software development. Transparency about the progress, deliverables and goals could make it easier to manage these expectations. To ensure this transparency the customer should be highly involved in the process. As has been shown, high customer involvement is being achieved by following a more structured approach. Therefore it is of importance for software development companies to be structured in terms of involvement. This structured approach should however not be perceived as unpleasant due to the impersonal and inflexible nature of the process. Given these risks, this chapter will look into the opportunity of increasing customer intimacy. Furthermore, advice on the other opportunities discussed in the previous chapter will be given.

5.2 IMPLEMENTATION OPPORTUNITIES IN THE PROCESS OF MSML

The implementation of the in previous chapter discussed opportunities could be challenging and is therefore further discussed in this section.

Being flexible as a company turns out to be positively experienced by the customer, due to the personal touch. This is also the main reason for companies to add this flexibility in the first stages of the process. The customers' perception of the process can have an effect on the perception of the end result. Following a strict and determined process could be perceived as impersonal and could eventually lead to resistance to the process that needs to be followed. A structured process seems nevertheless more efficient for the company and seems beneficial to the customer in the end. Unfortunately, customers are not able to compare processes, which makes it difficult to see the benefits of using structure. To lower the chance of customers having negative feelings about the process, it is therefore needed to increase customer intimacy. Implementing this opportunity could be done in two related ways. On one hand it could be achieved by lowering the effort it takes to be involved by means of making it easier for a customer to get involved. On the other hand, adding transparency in terms of the way of working and what is expected from the customer, could prepare the customer in advance. This could result in a customer feeling more familiar with the process.

Adding extra conversations in order to get to know each other before starting the collaboration lowers the chance of having a mismatch in terms of collaboration. Less knowledge about each other and each other's processes could result in a mismatch on a process level. This increases the chance of customers perceiving unclarity about Jira or these customers could even counteract to the way MSML is working. This could make the collaboration more difficult, making extra explanation necessary which required extra time. The implementation of additional conversations is not difficult, however resources such as time and money are needed for it. It is always unsure whether this investment is worth it or not. There is a possibility to address this opportunity within the opportunity of adding customer intimacy, in terms of adding transparency in the way of working. This has been elaborately discussed in the previous section.

Doing design research in an even more extensive way is hard to accomplish because of various reasons. In the ideal situation, design research could be done in a more extensive way. For example, visiting the end-users, sending questionnaires, observing the end-users, in order to make it easier to find the best fitting solution. This would prevent the company from possibly large amounts of real-time feedback from the end-users after release. According to company G, design research would ensure an even better product

in the end, because decisions would be based on research instead of their own assumptions. To confirm this, Icke (2015) mentions indeed that "Software that is created with end-users is more likely to answer the research questions and to support the workflow.". Unfortunately, doing extensive design research is not always possible due to the budget, time constraints and company's scale. It would nonetheless be preferable to execute design research more extensively. Implementing this into the process of MSML could be done by hiring new specialists, such as strategists or UX/UI designers who are completely focusing on doing end-user research.

The division of the roles and responsibilities is easier to accomplish. Assigning scrum masters to each of the projects could be easily done. Preferably these roles are assigned to independent employees. For MSML, I would suggest assigning the scrum master roles to the developers, because of its company scale. I would furthermore create a document wherein the responsibilities of these roles are explained. This in order to make sure everyone knows the tasks they are responsible for within the process. The addition of having testers employed is beneficial because these persons could independently validate the written user stories with the developed functionalities. Currently at MSML, the project manager/product owner is testing the functionalities, this person also wrote the user stories. This person could for this reason be prejudiced in terms of already having an impression of what should be built. Testing the solutions can be influenced by the perception of this project manager/product owner. Implementation of this opportunity could be done by hiring testers or by assigning independent testers from other project groups to test other projects on its functionality.

Retrospectives could be easily added to the process of MSML. These should be arranged by the project manager or scrum master each time the approximately three sprints are done. However, these recurring meetings should be interesting enough for the team members to attend, otherwise these unproductive retrospectives will become useless. Roden and Williams (2015) introduced the use of games in retrospective meetings to break the routine and enforce the structure of the meeting.

Fulfilling the roles, such as strategists and testers, is easier in larger companies, because on the one hand there are enough employees to fulfil these roles and on the other hand there is probably enough work to hire these employees. It is challenging for smaller companies to invest in hiring new specialists, such as UX/UI designers, scrum masters and testers, because it can be uncertain whether there is enough work for them. Hiring new specialists is a big investment and therefore easily postponed. For this reason it is hard to implement these opportunities without extensive research on the finances. The first opportunity, increasing customer intimacy, is easier to accomplish with the use of designs and is therefore chosen to implement in the process of MSML.

5.2.1 DESIRED FUTURE SCENARIO

"How to increase customer intimacy?" is the main question that has gained an increasingly prominent place in optimising the software development process. In the structured approach MSML is applying at the start of a new software project with a customer, the customer is highly involved in the project management tool. This transparency in the process, as mentioned, creates a better understanding on why software development is time-consuming. To enhance this, the entire project team, from stakeholders to project managers and developers, will experience the effects of having poor transparency (Clearbridge mobile, 2020). Integrating transparency into the development process means that the developers, project managers and stakeholders remain on top of the goals and deliverables, with as a result a better end solution.

Based on these findings the decision was made to keep following the structured process, with the transparency due to the large amount of customer involvement. The customer should be able to see and understand the benefits of this approach. This is what we are going to accomplish with the help of design solutions. In these solutions for the (potential) customer, there is a need to make clear why structure and involvement is important in the software development process. There is an opportunity to make it easier for the customers to be involved in the process, by giving instructions. Besides, a second opportunity would be preparing the customers by adding transparency in the way of working before the process starts. These opportunities would lower the effort it takes to be highly involved in the process and would decrease the chance of customers creating resistance against the structured approach (*figure 8*).

5.3 QUESTIONNAIRE CUSTOMERS

In order to get to know how these design solutions should look, a questionnaire is sent out to the customers. Questions about the project approach of MSML and the project management tool (Jira) were being asked to investigate what is needed and how they want to receive it. The method research through design is used to find out which of the senses (reading, listening, watching) they would prefer to use while receiving information about the process. Several example mediums were mentioned in the questionnaire in order to see how they would like to receive information.

The main goal of these designs is to ensure clarity in such a way that involvement in the process will be easier and that the process could be easily followed. Therefore, customers were first asked about what the customers need to know, which information needs to be explained. Thereafter, the customers were able to choose between different senses and mediums through which they would like to receive this information. This has been done with the research through design method. Designs are used to show how the explanation of the two topics in the various senses will look like.

The participants of this questionnaire were all customers of MSML, and were free to fill out the questionnaire. The answers were collected anonymously. The questionnaire can be found in *Appendix G*. Thereafter, the questionnaire was clearly analysed in terms of making explanatory graphs and tables of each of the questions asked.

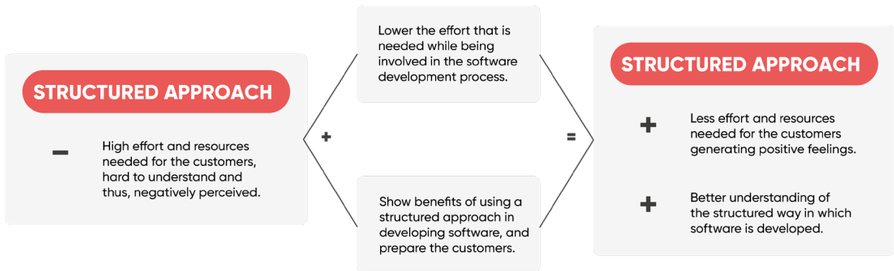


Figure 8: Optimization steps and effects.

5.3.1 RESULTS QUESTIONNAIRE

Nine participants took part in the questionnaire to express their needs and wishes in terms of explanations about MSML's project approach and Jira. The hypothesis was that more information about the use of Jira was needed, nevertheless the results say something different. It seems that the customers are willing to receive more information about MSML's project approach in contrast to information on the program Jira. Jira is of course part of the project approach, thus probably some information about Jira will be needed. However, research suggests focusing on giving more information on MSML's project approach.

It is obvious that the customers want to read through the project approach when they receive such information about MSML's project approach. Conclusions can be made about through which medium the customers want to receive this information. The most preferable medium is **an (illustrative) webpage**. Information about Jira is preferably received in the form of illustrations. However as the designer I would suggest some explanatory text to support the illustrations. A combination of the most preferred readable medium and most preferred illustrative medium is chosen: **'Do's & Don'ts' list in the form of an illustrative pdf/poster with realistic examples**. The 'Do's & Don'ts' lists means a compact readable information sheet with the most important things to do while using Jira.

To add to this, visual content will be processed earlier by the brain in comparison to textual content. To be more specific, visuals are processed 60,000 times faster than text. We, humans, remember only 20% of what we read, but 80% of what we see. Adding visuals to text increases the amount of information that is being remembered by 650

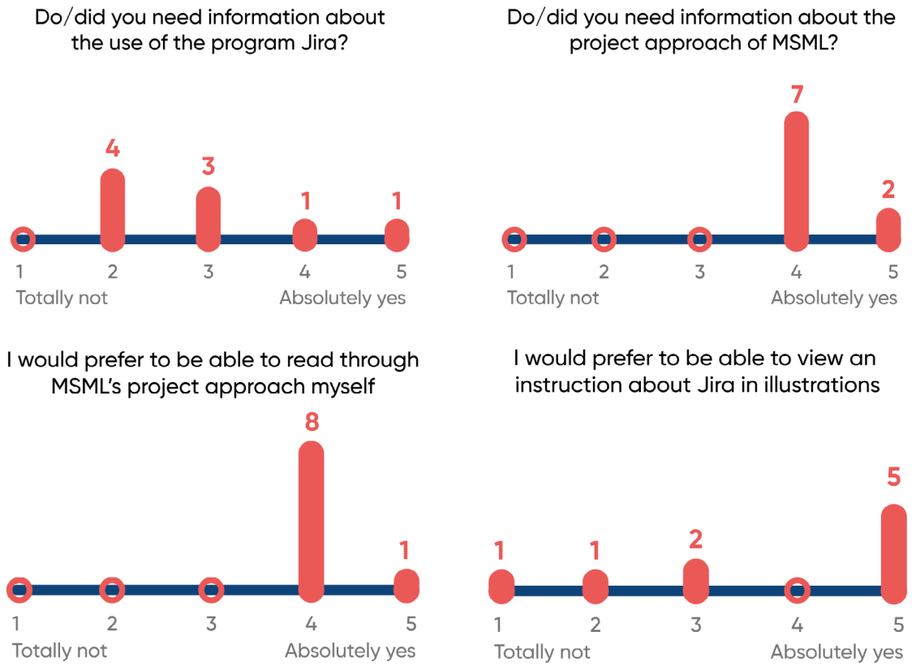


Figure 9 & 10: Charts on the need for information on the project approach and Jira
Figures 11 & 12: Preferable senses

percent. You can state that a human brain is made for visual processing (Entrepreneur Middle East Staff, 2018). Furthermore, the attention span of human beings is getting shorter, people rather skim over visual contents instead of reading every single word. Moreover, the more difficult to understand information could be perceived easier when visual content is added (Reed, 2021). According to the infographic of Entrepreneur Middle East Staff (2018), humans even have a shorter attention span than goldfishes, to be specific an attention span of eight seconds. Therefore, (realistic) visuals will be used in both the webpage and the compact pdf/poster.

Unexpectedly, an explanation on Jira is less needed than an explanation of the project approach of MSML. There is overlap between these topics, since the involvement in the project management tool forms a large part of the project approach of MSML. Lowering the effort it takes to be involved in the process could apparently be achieved better by giving an explanation on how to use Jira in the process. Currently more focus is on the explanation of how to involve in the project management tool, Jira. This solution would, from my perspective, better fit the goals this research aims at. Therefore two different solutions will be designed that have a positive influence on the customers' experience.

5.4 CONCLUSION

The following question is being answered in this chapter: 1.2 What are the possibilities in improving the software development process?, with the help of the following sub-questions and the results of chapter 4. Process analysis.

- *What adjustments must be made to change the chosen bottlenecks?*
- *How can these adjustments be made?*

Moreover, this chapter also provides answers to the following research question and sub-questions: 1.3 How to design a solution that ensures a better understanding of the software development process of MSML?

- *What are the needs of the customer within the software development process?*
- *How could the needs of customers be translated into a design solution?*

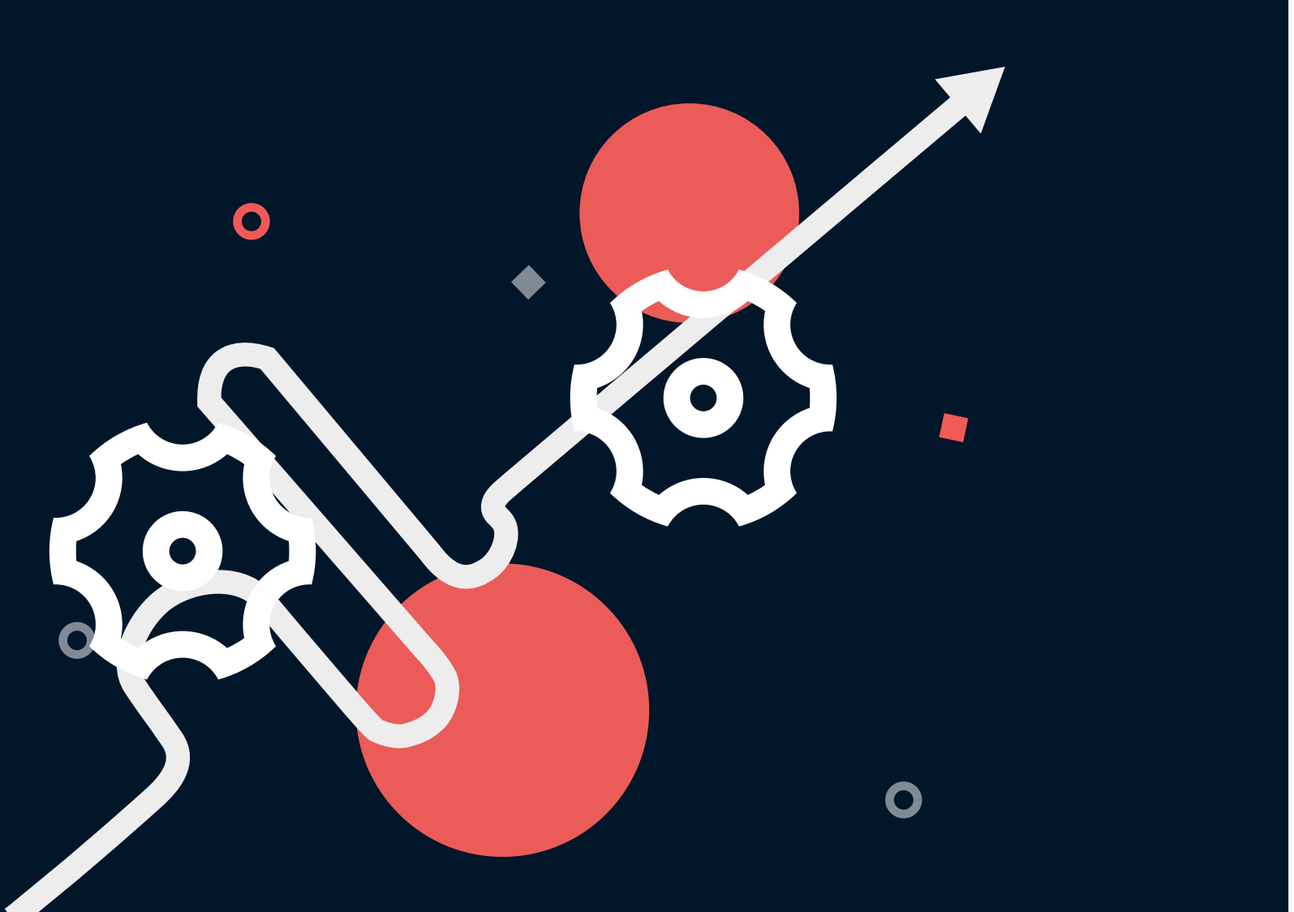
No specific adjustments are going to be made in the structured approach to optimise the process in terms of customer intimacy. However, explanations on the process could be given, because investigating the current practice suggests that personalised communication is missed and the documentation/communication within Jira is perceived as impersonal. It is of importance to show the benefits of being that structured. The customers' understanding could be strengthened by lowering the effort it takes to get involved in the process. Apart from this, transparency in why and how customers are being involved in the process could prepare the customers in some way. This could lower the chance of the customers getting resistant to the structured approach.

