Evaluation of the Hoodin-platform for smarter research and insights, focusing on the user experience

Alice-Mariam Ansari and Clara Mauritzson

DEPARTMENT OF DESIGN SCIENCES
FACULTY OF ENGINEERING LTH | LUND UNIVERSITY
2022

MASTER THESIS

hoodin

Evaluation of the Hoodin-platform for smarter research and insights, focusing on the user experience

Alice-Mariam Ansari and Clara Mauritzson

LUND
UNIVERSITY

Evaluation of the Hoodin-platform for smarter research and insights, focusing on the user experience

Published by
Department of Design Sciences
Faculty of Engineering LTH, Lund University
P.O. Box 118, SE-221 00 Lund, Sweden

Subject: Interaction Design (MAMM01)
Division: Interaction Design
Supervisor: Susanne Frennert
Co-supervisor: Marcus Emne
Examiner: Joakim Eriksson

Abstract

The digital transformation has increased rapidly over the years, and it has worked in favour for companies and organizations in general. The speed of transformational growth has maintained, resulting in software systems being updated continuously. As a natural effect, practicing companies must always be in the forefront to remain competitive. Studies have shown that the productivity within companies is boosted by introducing automation of monitoring digital data. By doing so, it results in stimulation of development and implementation of intelligent technologies.

Hoodin, an information monitoring company, has launched a new service aimed towards the IT-industry for fetching digital content. Their service provides data monitoring for smarter research, which implies reducing and sorting out irrelevant information. The purpose of this study was to examine the new launch based on its user experience and its user interface. The needs of potential customers were identified and studied to see if there was room for improvement of the new Hoodin-service. The users' needs were obtained through interviews and questionnaires which became the common thread throughout the project. Furthermore, usability tests were performed to analyse the interaction with the product. By taking the users' needs and their feedback from the usability tests, a high fidelity-prototype was built. Lastly, the prototype was user tested once more to confirm whether advancement was made or not. It showed enhancement among the test users. Furthermore, it is a prototype and to achieve the ideal user experience all of the functions needs to be fully implemented.

Keywords: Interaction design, User experience, Double diamond design, Usability testing, Search bar

Sammanfattning

Den digitala omställningen har ökat genom åren och har fungerat till en fördel för företag och organisationer generellt. Hastigheten på transformationstillväxten har bibehållits i nutid, vilket har resulterat i att mjukvarusystem utvecklas kontinuerligt. Som en naturlig effekt av detta fenomen, bör aktuella företag alltid ligga i framkant för att förbli konkurrenskraftiga. Studier har visat att produktiviteten inom företag har höjts genom att man infört automatisering av övervakning av digitala data. Att införa automatisering på arbetsplatser resulterar i stimulering av utveckling och implementering av intelligenta teknologier.

Hoodin, ett informationsövervakningsföretag, har lanserat en ny tjänst riktad till IT-branschen för att hämta digitalt innehåll. Deras tjänst tillhandahåller dataövervakning för smartare forskning, vilket innebär att minska och sortera bort irrelevant information. Syftet med denna studie var att undersöka den nya lanseringen utifrån en användarupplevelse och dess användargränssnitt. Potentiella kunders behov identifierades och studerades för att se om det fanns utrymme för förbättringar av Hoodins nya tjänst. Användarnas behov identifierades genom intervjuer och enkäter som blev den röda tråden genom hela projektet. Vidare utfördes användarbarhetstester för att analysera interaktionen med produkten. Genom att ta användarnas behov och deras feedback från användbarhetstesterna byggdes en high fidelity-prototyp. Slutligen testades prototypen en gång till för att bekräfta framsteg gjordes eller inte. Den visade förbättring bland testanvändare, men eftersom det är en prototyp måste alla funktioner implementeras fullt ut för att uppnå den perfekta användarupplevelsen.

Nyckelord: Interaktionsdesign, Användarupplevelse, Double diamond design, Användbarhetstestning, Sökfält

Acknowledgments

The master thesis was implemented at the Department of Design Sciences in partnership with Hoodin. We would first like to thank our family Maggie, Monika, Nahid, Jan, Mehrdad and friends for always believing and supporting us.