Two designs will be created to achieve these goals and these designs should eventually be incorporated into the company to ensure positive effects in terms of customer intimacy. The customers were asked in a questionnaire to identify their needs and wishes. The outcomes show that there is a need for an explanation on the project approach, meaning general information on how we develop software. This design would preferably be read through, in the form of an illustrative webpage in order to explain the project approach. An explanation of the use of Jira is less needed according to this research. This explanation of Jira was preferably received in the form of realistic illustrative examples, and as discussed in combination with a 'Do's & Don'ts' list. In the next chapter, the development and reasoning behind these solutions will be clearly explained.

6. DESIGN SOLUTIONS

This chapter discusses the created design solutions, the process to develop them, the several iterations, the design reasoning and the final designs. It visually gives an answer to the last research question, also addressed in previous chapter: 1.3 How to design a solution that ensures a better understanding of the software development process of MSML?, with its sub-questions:

- *What are the needs of the customer within the software development process?*
- *How could the needs of customers be translated into a design solution?*



6.1 INTRODUCTION

Two different solutions are created in order to achieve the main goal: increase customer intimacy by providing better understanding of the process. One solution takes the form of an explanation on how to use the project management tool Jira within the process of MSML. The other solution is in the form of an extended version of the current 'How we work'-page on MSML's web page, in order to explain the process to, especially, new potential customers. This is done because some customers mentioned that the information on the website has been of influence in the decision making in terms of which software development company to collaborate with.

The two solutions were both developed with the use of SCRUM methodology. The tasks that should be done to create the solutions are written into user stories and are provided with the needed acceptance criteria. These user stories were first listed on the backlog and eventually replaced in the sprints wherein these tasks should be fulfilled. In the two-week development sprints these tasks were done, iteratively checked by peers and eventually rejected or accepted. This will be done in several sprints to complete the desired solutions, up to and including the evaluation of the solutions. The process of creating the solutions differs a bit, as will be explained in the following sections. First, the development of the Jira instruction is explained, followed by the development of the explanation of the project approach of MSML.

6.2 JIRA MANUAL

The development of a design solution to explain the use of Jira within the process of MSML will be explained in this section.

6.2.1 INVENTORY

For the development of the first design solution, the Jira manual, more information about the goals and requirements could be found compared to the second solution, the 'How we work'-webpage. This was due to a small questionnaire handed out among the employees of MSML. This questionnaire enables to see where the difficulties reside within the use of Jira and how they would like to see the design solution. The answers were translated into relevant requirements for the solution. In the questionnaire the employees were asked to share their experiences with the involvement of customers in Jira. Aspects such as "Customers are not always accepting or rejecting the tickets correctly or fast enough" and "Sometimes, the customers forget to mention the employees in their comments, this lowers the response time" were mentioned by the employees of MSML. These answers in combination with the data collected about the current practice and of course the obtained experiences of the customers, are the foundation of the listed requirements. Requirements could have been easier set up according to the insights obtained from the employees of MSML. These are structured on the level of importance, using the MoSCow method (van Vliet, 2008). Together with the stakeholders, MSML, these requirements are prioritised in 'Must have's', 'Should have's', 'Could have's' and 'Won't have's'. In the table below (*table 3*), you can read the listed requirements. These will eventually be used to validate the designs.

6.2.2 DECISION MAKING

The Jira manual will be handed out among existing and new customers and should be an extension to the explanation MSML is giving about the process. Its aim is to explain the most important and difficult Jira issues, as a sort of reference material, in order to lower the effort in participating in MSML's structured process. Several iterations have been done

to find the best fitting solution. This was done with the help of peers and personal experience. It started with writing and reviewing the text several times. This text needs to explain the headlines on how to use Jira within the process of MSML (*see requirements in table 2*). The text starts with the descriptions of, according to the customer and the employees, most important terms. These terms were re-used in the rest of the explanation and therefore it is necessary to read these first. The rest of the written explanation could be divided into the necessary things to do or to remember before a sprint, during a sprint and after the sprint, thus in the support phase. The illustrations were created with the preferences of the customers in mind. These should support the written explanation of the Jira solution and therefore these should be especially easy to understand.

First, an online explanatory pdf (A3-format) was designed in mostly white and blue colours, in line with the website designs of MSML. After realising that the illustrations to explain the process preferably would be received in a realistic way, the designs completely changed. This would result in a static, not attractive solution, because of the grey-toned colours on white. Besides, due to the division of the written explanation in three parts in chronological order, it was design-wise hard to implement in one online poster. This created the idea of making it compact and small.

#	MoSCoW	Requirement
1	Must	It must contain the logo of the company MSML (maybe also Jira).
2	Must	It must be written in Dutch (MSML).
3	Must	It must be clear how a Jira SCRUM boards looks and how it is used within the process (moving tickets/user stories).
4	Must	It must be clear where and how 'tickets/user stories' could be accepted or rejected.
5	Must	It must be clear how to assign people and how to mention people in comments.
6	Must	It must be clear what the 'Backlog' is and to what extent it could be used by the custmer, so how to create 'tickets/stories' in support.
7	Must	The tone of the text on the poster/pdf must be informal but professional.
8	Must	The visuals must be realistic, clear and understandable for the customer.
9	Should	The customer should be able to read through it, whenever they want.
10	Should	It should be clear what exactly a 'ticket/user story' is.
11	Should	It should be clear where to find your project and how to reach it.
12	Should	It should be clear that when having questions (as a customer) you always can ask them in the comments of the concerned tickets.
13	Should	It should be clear that whenever the state is 'Input needed' you (as a customer) should give input through a specific button 'Input given', to ensure the ticket will be assigned back to its previous assignee.
14	Should	It should be clear that using Jira will strengthen the collaboration between the customer and the company MSML.
15	Could	It could contain simple and clean visuals/illustrations.
16	Could	It could use contrasting colours to emphasise on things.

Table 2: Requirements design solution: Jira explanation

The explanatory PDF initially aims at informing the customers about how Jira should be used. This to lower the threshold of being involved in such a project management tool. Therefore, I suggested giving the new customers a compact version (A6-format) at the start of the collaboration in order to inform them about the 'Do's & Don'ts' while using the project management tool. This also ensures a sort of preparation for collaborating. One employee suggested that it is needed to make the JIRA solution clear and compact. To achieve this a small and compact reference material (booklet in A6) and a more extended online version (2-paged PDF in A3) were made. The online version would provide more information and illustrations, so whenever more information is needed the customer is able to read this extended version.

6.2.3 FINAL DESIGN JIRA MANUAL

The compact solution of the Jira manual starts on the front page, the left page in *figure 13*, with an explanation of the most important terms: backlog, story, sprint, SCRUM board, and support board. The MSML website button style is used for these terms, this creates emphasis. These terms and definitions are divided from the other information by using a simple line. In the next section, the customer can read about the first two things to remember before the sprint starts. These support the customer to validate the priority of the user stories on the backlog and to validate the written user stories on completeness. This explanation is supported by an illustration of a small part of the backlog, to show them what this backog looks like.

The inner side of the manual, shown in *figure 14*, is explaining the most important things to keep in mind when in a development sprint. Thus, constantly keeping an eye on your tasks as a customer, accepting and rejecting the developed user stories and asking questions when needed. The inner side has been made white, because this looks calm. This also clarified the distinction between the certain time periods, before a sprint, during the print and after the sprint. The illustration in the middle gives a clear overview of how a SCRUM board looks and the arrow reminds the customer of accepting the user stories when these are finished. The other illustration helps to think of mentioning the employees while placing comments underneath the user stories. Mentioning the employees is an important thing to do, this ensures that the employees are receiving notifications.

The last page, the back side of the booklet, can be found on the right side of *figure 13* and consists of information about how to create a story when new functionalities are needed or bugs do appear. It invites the reader to scan the QR-code if more information is needed on the use of Jira. It ends with a tagline, which enhances that the use of Jira is helping you as a customer towards a great collaboration and eventually to the best possible solution.

The extended online version of this solution and the solution placed in context can be found in *Appendix H*. This solution does contain more text to explain the steps in the process of Jira more elaborately. More illustrations are in there to support the text, this makes Jira even easier to understand.

// FIRST DESIGN SOLUTION

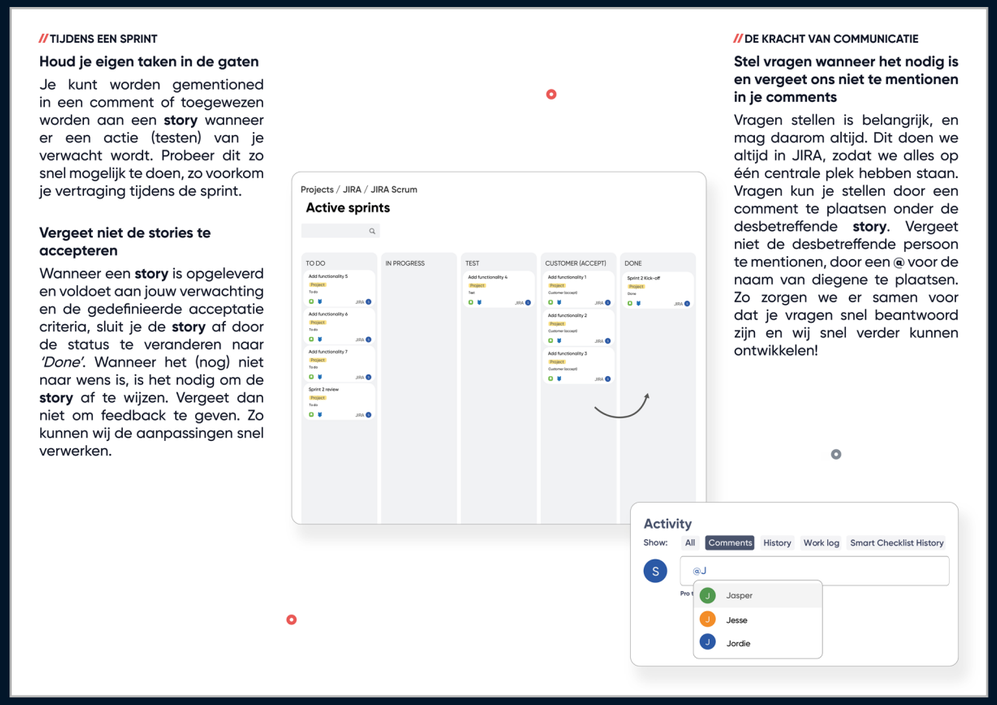


Figure 13 & 14: The front and backside of the compact Jira solution and the inner side of this solution

6.3 EXPLANATORY WEBPAGE

This section explains the development of the newly designed version of the 'How we work'-page, in order to extensively explain the project approach of MSML.

6.3.1 INVENTORY

For the development of the second solution, the explanatory 'How we work'-page, the focus is on the extensive peer review. As mentioned, more information could be found in terms of requirements for the first design solution, by simply addressing the mentioned mistakes or struggles the customer experiences while using Jira. This unfortunately is not the case for the second solution, it is therefore important to validate the text and designs more than once. Several customers mentioned that the website and especially the information about the project approach on the website influences their decision on the software company to collaborate with. This suggests that it is important to keep in mind that the solution should have hints of being attractive and convincing.

The webpage is another solution to inform the customers about the currently followed process. To address the initial goal of adding transparency as to why this process is used in this way and eventually to make it easier to understand, some boundaries are set. In order to stay in line with these goals the decision was made to only develop the text and visualisation(s). This means that the placement of the webpage on the website and the other information on this specific page is not relevant for this research and will not be taken into account.

Doing extensive research on process explanations and visualisations on other web pages created insights in what to include and what not. In a discussion with the stakeholder, MSML, the most important requirements have been identified and listed, as shown in *table 3*. This is done with the same method, namely the MoSCow-method.

#	MoSCoW	Requirement
17	Must	It must be written in Dutch (MSML).
18	Must	It must be clear that it is about the project approach of MSML.
19	Must	It must give an explanation of SCRUM: working in sprints and with the use of testing 'tickets'.
20	Must	The tone of the text on the website must be professional and commercial.
21	Must	MSML's corporate identity must be involved.
22	Must	It must contain simple and clean visuals/illustrations.
23	Must	It must be compact, short and clear (user friendly), however it should be an extension of the current webpage.
24	Should	It should be attractive and appealing.
25	Could	It could use contrasting colours to emphasise on things.
26	Could	It could use smooth/stylish animations to make it more attractive.

Table 3: Requirements design solution: Explanatory webpage

6.3.2 CONCEPTUAL DESIGNS

First, the text has been developed, which could be easily done with the information obtained in *chapter 2. Current situation*. The textual explanation starts with an introduction on SCRUM and how to work in SCRUM. Then, the process is divided into four relevant steps; inventory wishes, design & prototype, software development, and service & support. Each clearly explained and iteratively checked by peers, two employees of MSML. This is done to ensure the text is fitting the other content of the website and to make sure the text is professional and commercial enough. The text is the same in each of the designs.

Other related webpages and process visualisation examples were explored and used in order to brainstorm on how the process should be visualised (*Appendix I*). This brainstorm session elaborates on the question: "How to visualise the process steps correctly?", which resulted in several options of the steps inserted into several concepts. Four different concepts were created and are clearly explained below, while the conceptual designs can be found in *Appendix J.* These are created within the Figma tool and this implies you can click through the prototypes; some are unfortunately not animated in the way I wanted them to. This is not always possible because of the features Figma does not contain, however a detailed explanation is given below.

Photo collage
This first design consists of four tiles representing the different process steps. When hovering above the tiles an animation starts and shows a photo that belongs to that process step. New company photos have to be made, therefore these concepts use stock photos as replacement. While creating this design, I struggled with the order of the four different process phases and how to show them in the design. Making the tiles smaller and ordering them from left to right would result in an overcrowded page. On the other hand, this conceptual design has a lot of white space which is in contrast with one of the gestalt principles: law of proximity (Soegaard, 2020). This white space creates the feeling that these tiles do not belong together, apart from the fact that it is hard to see that these are animated. Therefore an arrow is added. When clicking the tiles a new page opens with the text and photo that belong to this process step. The buttons underneath the text make it possible to go back or go further to the previous or next step.

1

Puzzle pieces
The puzzle pieces design should be followed by scrolling in the vertical direction. It shows the metaphor of each process step, bringing the customer closer to their end product. Each puzzle piece is referring to one process step with the use of an icon. As a customer you are able to fill the puzzle by following the process in collaboration with MSML. Animations should be added in mind, unfortunately these are not shown in the clickable prototype. The line in the middle is first of higher opacity and will get filled while scrolling down through the process. Besides, the puzzle pieces would 'fall down' into the puzzle, when scrolling to the next step in the process.

2

Circular process
The circular process is again provided with realistic photos related to each of the process steps. However, the placement of the steps has been done in a circular way. Next, only one photo is in the middle of the design and changes according to the tile you are hovering on. When clicking on a certain step, the text appears underneath the design and you will automatically be scrolled to this section in order to be able to read the text.

3

Moving Icons
The last created design is derived from the current 'How we work'-page. It shows the tiles in order from left to right, together with the numbers 1 to 4 to show the steps. It is extended with animated icons while hovering over the tiles, besides a section with the explanation on each of the steps underneath these four tiles. When clicking on one of the process tiles the text underneath changes and you can clearly see which process step is selected, because the selected tile changed in colour.

4

6.3.3 DECISION MAKING

In order to develop the proposed solutions, peers were asked to iteratively check the solution. One peer, a textwriter at MSML, is asked to review the proposed texts of the solutions. A second peer, designer at MSML, reviewed the proposed designs several times, besides another peer who constantly validated both the designs and the text, on its correctness. The peers could freely be asked to look at the text and the designs.

The four different conceptual designs were exhibited to two different participants to explore the directions for the final design. First, they were asked to take a look at and to answer the questions individually to make sure they would answer the questions and give comments independently. This was followed by a discussion session on the answers and comments given. For the complete set-up of this peer review, I refer the reader to *Appendix K*. Unfortunately, the peer review session was executed differently than planned, as the initially asked participant, a designer, was not available to do the session. Therefore, a second session was conducted with one other participant, with a background in marketing and neuromarketing. This eventually led to even more marketing-related insights. Although, the solution should give the viewer some triggers to read further and to get interested in the company. Therefore, this marketing-related feedback could effectively add some value to the created designs.

At the start of the sessions, a small introduction was given about each of the designs. To ensure relative feedback not everything is given away. This gave me the opportunity to find out whether the designs stand out enough, due to the participant's first reactions. I will discuss the outcomes of the discussion by first mentioning advice and my own perspectives on the text. Eventually, I will go through the four created designs and discuss the given advice. Lastly, I will underpin the chosen design and the further improvements to be made.

6.3.3.1 REVIEW INFORMATIVE TEXT ON WORKFLOW MSML

As mentioned, the text is iteratively discussed and rewritten with the help of peers in the earlier phases of this design process. In this session, the two participants again read through the informative text, written to clarify the software development process to

prospective customers and other interested parties. I critically observed the participants during the peer review session while reading the text. Although there was, (un)fortunately, nothing interesting to observe, only one minor typographical error was mentioned during the session.

During the discussion about the text, the participant perceived the text as easy to read and clear in explaining the process. Only one interesting perspective was addressed, a remarkable one since I already noticed it myself as the writer. The informative text is mainly written through the eyes of the company, whereas the reader should be able to familiarise themselves with the process. Therefore, they recommend showing the value of the process from the customers' perspective. This will be a discussion point for the future since the writer of the company gave feedback according to the writing style the company nowadays is expressing. This solution focuses on clarifying the workflow of MSML to add transparency to why MSML works in such a structured way. Therefore the decision was made not to look further into the writing style. This will be covered in the future work section.

6.3.3.2 REVIEW DESIGN CONCEPTS WEBPAGE ON WORKFLOW MSML

In the review session, the participants were able to click through the prototypes themselves. This enables the chances for observation, to see whether the designs are understood. At first, I presented the first and third options for the web page; these are the designs with realistic photos: *Photo collage* and *Circular process*. As second I presented the *Puzzle pieces* design, the only design where the user has to scroll vertically to go through the process. As the researcher and designer, I decided to show them my favourite option in the end: *Moving icons.* After they answered the questions on clarity, alignment and added value of each of the designs, we discussed these together. This resulted in feedback, advice and suggestions (*on page 64*) in order to make the final decisions in design.

In the end, more peers joined the discussion with as a main topic the choice that has to be made between the two most interesting designs: *Puzzle pieces* & *Moving icons*. According to my perception as a designer the *Moving icons* is more in line with the style MSML is willing to express and this solution is more clear in terms of giving an immediate overview of the whole process, whereas, the initial peers are more in charge of the *Puzzle pieces* design because of its appealing metaphor. You want to scroll down to fill the puzzle. When looking at the predetermined requirements, these are all met in both of the designs, some are better fitting than others. Requirement #23, is according to my personal opinion more expressed in the *Moving icons* design than in the *Puzzle pieces* design. On the contrary, requirement #24 seems to be easier met in the *Puzzle pieces* design. The attractiveness is of course of great importance to the peers, due to their marketing backgrounds. Therefore, the metaphor in the *Puzzle pieces* design is perceived as strong and appealing. When looking through the eyes of a designer though, things such as clearness and usability become important. For these reasons the *Moving icons* design was finalised in this research, the final result is shown in the next section.

6.3.4 FINAL DESIGN WEBPAGE

The explanatory webpage on the process of MSML consists of four tiles representing the process steps: inventory wishes, design & prototype, software development, and service & support. These tiles contain the number of the process step, the title and a corresponding icon. Underneath the textual explanation of each of the process steps is provided; when clicking on a certain tile the corresponding text will appear. The solution can be seen in *figure 15 & 16* and experienced through this link.

1. Photo collage
The participants were not that charmed by the first design concept I showed them. They recommended to include numbers or to use order to show the steps in the process. As mentioned earlier, this was already an obstacle while designing. As a designer, I thought of inserting numbers or using order, however this would have resulted in an overcrowded webpage. The animation used in this design is generally perceived as engaging, it does however not completely fit the style MSML is willing to express and the arrows pointing up while hovering are considered as unclear. The value of representing the phases with photos is questionable, because, according to them, it is difficult to assign one photo to one phase of the process.

2. Puzzle pieces
The Puzzle pieces design concept is positively awarded, especially the trigger it generates to scroll down. The used metaphor of the idea that every puzzle piece (phase) is valuable for the complete process, is according to the participant a great idea to get the attention of the users. One of the participants mentioned "A complete puzzle is always giving the feeling of satisfaction". The only thing they recommended to add, is a starting point and an end point of the dotted line.

3. Circular process
The Circular process design is rewarded with better results than the Photo collage design. This is because this design is experienced as more clear and organised. All information is on one page, which makes it, according to them, well-organised. Nevertheless it scored lower than the Puzzle pieces because of the missing links between the phases. The participants would like to see lines between the phases to represent a circular process. Next to that, when leaving out the lines they would like to read from left to right. So in this case '3. Software development' should be placed in the bottom left corner instead of on the right.

4. Moving icons
When comparing the results this design will end up on the second place, straight underneath the Puzzle pieces design. Positive points mentioned were related to clarity and organisation, nonetheless it seems that this design is perceived as less engaging and attractive. Whereas this design has clear animations and fits the corporate identity of MSML, this is obviously not enough to beat the Puzzle pieces design. According to the participants, the titles should be horizontally placed, the icons should be bigger and the text in the tiles should be removed. Next to that, they advised to add an illustrative timeline underneath the text to make the design more engaging and clear.

// SECOND DESIGN SOLUTION

Figure 15 & 16: The explanatory webpage on the process of MSML.

The text written tells about the process from start to finish. It elaborates on writing throughout the eyes of the customer. The text would tell the reader what their collaboration in the process would consist of. It shows the reader that collaboration in such a way would be beneficial for the customer and the result in the end. In short, the introduction gives the reader information on the structured process and that it is beneficial for both the customer and the company, because of its transparency. The first process step explains that questions are being asked to identify needs and wishes, and it tells the reader about the conversations that take place to discuss the flow and functionalities. Thereafter, it explains the design phase, how designs are created and how the customers are able to validate the designs by a clickable prototype. The third step in the process, software development, explains the SCRUM cycle with its 2-week development sprints, and recurring meetings. Next to that, it explains how to get involved in the testing procedure as a customer. Lastly, the service and support section explains what happens after release in terms of when bugs do occur or when there exists a wish for the development of new functionalities. The text ends with a summarising sentence, and emphasises the importance of having a pleasant experience in terms of collaboration.

The visualisation changed in comparison with the conceptual version. The text is removed from the tiles and the animation icons are made larger. The text is placed horizontally instead of vertically to increase the readability. A timeline with icons is added, as these icons represent the steps taken within the main process steps. Navigating to the next step can easily be done by clicking on a certain process step tile or by clicking the arrow in the bottom right corner. These arrows are created in consistency with the other arrows on the webpage. This timeline is added to make it more attractive and clear. More about this solution can be found in *Appendix L*.

6.4 CONCLUSION

In this chapter the created designs could be found, this chapter contributes to the following research question: 1.3 How to design a solution that ensures a better understanding of the software development process of MSML?, with its sub-questions:

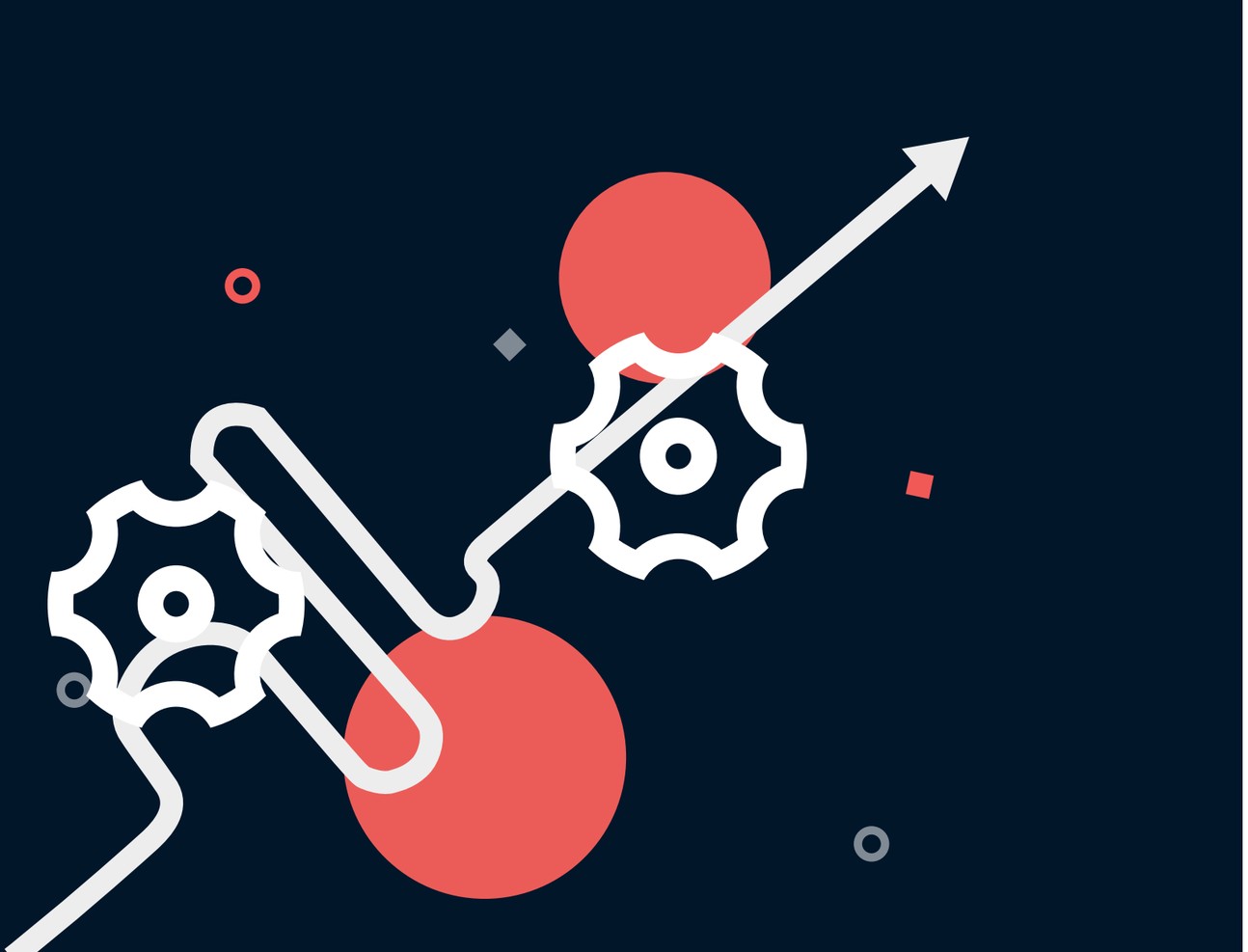
- *What are the needs of the customer within the software development process?*
- *How could the needs of customers be translated into a design solution?*

In *chapter 5: Implementation of opportunities*, there is chosen to give an explanation on both the project approach of MSML and the usage of the project management tool, Jira. It can be concluded out of these questionnaires, that it is needed to provide more explanation on both these topics. Besides, asking the employees on the difficulties the customers are having within the process, together with the experiences of the customers themselves gave the starting points of the requirements.