We would also like to thank Susanne Frennert at the Department of Sciences for providing guidance and support and the employees at Hoodin for allowing us to do our master's thesis at the company. Lastly, we would like to thank everyone that took their time to participate throughout this project.

Lund, March 2022
Alice-Mariam Ansari and Clara Mauritzson

Table of contents

1 Introduction 10
1.1 Background 10
1.2 Hoodin AB 11
1.3 Purpose and goals 12
1.4 Limitations and scope 12
2 Theoretical background 13
2.1 Information retrieval 13
2.1.1 Search Engines 14
2.1.2 Enterprise search 14
2.2 Interaction design 15
2.2.1 User experience 17
2.2.2 Usability 17
2.2.3 Cognition and perception 19
2.3 Double diamond design 20
3 Methodology 23
3.1 Project framework 23
3.1.1 The thesis format 23
4 Discover phase 24
4.1 User research methods 24
4.1.1 Semi-structured expert interview 25
4.1.2 Questionnaires 26
4.1.3 Affinity diagrams 26
4.1.4 Bar graphs 26
4.2 User research results 27
4.2.1 Bar graphs 27
4.2.2 Qualitative data 30
4.2.3 Conclusion from user research 31
5 Define phase 34
5.1 User-story 34
5.1.1 User-story result 35
5.2 Problem and goal definition 37
6 Develop phase 38
6.1 The first iteration, Hoodin-platform 38

6.2 Test plan 39
6.2.1 Purpose and goals 39
6.2.2 Data to collect 40
6.2.3 Test tasks 40
6.2.4 Selection of test users 42
6.2.5 Role distributions 43
6.2.6 Test environment 43
6.2.7 Reported results 43
6.3 Setup of testing 43
6.3.1 Orientation script 43
6.3.2 Background questionnaire 44
6.3.3 Observations 44
6.3.4 Post questionnaires 44
6.3.5 Pilot testing 44
6.4 Test result and analysis 45
6.4.1 Background questionnaire 45
6.4.2 Observation 46
6.4.3 System Usability Scale-questionnaire 48
6.5 Conclusion from usability testing of the Hoodin-platform 49
7 Deliver phase 52
7.1 List of features 52
7.2 The prototype 53
7.2.1 Compress the platform 54
7.2.2 Add a new Edit-button 57
7.2.3 Add a new Create report-button 58
7.2.4 Improvements of the Create report interface 60
7.2.5 Feedback of selected report receivers 62
7.2.6 Improvements of the Add matching words interface 63
7.2.7 The second iteration, Prototype 66
7.3 Test plan 66
7.3.1 Purpose and goals 66
7.3.2 Data to collect 67
7.3.3 Test tasks 67
7.3.4 Selection of test users 69
7.3.5 Role distributions 69
7.3.6 Test environment 69
7.3.7 Reported results 70
7.4 Steps of testing 70
7.5 Test result and analysis 70
7.5.1 Background questionnaire 70

7.5.2 Observation 71
7.5.3 System Usability Scale-Questionnaire 74
7.5.4 Conclusion from Usability testing of the Prototype 74
7.6 Method investigation 76
8 Discussion 79
8.1 Conditions of the thesis 79
8.2 Framework 80
8.2.1 Discover 80
8.2.2 Define 81
8.2.3 Develop 81
8.2.4 Deliver 83
8.3 The prototype 84
8.4 Future development 84
8.5 Importance of User Experience 86
9 Conclusion 87
References 89
Appendix A Discover 95
A.1 Questionnaire 96
96
A.2 Affinity diagram 100
100
Appendix B Develop/Deliver 103
B.1 Orientation script 103
B.2 Background questionnaire 104
104
B.3 Post questionnaire 105

1 Introduction

This chapter will give a short introduction of the background. The purpose and goals of the master thesis will be presented below, its limitations and scope. A brief description of Hoodin and related work for this paper is given.

1.1 Background

The digital transformation has increased rapidly over the years, and it has worked in favour for companies and organizations in general. Maintaining the rapid pace of digitalization and being up to date with changes within IT can be considered challenging [1]. Productivity boost and enhancement of quality in manufactured products is achieved by introducing automation of monitoring digital data [2]. Moreover, it creates a demand for innovation which leads to stimulation of development and the implementation of intelligent technologies [3].