In this chapter, the requirements are transfered into two different design solutions. These solutions both contributing to the goal of lowering the threshold of being involved in the process as a customer. This could prevent the company from investing time and money in repeatedly explaining how to get involved in the process. These interventions also would make it easier to understand for the customer why MSML is working this way. The next chapter focuses on the validation of the two solutions, where the first solution is evaluated in a more elaborate way.

7. EVALUATION

This chapter is about the validation of the final design solutions, the Jira manual and the explanatory 'How we work'-page. This is done by checking the requirements. The Jira manual has been validated by three participants in a more extensive manner, the execution of this validation is explained in this chapter.



7.1 EVALUATION METHOD

In order to validate whether the solutions could add to the process in terms of increasing the understanding of having a structured process, different types of evaluations have been performed. Both the solutions are being validated by checking whether the predetermined requirements are met and to what extent these solutions are fitting the requirements. An additional validation on the created Jira manual has been done, to check whether this solution is understandable and clear. A decision has been made to not execute such an extensive validation for the explanatory webpage, since that solution was already extensively peer reviewed and there was no further need to get more opinions.

To evaluate the created Jira manual solution the following predetermined evaluation plan was executed. The goal of this evaluation is to investigate whether the Jira solution is understandable. It will also be checked whether an extended version is needed. The evaluation is executed with three different participants; one participant not in the software industry, one participant daily working in Jira and the last participant being somewhere in between. This ensures that the solution is being reviewed from different perspectives. One participant is an external person and therefore signed an ethical approval to agree on using his or her thoughts into this research. The complete overview of how the evaluations took place can be found in *Appendix M*.

7.2 EVALUATION OF THE SOLUTIONS

Validating the Jira manual according to its predetermined requirements, it can be said that the solution merely fits all the requirements. Requirements #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #12, #14, #15, and #16 are completely met. However, it can be imagined that it is not clear enough that tickets mean more or less the same as user stories (#10). User stories are always tickets, however tickets are not always user stories, a ticket could also be a bug or a service request. Thus, a user story is a type of ticket and represents a certain functionality. Requirement #11, is not that obviously implemented in the compact solution, although this topic is explained in the extended version. According to requirement #13, the solution should gives an explanation on how to react whether there is input needed from you as a customer. It is stated in the solution that whenever the status is 'Input needed' you should check this ticket, although there is no information given on how you should respond to that. Unfortunately, these requirements could not be met, due to the limited space on the compact Jira manual and because other explanations needed to be mentioned.

These explanations were not missed by the participants during the evaluation sessions. In general the solution was perceived as clear and understandable. There were some interesting insights to discuss. The compact Jira manual was exhibited to three different participants, one having prior experience with the project management tool, one having a bit of experience but not involved in the projects and one participant was not having any experience in software development at all. All participants mentioned that the compact Jira solution would be enough to understand the program, thus the extended version would not be needed. One participant mentioned that this extended version was not needed because this participant is rather willing to investigate the functions of the program himself rather than reading another explanation. Furthermore, one participant suggested to add the sentence "Zet je notificaties aan, zodat ook jij meldingen kunt ontvangen", in English "Turn on notifications, to make sure you receive notifications". He said so, because this participant mentioned that turning on notifications was sometimes forgotten in the past. One participant mentioned that the visualisation on the inner side, the SCRUM board, could be made more clear. The definitions of the columns could be

provided with some extra explanation. Apart from this, the indications of the phases, before a sprint, during a sprint and after a sprint, could be made bigger since this would give structure to the compact manual.

Based on the validation of the explanatory webpage with the help of the requirements, it can be concluded that all requirements were met, except for #19 and #24. Requirement #19 is included in the solution, however this topic could receive more emphasis to clarify it even more. Requirement #24 is about its attractiveness and could be perceived as met, although this is not checked by customers thus we are not able to say that this solution is attractive and appealing.

#	MoSCoW	Requirement
10	Should	It should be clear what exactly a 'ticket/user story' is.
11	Should	It should be clear where to find your project and how to reach it.
13	Should	It should be clear that whenever the state is 'Input needed' you (as a customer) should give input through a specific button 'Input given', to ensure the ticket will be assigned back to its previous assignee.
19	Must	It must give an explanation of SCRUM: working in sprints and with the use of testing 'tickets'.
24	Should	It should be attractive and appealing.

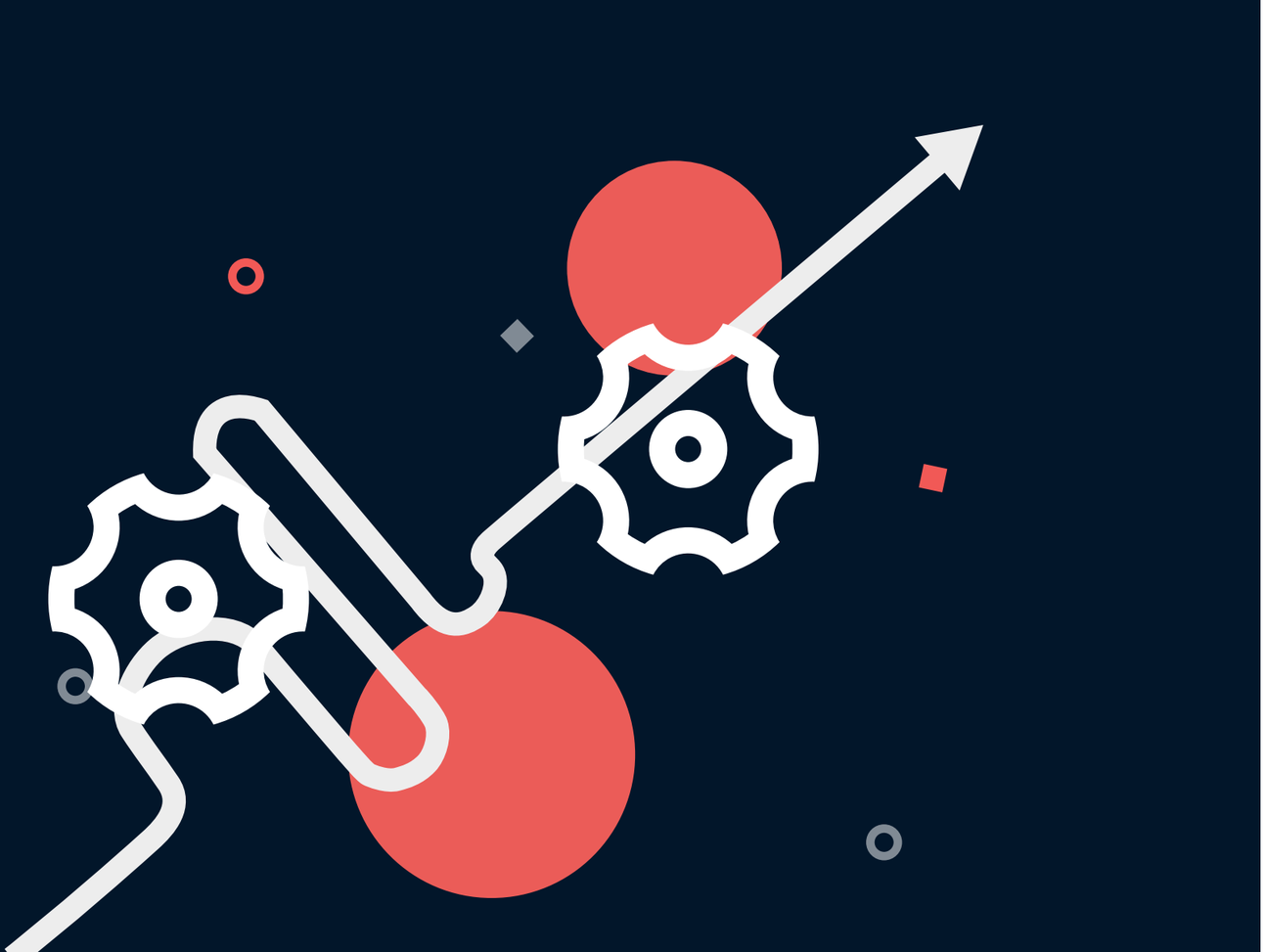
Table 4: The requirements not (completely) met.

7.3 CONCLUSION

It can be concluded that the solutions did well in the validation sessions. However, there is no real-life feedback collected and therefore it is important to validate the results with the customers and potential customers to see whether these solutions address the goal of increasing customer intimacy.

8. DISCUSSION & CONCLUSION

The following chapter discusses the recommendations for future work and improvement and the conclusions.



8.1 FUTURE WORK

Further implementation of the opportunities would benefit both the customers and the company. First of all, I recommend handing out the proposed Jira manual to the customers to receive real-life feedback. I would recommend trying to obtain opinions from the customers and check whether the solution is in use after a certain period.

Secondly, extensive research could be done on the website's usability to check whether the current explanation of the process is easy to find on the website. Questions on whether the elaborate explanation of MSML's project approach should be exposed more extensively could be asked to find the right place for this 'How we work'-page. Furthermore, the created 'How we work'-page should be refined by finalising the text and its design and eventually developed with the help of the developers.

Due to the need for a long validation period and time constraints, there is no possibility to validate the solutions on their effectiveness. The increase in customer intimacy could only be checked after a certain period. Thus, it is recommended to validate the efficacy of the first preparation for heavy involvement and attendance by retrieving the opinions of customers and observations in the collaboration.

Thirdly, adding retrospective meetings to the process would be suggested to implement in order to improve the software development process further. Since this opportunity is relatively easy to incorporate, it would not be a significant struggle to add.

Fourthly, the other expressed opportunities of splitting and adding roles, and doing additional design research, should be considered for implementation in the near future. Therefore, extensive research is needed on the conditions to be met before employing new specialists, such as strategists, designers, scrum masters, and testers. It is needed to investigate which requirements are needed, and why this investment is such a complex consideration. It would be beneficial to search for opportunities to hire new specialists to fulfil the considered additional roles and tasks.

Lastly, customer intimacy has been addressed within this research by adding explanations. Additional personalization strategies could be opportunities to optimise the process and customer experience further. However, I would recommend searching for other ways to personalise a structured approach.

8.2 CONCLUSION

The main research question will be answered in this section: How can the software development process of MSML be optimised?

Various opportunities to optimise the software development process came to light, some more difficult to implement than others.

At first, conducting additional conversations with the potential customer could enhance the chance of having a personal and professional match on workflow execution. Resulting in a better understanding of each other's processes and eventually a better collaboration. This opportunity could be implemented in order to increase customer intimacy even more by creating better understanding and lower effort to participate in the process.

It would be beneficial to execute design research as a software development company. This can be achieved by visiting end-users and doing questionnaires to find the best fitting

solution in an earlier stadium. Moreover, splitting the UX and UI parts in design creation would ensure elaborate research and research-based design decisions. Both provide a better understanding and a feeling of trust between customers and the company.

Thirdly, roles should be split and added to ensure each person can focus on their corresponding responsibilities. Creating a clear distinction between the roles of scrum masters, project managers, and product owners could provide knowledge of the duties each employee needs to fulfil. It lowers the chance of unclarity regarding which person should take the responsibility for a certain task at a certain moment in time as it provides a clear distinction and explanation of responsibilities. In addition, including a tester's role, someone validating the functionalities, could be an opportunity to implement. Having a tester instead of a product owner/project manager to check the results would ensure complete independence because this person does not know anything about what will be built.

Fourthly, the addition of retrospective meetings to discuss the execution of the previously followed development sprints. This would provide more feedback on each other's work and could eventually prevent the process from internal flaws.

The low customer intimacy in the process is an opportunity to optimise the process. High customer intimacy ensures a personal touch to the process and could be perceived as pleasant. Increasing this customer intimacy by adding flexibility in terms of giving the customer the freedom to choose their path in the process, would not guarantee customer involvement in the process. Due to freedom given in advance of the process, the customer may not be involved in the process.

Customer involvement, especially in a project management tool, could be experienced by the customers as stifling and unpleasant. Customers could counteract the process they are in because of the effort needed to keep up with the company's process, which could give the company more work to do since an explanation is required to create a better understanding.

Research states that customer involvement is essential. It can ensure transparency within the process. This transparency gives the customers insights into deliverables, goals, and progress which eventually makes it easier for the company to fulfil the customers' expectations. Unfortunately, this customer involvement could arouse negative feelings during the process perceived by the customers.

Customer intimacy is being enhanced by adding transparency in advance of the process. This is done by explaining to the customers beforehand what it means to be involved in the process and by showing them what the benefits of this structured approach are. All to create a better understanding for the customers and eventually optimise the process through the eyes of the customer.

// REFERENCES

Adams, W. (2015). *Conducting Semi-Structured Interviews*. doi: 10.1002/9781119171386.ch19.

Athuraliya, A. (2021). Process Mapping Guide. *Creately*. Retrieved from https://creately.com/blog/diagrams/process-mapping-guide/

Beck, K., et al. (2001). The Agile Manifesto. *Agile Alliance.* Retrieved from http://agilemanifesto.org/

Berg, M. (2020). Software Development Life Cycle (SDLC). *Techopedia*. Retrieved from https://www.techopedia.com/definition/22193/software-development-life-cycle-sdlc

Boehm, B. (2002). Get ready for agile methods, with care. *Computer, 64*–69.

Bordeaux, J. (2018). *What Is Customer Experience? (And Why It's So Important).* Retrieved from https://blog.hubspot.com/service/what-is-customer-experience#:~:text=A%20remarkable%20customer%20experience%20is,the%20power%2C%20not%20the%20sellers

Burak, A. (n.d.). *7 Steps of Effective Software Product Development Life Cycle.* Retrieved from https://relevant.software/blog/7-steps-for-effective-software-product-development/

Cambridge Dictionary. (2022). Flexibility. *Cambridge Dictionary.* Retrieved from https://dictionary.cambridge.org/dictionary/english/flexibility

Cho, J. (2008). ISSUES AND CHALLENGES OF AGILE SOFTWARE DEVELOPMENT WITH SCRUM. *Issues In Information Systems, 9*(2), 188–195. https://doi.org/10.48009/2_iis_2008_188-195

Cho, J., Huff, R. A., & Olsen, D. (2011). MANAGEMENT GUIDELINES FOR SCRUM AGILE SOFTWARE DEVELOPMENT PROCESS. *Issues In Information Systems, 12*(1), 213–223. https://doi.org/10.48009/1_iis_2011_213-223

Clearbridge mobile. (2020). *The Top 5 Reasons Transparency is Important in App Development.* Retrieved from https://clearbridgemobile.com/the-top-5-reasons-transparency-is-important-in-app-development/#:~:text=Transparency%20in%20the%20app%20development,among%20the%20internal%20project%20team

Cohen, D., Lindvall, M., & Costa, P. (2003). Agile software development. *DACS SOAR Report, 11*, 2003.

Cousins, M. (2021). Process Mapping Techniques: 6 Methods to Create Process Maps. *Triaster*. https://blog.triaster.co.uk/blog/process-mapping-techniques-methods-to-create-process-maps

Damelio, R. (1996). *The basics of process mapping.* Productivity Press, New York.

Dam, R.F., & Siang, Y. T. (2020). Affinity diagrams learn how to cluster and bundle ideas and facts. *Interaction Design Foundation*. Retrieved from https://www.interaction-design.org/literature/article/affinity-diagrams-learn-how-to-cluster-and-bundle-ideas-and-facts

Entrepreneur Middle East Staff. (2018). *Infographic: Five Scientific Reasons People Are Wired To Respond To Visual Marketing.* Retrieved from https://www.entrepreneur.com/article/312551

Figma. (2022). *Figma | Design features*. Retrieved from https://www.figma.com/design/

Franken, M., & van Solingen, R. (2014). *Voor Dummies - Scrum voor Dummies (5th ed.)*. Voor Dummies.

Gabriel, D. (2013). *Inductive and deductive approaches to research*. Retrieved from https://deborahgabriel.com/2013/03/17/inductive-and-deductive-approaches-to-research/

IBM Research. (2014). *Software Development.* Retrieved from https://researcher.watson.ibm.com/researcher/view_group.php?id=5227

Icke, J. (2015). *10 ways to involve users in software development.* Retrieved from https://www.linkedin.com/pulse/10-ways-involve-users-software-development-joost-icke/

// REFERENCES

van Lier, W. (2021). Tegelijkertijd Product Owner en Scrum Master zijn, kan dat?. *Agile Scrum Group*. Retrieved from https://agilescrumgroup.nl/tegelijkertijd-product-owner-en-scrum-master/

Lucidchart. (2021). *What is Process Mapping?*. Retrieved from https://www.lucidchart.com/pages/process-mapping

Meidan, A., García-García, J. A., Ramos, I., & Escalona, M. J. (2018). Measuring software process: a systematic mapping study. *ACM Computing Surveys (CSUR), 51*(3), 1-32.

Mortensen, D. H. (2020). How to do a thematic analysis of user interviews. *Interaction Design Foundation*. Retrieved from https://www.interaction-design.org/literature/article/how-to-do-a-thematic-analysis-of-user-interviews

MSML. (2021). *MSML Over ons.* Retrieved from https://www.msml.nl/over-ons

Muslihat, D. (2018). 7 Popular Project Management Methodologies. *Zenkit*. Retrieved from https://zenkit.com/en/blog/7-popular-project-management-methodologies-and-what-theyre-best-suited-for/

Nuclino. (n.d.). *Agile Development Methodology and Documentation*. Retrieved from *https://www.nuclino.com/articles/agile-documentation*

Pollock, T. (n.d.). The Difference Between Structured, Unstructured and Semi-structured Interviews. *Oliver Parks*. Retrieved from https://www.oliverparks.com/blog-news/the-difference-between-structured-unstructured-amp-semi-structured-interviews

Przybyłek, A., Albecka, M., Springer, O., & Kowalski, W. (2021). Game-based Sprint retrospectives: multiple action research. *Empirical Software Engineering, 27*(1). https://doi.org/10.1007/s10664-021-10043-z

Reed, A. (May 13, 2021). *Visual Content vs Text Content – Epic Face-off with Obvious Winner*. Retrieved from https://www.motocms.com/blog/en/visual-content-vs-text-content/

Roden, T. & Williams, B. (2015). Fifty quick ideas to improve your retrospectives. *Leanpub.*

Schwaber, K. & Sutherland, J. (2017). *The Scrum Guide — The Defnitive Guide to Scrum: The Rules of the Game*. Retrieved from www.scrumguides.org

Slack. (2022). *Slack | features*. Retrieved from https://slack.com/features

Soegaard, M. (2020). Laws of Proximity, Uniform Connectedness and Continuation - Gestalt Principles (2). *Interaction Design Foundation*. Retrieved from https://www.interaction-design.org/literature/article/laws-of-proximity-uniform-connectedness-and-continuation-gestalt-principles-2

Stoica, M., Mircea, M., & Ghilic-micu, B. (2013). Software Development: Agile vs. Traditional. *Informatica Economica, 17*(4/2013), 64–76. https://doi.org/10.12948/issn14531305/17.4.2013.06

Team Scrum Academy. (2020). *Wat is het verschil tussen Scrum Master en Product Owner?*. Retrieved from https://scrumacademy.nl/blog/wat-is-het-verschil-tussen-scrum-master-en-product-owner/

Treacy, M., & Wiersema, F. D. (1995). The discipline of market leaders: Choose your customers, narrow your focus, dominate your market. *Reading, Mass: Addison-Wesley Pub. Co.*

van Vliet, H. (2008). *Software Engineering: Principles and Practice*. John Wiley & Sons. Retrieved from http://160592857366.free.fr/joe/ebooks/ShareData/Software%20Engineering%20-%20Principles%20and%20Practice%20By%20Hans%20van%20Vliet%20-%20Wiley%202007.pdf

// APPENDIX A: INTERVIEW EMPLOYEES

Introduction:
As you hopefully know, I am researching your design process and how it can be improved. In order to gain insights into how you work, in your process, I would like to ask some of you some questions. This will be an open conversation about your work and your experiences around MSML and the process it goes through. So the more detailed the questions, the better I can map out the process. May I record the conversation? So that I can listen to it again if I don't manage to write it down.

Questions:
Tasks:
1. Could you tell me what your global tasks are within MSML? What do you do in a day?

2. Did you do a project, which you could go through with me? So that I can see what and where your tasks are?
    a. What is your worst experience in the process? Why? What went wrong? How could you have done things differently? And what could you have done differently?
    b. What is your best experience of the process? Why?

Input/Output:
3. What is the input you get from the customer? A problem? Or does it change every time?

4. What do you deliver to Participant B? Or to Participant C? Where do your activities stop in the process?

Customer contact/customer experiences:
5. You obviously have a lot of contact with the customer. Where are your contact points with the customer? Is it often the same, or does it also vary?

6. You have of course worked in other companies? Also software companies? How was the process there? Did it differ much from the process at MSML?

Other remarks/questions?

// APPENDIX B: PROCESS MAP MSML

// APPENDIX C: INTERVIEW CUSTOMERS

Introduction:
Good morning/afternoon …, first of all super nice that you want to make time for this research for MSML. I saw that you filled in the 'Informed consent', that's great, then I'll start recording the conversation, if you don't mind?

I'll introduce myself briefly, I'm Suzan Antvelink, 23 years old, studying at the University of Twente, currently busy with the master in Industrial Design Engineering. At MSML, I am working on finishing this study, I have ¾ of a year to do so, which is why it should be quite a big research project. The research I am doing at MSML has the goal of improving the design process at MSML, because they are a small group and have formed the process themselves, hopefully there are points of improvement to be found. If not, they are doing very well! I hope to eventually tackle those points of improvement, in order to rebuild an application built by MSML with a renewed process. And of course, to be able to map out the process properly, I also need your side of the story. This way we can find out how MSML does things from your point of view, which is why your experiences and expectations of certain things are of great importance. I will ask some open questions, you can tell me anything you want about it, if you don't want to answer anything, that's fine too.

Questions:
1. First of all, who are you and what do you do as a customer/company?

2. How did you come in contact with MSML (sales)?
    a. How was the first contact? How did you experience this? Why?

3. What did you, as a customer/company, deliver to MSML during the first contact, so that they could get to work? (Sales/Problem/Solution)
    a. Was this an existing solution? Or a problem, which is why you and MSML perhaps came to a solution together?
    b. How did MSML handle this, what did they do well/less well?
    c. What were your expectations?

4. At which moments did you have further contact with MSML, where are the contact points between you and MSML during the rest of the process, so from the signing of the contract until the release of the product? (Concept phase)
    a. How was that contact, different from the first contact? The same? Better? Why?
    b. Different per contact? Difference in contact for example between the different departments within MSML or per person?
    c. What is the goal per contact? Or the expectation per contact point? What do you expect to achieve at the contact points (getting to know participants C & D)?
    d. Have the expectations from before the signature been met in the follow-up phases?

5. We want to focus on the first part of the process, so therefore the question is also how the design of the delivered product came about? (Concept phase)
    a. What has been delivered in terms of design by you as a company? What has been MSML's share in this design? Why was it divided in this way?
    b. How were the choices made? (Much contact or actually on good faith?)
    c. What did you find important in the design, in terms of colours, functions, style? How did you communicate this to MSML? And how were these requirements translated into the design by MSML?
    d. How did you experience this interaction? Why?

6. As you have experienced, MSML works with Jira to communicate with you as a customer. How is the communication via Jira experienced by you? (Communication in general via Jira)
    a. Does it differ per department (Concept, Development, Support)? Or per person with whom you have contact?
    b. When is it more pleasant and when is it not? What could be different? Why?

7. You probably work together with other companies as well? How do they work?
    a. Can you compare that with the way MSML works?
    b. How do they communicate with you? How is the communication different?

8. Would you recommend MSML to others?
    a. Why? What was so enjoyable?

Other comments/questions?

// APPENDIX D: EXPERIENCES CUSTOMERS

The process

First contact with MSML

In the beginning, the customers are trying to find software solutions for their proposed ideas or problems. It can be said that all consumer customers are searching for a company that is willing to build their proposed ideas, while business customers are searching for software solutions to facilitate their employees or their core activities. These facilitations could be in terms of helping employees doing their jobs or branding the company's products. Luckily, all four parties came in contact with MSML, one business customer found MSML through finding a similar case on their website. The consumer customers reached MSML through their network and the platform watkosteen.app, which eventually worked out quite well. All customers mentioned that the first conversations with MSML were perceived as being pleasant, one customer adds to this that the conversations felt immediately familiar because of the shared province they both are living in. Besides, according to all four customers MSML is from the start of the process straight and honest in what kind of solutions they are able to develop, this gave confidence.

+ Overall pleasant first contact
+ Immediately felt familiar with MSML
+ MSML is straight and honest in abilities

Orientation (Identify needs & wishes and flow)

Although before signing the quotation different conversations took place between both parties, the customer and the company, led to agreements on the budget, planning and the solution. According to the customers, these conversations were perceived as clear and sympathetic, one customer mentioned that MSML is actually really thinking along during these conversations. They all mentioned that they feel that MSML is willing to help you to find the specific solution, they ask questions, they think along and they are giving explanations on the process and the techniques they are going to use. One of the customers mentioned that they only had one or two conversations before making a decision on whether or not to collaborate with each other. This amount of conversations seemed to this participant not enough to know if there is a match between the customer and the company in terms of connection between the people and their way of working. Three out of four customers mentioned that they also have been in contact with other parties, however you can say that MSML won by emitting confidence and giving an overall pleasant feeling.

After signing the quotation, different conversations took place to discover needs and wishes and to identify the flow of the solution. As mentioned earlier, these conversations were perceived as pleasant, clear and sympathetic. While discovering the flow, MSML is giving a lot of feedback on flowcharts and created sketches, is thinking along and is trying to ask as many questions as possible to avoid uncertainties in further stages. MSML also tries to discuss all possibilities in terms of features which can be implemented in the solution. Unfortunately, one customer also mentioned that there were some features discussed and established in the first conversations and these eventually could not be implemented later on in the process, this of course is perceived as an unfortunate experience. Another customer mentioned that despite the fact that MSML is asking a lot of questions to identify the needs and wishes, they still have not discovered all the features possible. According to all customers this is not even possible however some of them still mentioned it, so it seems this customer would like to see it differently. Nevertheless, whenever the customers discover new features during the process and they want these

to be implemented, the company was clear and helpful in terms of the extra costs.

+ Clear and sympathetic communication
+ MSML is thinking along, willing to help you and asking a lot of questions
- Not enough conversations to see whether there is a match or not
- Sometimes unclarities showed up about all possible and implementable features

Design and prototype

The customers generally were well pleased about the design phase, in three of the four cases the design phase went really smoothly. They mentioned for example that MSML emits immediately a confidential feeling, since they understand the specific goals of the proposed solution and the brand you want to emit. Because of the fact that the customers had limited expectations, the created designs positively surprised the customers. However, whereas the explanations in the beginning stages were clear and understandable, this seemed not the case in one of the design processes. One customer mentioned that he or she was too little informed about what should be delivered as it comes to design. To be more specific there arose some questions about what should be delivered to the MSML in terms of flowcharts, sketches and corporate identity and questions about who is responsible for which part in the design phase. Due to making assumptions such as "This must be the thing I need to check right now." or "I think that I need to check the layout of the created designs, and not the look and feel it emits", the allocation of the responsibilities was confusing. This customer even mentioned that afterwards they had to ask even more questions to prevent this type of miscommunications. In short, the design phase was experienced quite well, probably because the customers had no specific expectations and therefore they trust the expertise of MSML. However, sometimes assumptions were made which led to unclear situations and thus miscommunications, which could be avoided by asking more questions according to the customer.