To be up to date with new information in general, it requires an individual to master and use new methods to collect data [4]. It is no longer enough to rely solely on textbooks and newspapers since it requires an amount of effort and resources [5]. The internet has made it easier to access and spread information [6]. Furthermore, it has contributed to unwanted content [7], such as irrelevant data, when too much information is retrieved [8].

The use of automated and filtered content monitoring would collect the information online and automatically update the individual based on specific and chosen keywords. With this method, the individual would always be up to date without the need for manual research which reduces the time required to gather information [9]. In conclusion, this results in a possibility of efficient time management.

If companies would start using the concept of automated content monitoring, qualities such as accessibility and usability are of importance. The terminology of accessibility [10] means that when creating a product, website, app, or service, it should be usable by as many people as possible. The definition of usability [11] is a quality attribute that assesses how easy interfaces are to interact with. It also provides methods for improving the ease-of-use. To achieve a good user

experience for potential end-users, these concepts should be taken into consideration when designing and developing a product.

1.2 Hoodin AB

Hoodin AB is a company based in Malmö, Sweden, and has about 11 employees today. The company was first founded in 2013 but decided to change its direction in 2018 by developing an IT-platform. Hoodin's business concept is to provide professional users custom solutions with a new and innovative service for automated content and monitoring of digital data, focusing on companies in MedTech, pharma, public sector, finance and tourism.

The company offers a software as a service, shorted SaaS. SaaS is a software distribution model in which a cloud provider hosts the application and makes it available to end-users over the internet. With their solution, users can interact with the system and create feeds on sources with matching words that are relevant to the customers' needs. This method simplifies the search and filtering up to 90% and most importantly, their time. Automated information retrieval systems are used to reduce information overload. Using Hoodin-platform makes it easier to cancel out irrelevant information. The product generates knowledge at workplaces and makes it easier to share information and skill with the employees.

The concept of the platform is to set up a notification by matching a keyword (or keywords) the search is based on. This is done by setting up a use case template and then add the matching words. This setup is only done once since it saves the use case and refreshes the feed every time a new article is found. Hoodin-platform keeps relevant information and only provides content that is less than a year old. The data is in text form, images and other attributes and can be filtered on author and date of publication. The list of fetched subjects that the individual wishes to use in the report can be shared with invited colleagues. Shared knowledge and insights in a systematic way are one of the top denominators for top-performing companies, which Hoodin offers.

By using the Hoodin-platform, the users will save time on searching information on the internet since relevant articles are sorted out automatically. The articles will be shown in the user’s feed. When using the report function, the provided articles can be easily shared with colleagues for knowledge sharing.

1.3 Purpose and goals

The purpose of this thesis report was to examine Hoodin's new launch of their service for automated content monitoring. The new launch is aimed towards companies with an IT-department. The writers of this master's thesis were to examine if the Hoodin-tool provides a good user experience for end-customers. The user experience of a product is often measured by many different factors such as functionality, usability, aesthetics, the sensual appeal and the emotional appeal [12]. These factors were taken into consideration when examining the Hoodin-tool. The product was evaluated with qualitative analysis, interviews, surveys and usability tests. By using these methods, the writers gathered information that was needed in order to find a solution to the research questions presented below:

- *To which degree is the Hoodin-platform suitable to meet the needs and requirements of potential customers and if not, how should it be designed to improve the user experience?*

- *By mapping and proposing measures for Hoodin, how can the interaction design of the platform be improved?*

1.4 Limitations and scope

The project was carried out within the field of interaction design. The research was limited to end-users working within an IT-department since the new launch is focused on that specific target group. The platform is an already existing product, therefore, the service was evaluated rather than produced by the writers.

The master thesis was carried out within a time frame of 20 weeks and due to lack of time, more extensive research could not be done. Otherwise, when usability tests are performed, more advanced methods such as Eye-tracking or Co-discovery could have been taken into consideration for more detailed results.

An additional limitation was the pandemic (covid-19). Due to the pandemic, some processes were delayed such as meeting with the test users who became ill. There were also restrictions which resulted in postponing the time slot of the testing sessions.