+ Overall, the design phase went smoothly
+ Great communication
+ MSML understands your goals and brand
- Less informed on what should be delivered in terms of design (miscommunication)
- Make sure you do not make assumptions, instead ask questions before digitally agreeing on tickets

Development and support

In this phase, the customers are able to follow the developments in the so-called SCRUM board in Jira. Experiences during the development phase are particularly based upon this system called Jira, however this is going to be discussed later on. Due to the fact that this research will focus on the stages earlier in this process, there is not much to discuss in this paragraph. The development phase is generally experienced in a good way, three out of four customers mentioned for example that the developers are very clear in communicating, they communicate straight to the point. According to the customers MSML is working efficiently, he or she mentions that sometimes when MSML needs immediate input, they try to make contact by a call or message. In that way, the customer knows that they are in a hurry and this customer likes this informal way of communication. In contradiction to this, another customer mentioned that he or she would be able to call more or send a message more often when a problem occurs. So it seems that there is a difference in communication with the customers or the communication possibilities are perceived in a different way by the customers themselves. In addition to that, in one case the customer mentioned that there was discussed that a lot of tickets could be tested that specific weekend, unfortunately it turned out to be not ready to test yet. This false promise or miscommunication is of course perceived as an unpleasant experience. Next, before each sprint the tasks, so-called user stories, are being written and eventually checked by the customer. By checking these user stories, interpretation differences could occur and therefore questions could arise. However, to lower the threshold to ask questions, one customer mentions that it would be even better to discuss these tickets at the office. A physical meeting to discuss the user stories gave them a more customer-oriented feeling and was experienced positively. To add to this, another customer mentioned that the release of the end product took place at the office and this was experienced as fine. As mentioned before, MSML is really fast and efficient in developing software. They work on projects in teams, and thus not everyone is having contact with the same customers, this means for example only two developers are working on one specific project at the same time. Whenever, one of the two developers is left for a vacation, the other needs to be able to keep doing his work and ask questions of the customers. This seems not always the case, and thus the other developer should be involved to solve the problem, even though he is on a vacation. To conclude, the development phase is generally experienced as an efficient process in which MSML is communicating clearly and straight to the point.

+ Efficient way of developing
+ Clear communication, MSML is straight to the point
+ Informal communication
- Differences in way of communicating to the customers or this is perceived differently
- Interpretation differences occur in checking user stories, therefore these want to be discussed in physical sessions instead of discussing these online

General

In general the customers were positive about the process and the end results. All expectations in terms of the end product were fulfilled, they mentioned things such as: "P1: We are very pleased, there is such a nice application created, it works technically fantastic in my opinion." and "P4: Of course, there is a very nice system built!". Next to that, according to the customers MSML has a high willingness to take on new projects or new features to implement. Besides, they have a lot of knowledge within their company, there is always enough internal knowledge to solve specific problems. The customers also mentioned that MSML is giving them the feeling that they know what they are talking about. MSML is able to be commercial while it also can make jokes during conversations, this environment is experienced as pleasant. To add to that, one customer mentioned that "P3: MSML is not extremely formal, but they still are professional.". Despite this, the two consumer customers mentioned negative experiences they faced during the process. In one case, according to this customer the main person of contact was not available without mentioning this to the customer. However, he or she mentioned that someone was taking over this role although some decisions could not be made without the main contact person involved. As a result of this occurrence, it felt like there first were unpleasant situations needed before things were getting better again. Besides, the expectations and promises made in the beginning of the process of the amount of money the project will cost, are not fulfilled at all. However, they also mentioned that MSML was clearly explaining why and when the costs were higher.

+ Positive about the process and end results
+ Expectations on the end result were in all cases positively realized
+ High willingness to take on new challenges
+ Enough internal knowledge to solve problems and they know what they are talking about
+ Informal and commercial at the same time
- Main contact person was not available without mentioning this
- Unpleasant situations were needed to get the project on track again

- Expectations on costs were not fulfilled, however good communicated towards the customers

Communication

In general

You can clearly understand that communication is a key indicator in the experiences of the customers within the process. Therefore, these experiences in communication within the process are already mentioned above, however there are also opinions on the communication generally not precisely related to the process and its phases. In the customers' opinion the communication is perceived as not that intrusive. Whenever you as a customer have no time to answer a call or want to start the project a bit later, MSML would not have a problem with that. As mentioned earlier the developers are clear and straightforward in their communication, while you can notice that the project managers are more focused on the customer and thus more comprehensive in their communication. Both types of communication are perceived as pleasant, because of the different purposes you communicate for. They also mentioned that it is pleasant to have contact with the same set of people throughout the whole project. Besides, as a customer you notice that MSML is willing to improve customer relationships, they treat the customer not as a number but as a real customer. Still, sometimes more personal attention and thus communication is needed especially when the customers are investing their own time and money. According to them there is a great difference between customers who are spending their own money and customers who are not. The whole process is being experienced differently, since as a consumer customer you are attaching great importance to the end project and thus on the personal process to reach the end product.

+ Developers communication clear and straightforward
+ Project managers communication comprehensive and customer focused
+ Contact with the same set of people
+ MSML is willing to improve customer relationships
- More personal attention and communication desired

Jira

In the process of MSML, the program Jira is mainly used to give an overview of the complete project. It is also used to communicate with the customers, write the tasks for designers and developers and to let the customer be able to check certain developments. You can say that the process of MSML is for the majority dependent on the program Jira, because everything is documented there. So, during the conversations with the customers the program Jira could not be avoided and several opinions about this program were formed. Generally, the program Jira is perceived as a pleasant system and it gives a clear overview of the status of each ticket. The customers mentioned that it works efficiently, that you can filter on what tickets you as a customer need to look into and that you can communicate by mentioning the relevant people. Besides, the communication through tickets is perceived as being clear, short and straightforward. Nevertheless, the communication within the tickets is not always that clear, sometimes interpretation differences can occur. Questions such as: "What do you agree or disagree on within this ticket?" and "What does this ticket exactly mean?" come up in some cases. Next to that, this communication through Jira is not always perceived as pleasant, whenever the customer wants to open a conversation and you have to communicate through tickets in Jira it feels less customer oriented. In addition to this, one of the customers mentioned that in his or her opinion MSML is tightly sticking to the process they go through and the systems they use. Herewith, the participant means that MSML does not deviate from the way in which according to them the process should be followed. Unfortunately, this is being experienced as less personal and customer focused, however this participant also mentioned that he or she can imagine that working in Jira is safe because of the fact that everything can be documented and stored. Another point that is being mentioned about Jira is that the program is hard to learn and understand when someone for example has to take over your work when you are on a vacation. Lastly, a benefit of using Jira is that the tasks could be cut into small doable tickets to test, which is perceived as pleasant to some customers. In short, Jira is experienced as a clear and safe system to work in, however in some cases communication through Jira feels less customer oriented.

+ Pleasant system, clear overview
+ Communication with developers is clear, short and straightforward in Jira
+ Tickets ensures small and doable things to test
- Descriptions of tickets can be interpreted differently
- Communication through the ticketing system feels less customer oriented
- MSML is not deviating from the process, which is of course safe but in some cases it feels less customer oriented.

// APPENDIX E: INTERVIEW SOFTWARE BRANCHE RELATED COMPANIES

Introduction:
Good morning/afternoon ..., first I would like to thank you for being available to participate in this research project for MSML. I saw that you filled in the 'informed consent', great, is it okay if I start recording this conversation?

I will first introduce myself shortly, my name is Suzan Antvelink, 23 years old, and I am studying Industrial Design Engineering at the University of Twente. I am doing this research in collaboration with MSML, a small software development company situated in Deventer. The goal of this research project is to optimize the design process they are currently using. MSML is developing software with a small group of people, and because this process is formed by themselves the way it is right now, there are hopefully points to improve. If not they are doing great! These improvement points will be translated into a newly created process and one of their developed applications will be re-designed according to this new process. However, to compare and optimize this current process of MSML, I will need insights in other processes used by other companies, therefore I am asking your company to participate in this study. Through this way I hope to find where possible points of improvement are situated and what they can change according to optimize the process. I will ask a set of open questions, you are free to answer them as broad as possible, if you are not willing to answer a specific question, that is okay!

Questions:

1. First, who are you?
    a. What is your mission and vision?
    b. What are you doing as a company in short?
    c. How many employees are working at your company?
    d. For what type of clients are you developing software? Are they mostly bigger parties, such as companies or the government or are you also developing software for smaller consumer clients?

2. How do you work as a company?
    a. Can you tell me about the different phases within your proces (maybe with the help of an already released project)?
        i. Start at the beginning, how does a project reach your company? How is this being handled?
        ii. What will be delivered to the next department/phase? What is the following department doing with it in order to deliver it finished to the next department/phase in line? (and so on)
        iii. What will be released?
    b. How much time is being used to finish such a process? Is this different for each project?
    c. What are the different roles within this process? Does every department/phase have its own roles? Do more people fulfill the same specific role, which ones?
        i. What does your UX/UI designer exactly do?
        ii. How are they making choices in terms of design, style and user experience?

    d. Which phase in your process is most important and why?
    e. Can you define the process followed by a specific name? (Agile development, scrum methodology?)

3. How are you communicating with your clients?
    a. Do you use specific programmes to communicate with your clients? Mail contact, telephone conversations, whatsapp?
    b. What are the proportions in terms of platform use to communicate with clients (mail contact, telephone conversations, whatsapp)? Does this differ per specific project/client? Why?
    c. How much and when do you communicate with the client? What is being expected at each contact point?

4. How do you experience your currently followed (design)process?
    a. What do you think is going well? And why?
    b. Are there things that are not going that well? Why?
        i. Can this be improved? How?
        ii. Do you already have some ideas to further improve your (design) process?

5. Are you using this (design) process for a long time? Has this process been changed over the years?
    a. If yes, can you think of the way you were working before?
        i. In what way this process was different from the current process? What points have improved?
        ii. Why is this process in this way optimised?

Other questions/remarks?

// APPENDIX F: PROCESS COMPARISON

Process phase	Company E	Company F	Company G
Selection procedure	No strict selection procedure.	No strict selection procedure.	Prospect reviewed on whether there is a personal and commercial match.
First contact customer	A strategist investigates mission and vision of the prospect.	The company determines who is responsible for the project.	The company investigates mission, vision and current process of the prospect.
Orientation	Simple questions are asked to identify needs and wishes and to find the best fitting solution. Design research is done when needed in the way of sending questionnaires and creating personas/customer journey's. When possible the end-user is involved.	The solution of the customer will be ignored in the first place. Simple but critical questions are asked to identify needs and wishes.	Simple questions are asked to identify needs and wishes and to find the best fitting solution. Design research is done when needed in the way of sending questionnaires and creating personas/customer journey's. When possible the end-user is involved.
Design & prototype	UX-designers start wireframing & sketching. UI-designers eventually design a clickable prototype. These phases will be split whenever there is enough budget. There is always another designers checking the created designs.	Hired designers start creating the designs based on the strict requirements given. The company is always in between the designers and the customer, to make sure that the requirements are met.	In the design phase, the solution will be further worked and thought out in a more technical way. The designers will create a clickable prototype in different iteration rounds.
Transfermeeting & recurring refinements/reviews	The designers explains his work in a transfermeeting with the complete project group. A Pre-refinement meeting takes place before the real Refinement meeting to make sure everything is ready (data, designs). In a Refinement meeting they discuss the responsibilities and sprint planning. At the end of a sprint a Review is held and after a couple of sprints there is a Retrospective meeting to review the workflow.	Refinements and Review sessions take place to open and close the different phases during the project. The whole organisation is present in these meetings, while the customer is not.	A Kick-off session is done with all the team members, the sales person, the UX-designer, the Project manager, the front-end and back-end developer and sometimes the tester is also included. To create a warm relationship between its initial project team and the customer. Refinements and Review sessions take place to open and close the different phases during the project.
Development & testing	The developers take the responsibility for the elaboration of the software solution in sprints (SCRUM method) and can rely on the designers in the way of asking questions when things are unclear or incomplete. The developed features will be checked by the assigned testers, these are responsible for checking the functionality of the developed application.	The developers work in simultaneous sprints (SCRUM method). Sometimes the Product Owner will test small adjustments before the testing period starts. The customer is testing the developments on functionality in a test-period of 2/3 weeks, dependend on the customer's wishes.	The process that is being followed is a mix of the SCRUM method and the Kanban method. The developers mostly work in sprints which depends on the customer's resources and wishes. The company tries to keep the customer up to date during the process. When the product is checked by the testers and ready to be released the customer (and end user) will test the product.

// APPENDIX G: QUESTIONNAIRE CUSTOMERS

Introduction:
I am currently studying the effectivity of the project approach at MSML and how this can be optimised. The main goal of this study is to support you as a customer during the process, thus the execution of sprints and during the support phase. Therefore, I want to ask you some questions about your experieces during the execution of the projects, support and in particular the use of Jira. This small questionnaire will approximately take 5 minutes and your submission will add a lot to the study. The answers will be obtained and processed anonymously. Whenever questions arise, you are able to ask them by sending an email to the email address below.

Thank your for your participation!

Kind regards,
Suzan Antvelink (suzanantvelink@msml.nl)

Questions:

1. How intensively do you cooperate with MSML?
    - O Weekly
    - O Monthly
    - O Once in the three months
    - O Once in half a year
    - O Yearly

2. The project approach is one of the most important parts to make a project a success. Was this project approach of importance in making the decision of starting the collaboration with MSML?
    a. If yes, where did you find this information?

3. Do you need to receive information about the project approach of MSML?

Totally not				Absolutely yes
1	2	3	4	5

4. I would prefer to be able to read through MSML's project approach myself.

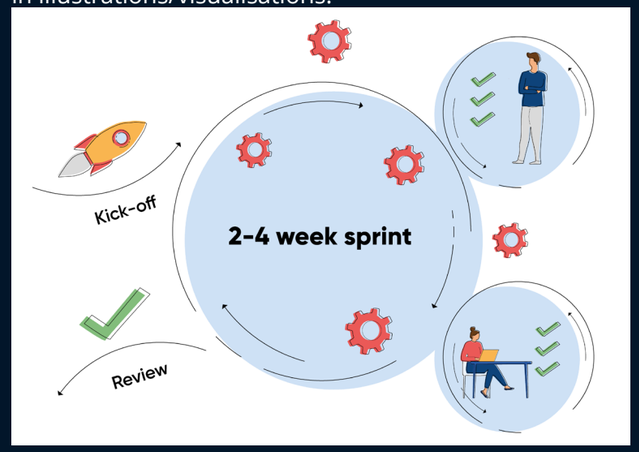
> **//STAP 4:** We beginnen natuurlijk bij het begin, het ontwerp. Alle functies die te maken hebben met het ontwerp zijn ingedeeld in wat wij noemen, de design sprint. Deze sprint duurt wat langer dan een normale sprint, namelijk 4 weken. Verder is een design sprint gelijk aan de rest van de ontwikkelsprints van 2 weken, dus de werkwijze blijft hetzelfde! Na de Kick-off van een sprint gaan de ontwerper en/of ontwikkelaars aan de slag om de geplande taken uit te voeren. Hebben ze een ticket afgerond? Dan wordt de projectmanager heel even weer toegewezen aan het ticket en hij of zij checkt dan of het gebouwde onderdeel voldoet. Wanneer dit het geval is, mag ook jij als klant het ticket in de testomgeving controleren en accepteren of afwijzen. Wanneer alle tickets gecontroleerd en geaccepteerd zijn hebben we een sprint afgerond!

Totally not				Absolutely yes
1	2	3	4	5

5. I would prefer to listen to an explanation of MSML's project approach (listen via link). https://drive.google.com/file/d/1e3AiGN7BTHsgQ6DFMQAK6TowGUL7TDYe/view?usp=sharing

Totally not				Absolutely yes
1	2	3	4	5

6. I would prefer to be able to view an instruction about the project approach of MSML in illustrations/visualisations.



Totally not				Absolutely yes
1	2	3	4	5

7. Imagine, you preferable want to read through the project approach instruction yourself, how do you want to receive this information? *Click at 1, the option which you think is most preferable, at 2 the second most preferable and at 3 the third preferable option and at 4 the option wherein you preferable don't want to receive this information in.*

	A manual (3 to 4 pages) (offline)	A flyer (offline)	An article (online)	A webpage (online)
1				
2				
3				
4				

8. Imagine, you preferable want to listen to the project approach instruction, how do you want to receive this information? *Click at 1, the option which you think is most preferable, at 2 the second most preferable and at 3 the third preferable option and at 6 the option wherein you preferable don't want to receive this information in.*

	A personal oral explanation once	A personal oral explanation each time a sprint starts	I preferable want to call when I need explanation	A short explanatory instruction video (2 to 3 minutes)	Several short explanatory instruction video's (workflow in chapters)	A long explanatory instruction video (5 minutes)
1						
2						
3						
4						
5						
6						

9. Imagine, you preferable want to view the explanation of the project approach in illustrations/visualisations, how do you want to receive this information? *Click at 1, the option which you think is most preferable, at 2 the second most preferable and at 3 the third preferable option and at 5 the option wherein you preferable don't want to receive this information in.*

	A poster/pdf with mainly explanatory illustrations	A short illustrative instruction video (2 to 3 minutes)	Several short illustrative instruction video's (workflow in chapters)	A long illustrative instruction video (5 minutes)	An illustrative webpage
1					
2					
3					
4					
5					

10. It may be that your best option is not among them or that several things or combinations of things appeal to you. Tell us briefly how you would like to receive information about MSML's project approach? And why?

11. Did you have experience with the project management system Jira before working with MSML?
    - O No, I never used Jira before
    - O Yes, I am using Jira incidentially
    - O Yes, I use Jira also for other partners at least once a month
    - O Other, namely...

12. Dive into the project management system Jira, what did you find difficult in this system during the implementation of the first sprints?

3. Do you need to receive information about the use of the project management tool Jira?

Totally not				Absolutely yes
1	2	3	4	5

14. What information about the use of Jira do you need most?
    - [ ] About the whole Jira process (specific Jira manual)
    - [ ] All the precise moments where Jira should be used within the MSML workflow
    - [ ] The preparation of sprints (via the backlog) and how acceptance critera of stories works
    - [ ] The execution of the sprint via the sprint board
    - [ ] The test work during the sprint
    - [ ] The communication between you and MSML in Jira
    - [ ] Registering support tickers (service requests / bug)
    - [ ] Determining how priorities on support works
    - [ ] Everything is clear, I don't need extra explanation
    - [ ] Other, namely ...

15. I would prefer to read through an explanation on Jira myself

> //**STAP 4:** Wanneer een ticket is verplaatst naar "Customer accept" op het **SCRUM board**, ben je als het goed is ook toegewezen aan het desbetreffende ticket. Wanneer ook jij tevreden bent met het ticket wat gebouwd is, mag jij hem accepteren. Accepteren kun je doen door op de pagina van het desbetreffende ticket op de grote blauwe knop te klikken en deze te zetten naar "Done", of door het ticket te verplaatsen met de muis naar de kolom "Done". Afwijzen doe je door op de ticketpagina op "Rejected by customer" te klikken, hier moet je de reden voor de afwijzing ingeven. Doe dit zo compleet mogelijk en zorg ervoor dat je de afwijzing ook aan iemand richt, zo kan de projectmanager of ontwikkelaar gelijk weer met de feedback aan de slag!

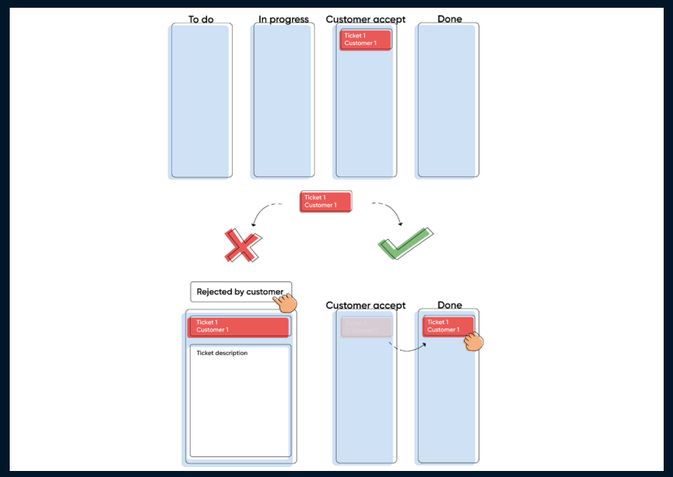
Totally not				Absolutely yes
1	2	3	4	5

16. I would prefer to listen to an explanation on Jira (listen via link) https://drive.google.com/file/d/1mLvWVtFt-sqAr4WTFiCgk3yo3nSHqZB1/view?usp=sharing

Totally not				Absolutely yes
1	2	3	4	5

17. I would prefer to be able to view an instruction on Jira in illustrations/visualisations

Helemaal niet				Helemaal wel
1	2	3	4	5



18. Imagine, you preferable want to read through an instruction on Jira yourself, how do you want to receive this information? *Click at 1, the option which you think is most preferable, at 2 the second most preferable and at 3 the third preferable option and at 6 the option wherein you preferable don't want to receive this information.*

	An extended manual (3 to 4 pages) (offline)	A flyer (offline)	An article (online)	A webpage (online)	A (written) guidance in Jira itself	A guide to the most important Do's & Don'ts in Jira
1						
2						
3						
4						
5						
6						

19. Imagine, you preferable want to listen to an instruction on Jira, how do you want to receive this information? *Click at 1, the option which you think is most preferable, at 2 the second most preferable and at 3 the third preferable option and at 6 the option wherein you preferable don't want to receive this information in.*

	A personal oral explanation once	A personal oral explanation each time a sprint starts	I preferable want to call when I need explanation	A short explanatory instruction video (2 to 3 minutes)	Several short explanatory instruction video's (workflow in chapters)	A long explanatory instruction video (5 minutes)
1						
2						
3						
4						
5						
6						

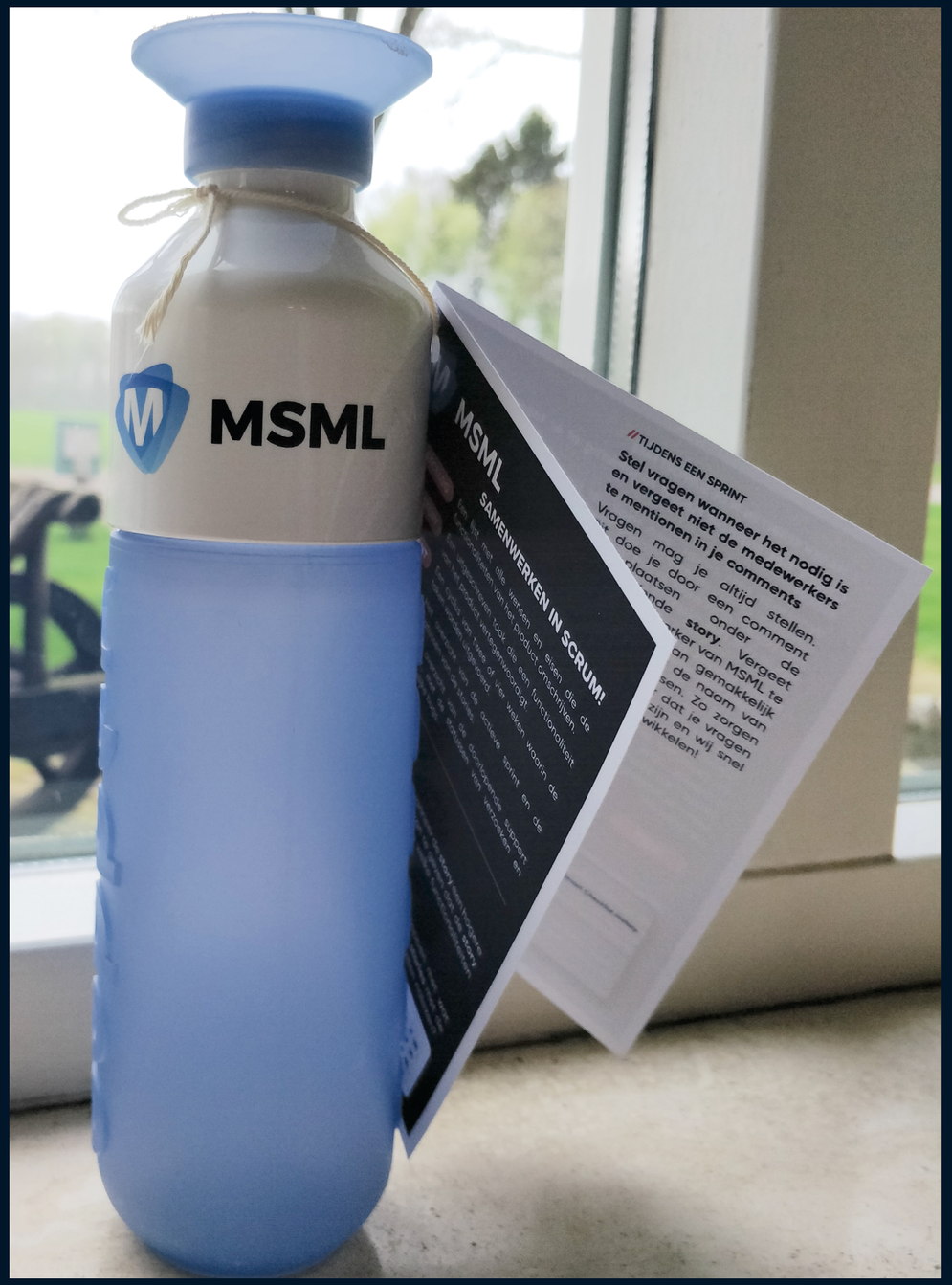
20. Imagine, you preferable want to view the explanation on Jira in illustrations/visualisations, how do you want to receive this information? *Click at 1, the option which you think is most preferable, at 2 the second most preferable and at 3 the third preferable option and at 6 the option wherein you preferable don't want to receive this information in.*

	A poster/pdf with mainly realistic example illustrations	A poster/pdf with mainly schematic/ unrealistic illustrations	A short illustrative instruction video (2 to 3 minutes)	Several short illustrative instruction video's (workflow in chapters)	A long illustrative instruction video (5 minutes)	An illustrative webpage
1						
2						
3						
4						
5						
6						

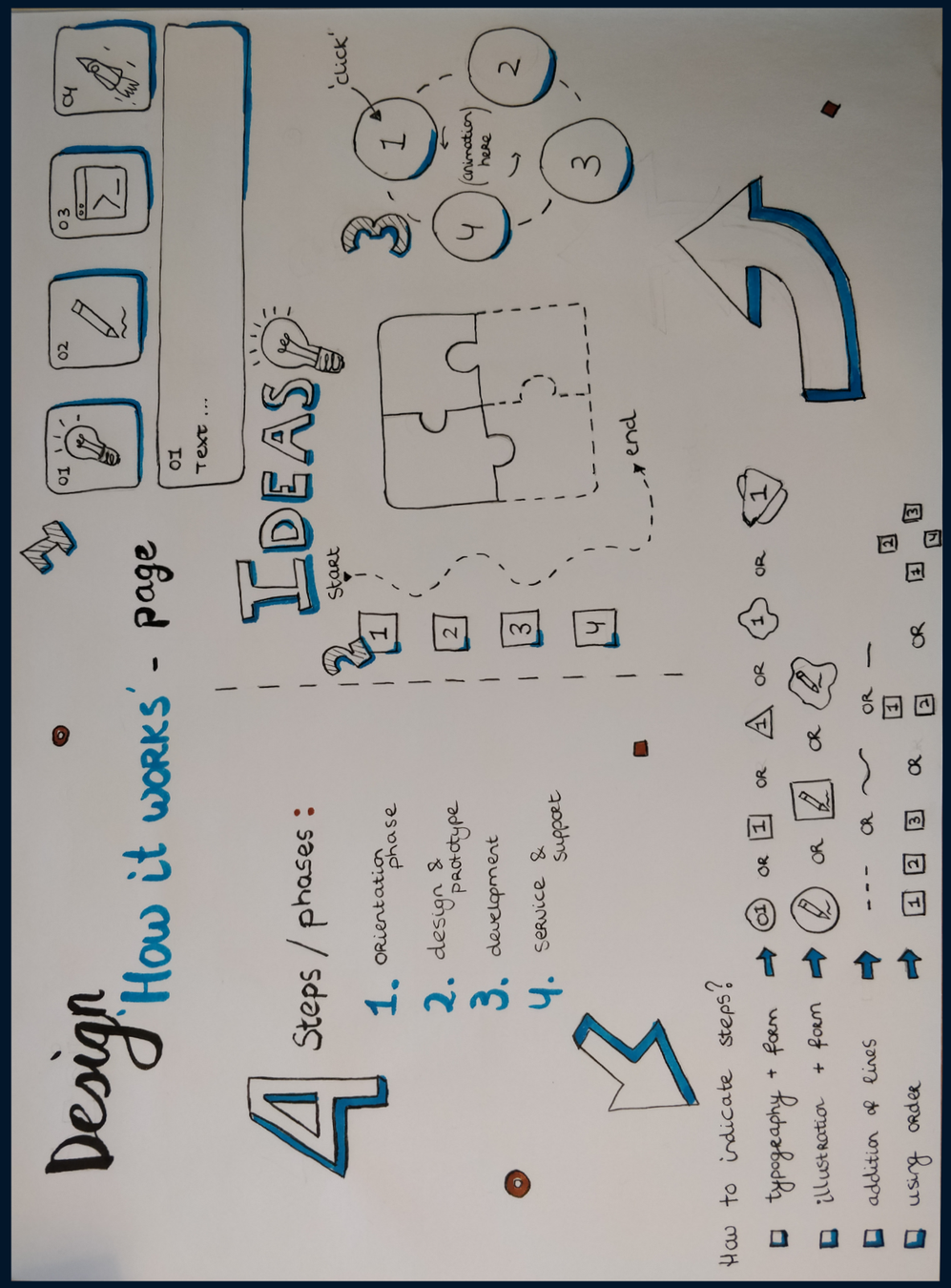
21. It may be that your best option is not among them or that several things or combinations of things appeal to you. Tell us briefly how you would like to receive information about Jira? And why?

// APPENDIX H: FINAL DESIGN JIRA SOLUTION

Click this link to go to the extended version of this solution, this is an online version and could preferably be on the website of the company.



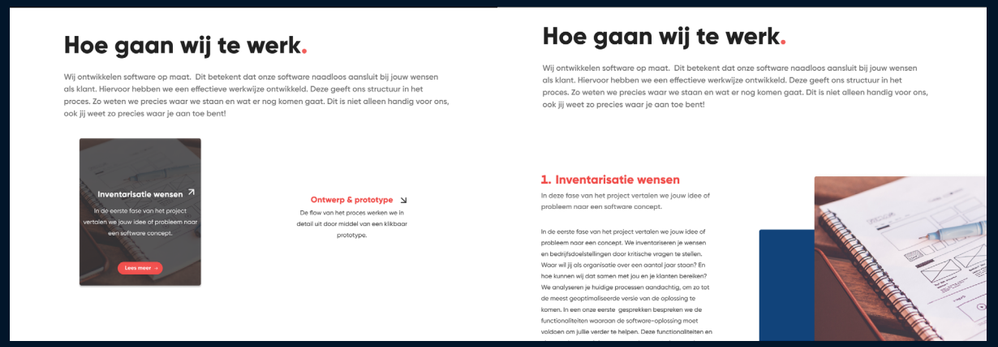
// APPENDIX I: BRAINSTORM WEBPAGE DESIGN



// APPENDIX J: CONCEPTUAL SOLUTIONS ‘HOW WE WORK’-PAGE

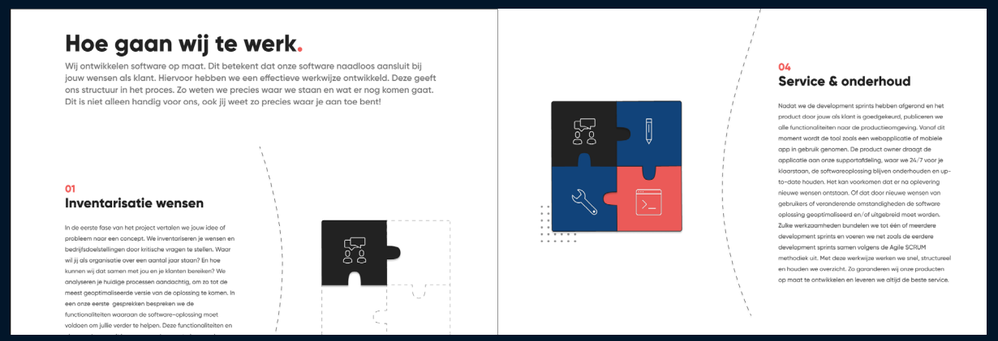
1. Photo collage

Clickable prototype



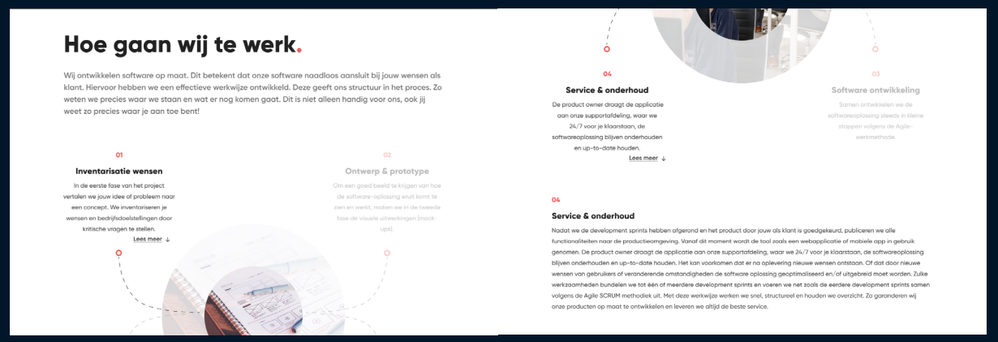
2. Puzzle pieces

Clickable prototype



3. Circular process

Clickable prototype



4. Moving icons

Clickable prototype

// APPENDIX K: PEER REVIEW SESSION WEB-PAGE DESIGN SOLUTION

Who?
- 2 Participants:
  - Designer
  - Project manager

How?
A peer review session to see which of the designs fits best with MSML and the message we want to convey.

Resources needed:
- Figma (4 designs with the controlled text) + mobile display ideas
- Introduction to each of the designs (+ additional info)
- Evaluation tables (the first one includes questions about the text, the other tables all the same)
- Pen & paper

Set-up session:

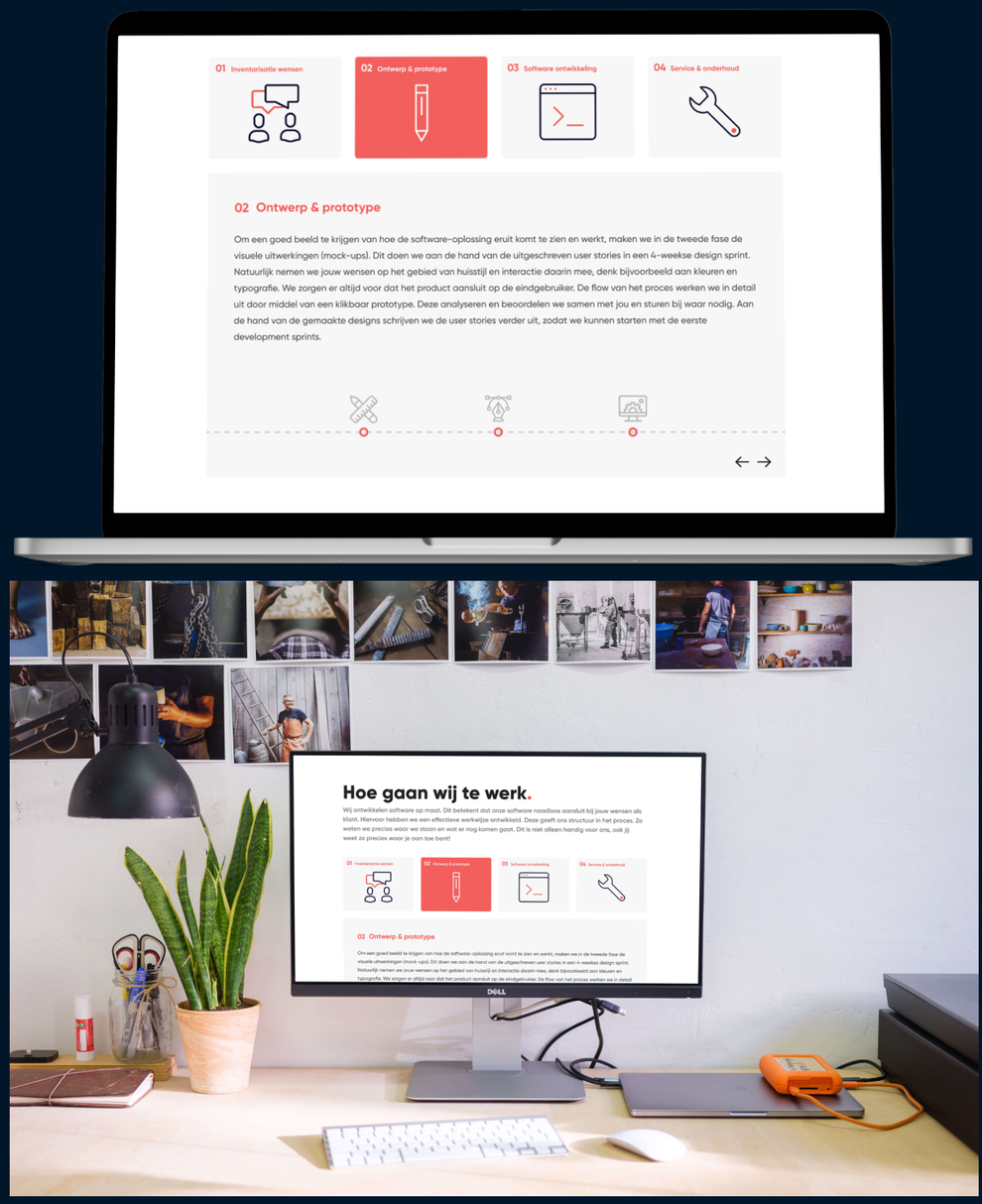
Time:	What?	Actions	Resources:
10:00-10:10	Give an introduction, explain what has been made and what can be looked at and read first. The participants look at/read *Design 1*.	- Observing - How is their first reaction?	- Introduction - Pencil - Laptop with link to *Design 1*
10:10-10:15	Fill in questionnaire Design 1.	- Observing	- Questionnaire *Design 1* - Pencil
10:15-10:25	Introduction to *Design 2*. Participants look at/read *Design 2*. Fill in questionnaire *Design 2*.	- Observing	- Laptop with link to *Design 2* - Questionnaire *Design 2* - Pencil
10:25-10:35	Introduction to *Design 3*. Participants look at/read *Design 3*. Fill in questionnaire *Design 3*.	- Observing	- Laptop with link to *Design 3* - Questionnaire *Design 3* - Pencil
10:35-10:45	Introduction to *Design 4*. Participants look at/read *Design 4*. Fill in questionnaire *Design 4*.	- Observing	- Laptop with link to *Design 4* - Questionnaire *Design 4* - Pencil
10:45-11:00	Going through the completed questionnaires, asking for general feedback and suggestions.	- Discussing	- Completed questionnaires - Pen en paper

Evaluation questionnaire/table:

General					
My first thought of *Design 1* is:	Very negative 1	2	3	4	Very positive 5
I can imagine that customers will now become familiar with the process more quickly.	Totally disagree 1	2	3	4	Totally agree 5
I find the web page with *Design 1* very much in line with MSML.	Totally disagree 1	2	3	4	Totally agree 5
Layout/overview					
I think that this design (*Design 1*) gives an clear overview.	Totally disagree 1	2	3	4	Totally agree 5
I think that this design (*Design 1*) is clear.	Totally disagree 1	2	3	4	Totally agree 5
I can quickly find what I am looking for.	Totally disagree 1	2	3	4	Totally agree 5
Readability/text					
The text is easy to read.	Totally disagree 1	2	3	4	Totally agree 5
The text clearly explains the process of MSML.	Totally disagree 1	2	3	4	Totally agree 5
Illustrations/animations					
I find the illustrations/visualisations clear and understandable.	Totally disagree 1	2	3	4	Totally agree 5
The illustrations/visualisations fit the text.	Totally disagree 1	2	3	4	Totally agree 5
The animations used complement the design.	Totally disagree 1	2	3	4	Totally agree 5
Remarks and/or suggestions?					

// APPENDIX L: FINAL ‘HOW WE WORK’-PAGE SOLUTION

Click this link to go to the final clickable version of the ‘How we work’-page of MSML. Keep in mind that the other parts of this website are not changed, the focus is on the ‘How we work’ part of this page with the different process stages. The layout of this page is dependent on where this page is placed in the end, therefore, the other parts of this page will be further developed when the this is thought out and discussed with the company.



// APPENDIX M: EVALUATION SESSION JIRA MANUAL SOLUTION

Who?
- 3 participants: 1 participant (23), 1 participant (25), 1 participant (25).

When?
- Saturday 2nd of April 9:15
- Monday 4th of April 10:15
- Monday 4th of April 9:15

How?
Evaluation session of approximately half/45 min 3 participants who have not worked in JIRA or who have worked in JIRA little or not at all.

Resources needed:
- Printed A6 JIRA solution
- Printed A3 JIRA solution (online is also fine)
- Evaluation table
- Pen & paper

Set-up session:

Time:	What?	Actions:	Resources:
9:15-9:25	Give introduction, explain what has been made and what may be looked at and read through first. Sign the participation form. The participant reads the small (A6) version of the JIRA solution.	- Observing - Checking if the participant tries the QR code.	- Introduction - Informative consent - Pencil - Printed A6 solution
9:25-9:35	Hopefully by themselves (otherwise with hint): Participant reads the larg-er/expanded version of the JIRA solution (online).	- Observing	- A3 online solution
9:35-9:45	Fill in table/questionnaire.	- Observing (some questions more difficult than oth-ers?)	- Evaluation table - Pencil
9:45-10:00	Discussion about complet-ed answers and choices (why ask questions)	- Discussing	- Evaluation table - Pencil - Results - Paper for notes

Introduction:
Good morning participant A/B/C,

As you may have heard, I've been very busy over the last few weeks creating a kind of reference book for the project management programme: Jira.

At MSML we use Jira to manage our projects and to bring structure, it's a kind of project management tool. Of course, the customer is also involved in this, that's why I want to support the customer with using this tool. It is very understandable that some customers do not (yet) know the programme and do not know how to use it. That's why, at the start of a cooperation, this reference book will be handed out (to a dopper of MSML). This way, customers will hopefully be able to identify with Jira and how we use it. But to see if these solutions work for someone who knows (almost) nothing about how we work with Jira, I'd like to go through them with you. I'll give you the solution I made, would you read it carefully and critically? After that I have a list with some questions, which we will discuss together to come to evaluation points.

Evaluation questionnaire/table:

General					
My first thought of the design solution is:	Very negative 1	2	3	4	Very positive 5
I feel that I understand (the use of) Jira better now.	Totally not 1	2	3	4	Absolutely yes 5
I can imagine that customers will now become more familiar with the process (using Jira).	Totally disagree 1	2	3	4	Totally agree 5
I would certainly pick up this design solution when I am at a loss for words.	Totally disagree 1	2	3	4	Totally agree 5
I need the extended (online) version because I still don't understand or things are unclear.	Totally disagree 1	2	3	4	Totally agree 5
Why? Or why not?					
Layout/overview					
I think that this design solution gives a clear overview.	Totally disagree 1	2	3	4	Totally agree 5
I think that this design solution is clear.	Totally disagree 1	2	3	4	Totally agree 5
I can quickly find what I am looking for.	Totally disagree 1	2	3	4	Totally agree 5
Readability/text					
I think that this design solution is very readible.	Totally disagree 1	2	3	4	Totally agree 5
The text is easy to read.	Totally disagree 1	2	3	4	Totally agree 5
Illustrations					
I think that the illustratrions/visualisations are clear and understand.	Totally disagree 1	2	3	4	Totally agree 5
The illustrations/visualisations are an addition to the text.	Totally disagree 1	2	3	4	Totally agree 5
Comments and/or suggestions:					