When developing the high fidelity-prototype, it was important that the prototype was integrable and that users could interact with it. However, the prototype was not complete as there were functionalities that were not fully implemented. To achieve the optimal user experience, certain functions should be fulfilled correctly.

2 Theoretical background

This chapter will give a deeper understanding of what information retrieval is, how search engines work and how they are implemented in companies. Theory within interaction design.

2.1 Information retrieval

The term information retrieval was invented in 1952 and gained popularity in research communication from the year 1961 [13]. At that time the concept was used in major advanced libraries where the information was catalogued and indexed [14]. Several new databases were created when "information handling in computer" emerged, these databases combined bibliographic details with keyword. The concept of information retrieval came to mean the retrieval of bibliographic information from stored document databases.

Using the concept information retrieval is very broad; however, in the academic field it is defined as finding data [15]. The data is typically documents or text that satisfies the needed information from large collections that are stored in computers [16]. Information retrieval is the science of searching for information.

The process of how information retrieval works, begins when a user enters a keyword of information that is needed. In information retrieval, several objects match the keyword and can have different degrees of relevance. An object is a unit that is signified by information in a content collection or database and the user keyword matches with the database information. However, it is important to know that the results may not match the keyword therefore the results are normally ranked [17].

The purpose of an information retrieval system is to provide documents or information required by the user. An information retrieval system aims to collect and organise information in one or several subject areas to provide it to users as soon users ask for it [18].

Information retrieval system is used by hundreds of millions of people today. It has become the dominant form of information access [19].

2.1.1 **Search Engines**

In today's modern industrialised society, the average person is exposed to different kinds of information in a single day [20]. In our busy times where time never seems to be enough, search engines have made everyday life much easier providing information with just a click [21].

Google is the most popular search engine today with over 86% of the search market [22]. For instance, in the month of March 2006, there were 6.4 billion searches made on the website. Search engines as a phenomenon have been widely accepted in today's culture to the extent that the word Google appears in the dictionary [23].

In general, search engines help filter information on the internet. By using search engines, it allows users to find relevant information quickly and easily without going through irrelevant web pages. In 2004 the number of pages in Google's index surpassed the number of people on the planet, reaching more than 8 billion [23]. Since so many people these days are connected to the internet, search engines have made it easier to expand knowledge [21].

2.1.2 **Enterprise search**

Companies are under constant pressure to improve product quality and stay competitive by being relevant. To improve the product quality, future companies and/or industries are exposed to new technologies. Among improving product quality and the transformation towards the Industry 4.0 there will be requirements to re-skill employers. The employees must adapt to workplace transformation brought by digitalization, automation and robotics or eventually face layoffs [24].

Automation and robotics will eventually take over existing current jobs, but new job opportunities will also occur. Even though automation and robotics can take over repetitive, complicated and/or heavy tasks, the current evidence seems to suggest that job demands will change making employees work more cognitively or mentally [25].

Since new job opportunities will be produced, it is important to define new models of Education 4.0 within both schools and the companies for the fourth industrial revolution. This can be done for instance through integration of technology-enhanced learning experiences and [26] learning and developing within the workplace. However, it is still unclear what kind of knowledge, learning and competence development programs should be in place to properly contain and respond to the transformative effects. Some of these problems can be solved by

using enterprise search tools by updating and contributing to the knowledge skill at workplaces.

The term enterprise search does not have a specific definition. It is often considered as an implementation of a single search application that can index all information repositories inside an organisation and provide highly relevant information to all employees [27].

A lot of companies and organisations understand that effective information management is crucial to information for productivity and performance at workplaces. In today's society, the growth and volume of information have been difficult to keep up with the availability that exists. One way to simplify this is by using search-based applications. Digital technology provides a wealth of opportunity to those willing to change their business to take advantage of, especially for those businesses that are interested in globalisation. For example, globalisation can only be achieved through digital processes and collaborative tools [28].

Search enterprises have been expanded on and more invested in since it helped staff to search, share, create new knowledge, saving time and supporting decision-making [29]. There are two crucial benefits of using enterprise search at workplaces which improve work:

- **Improved productivity** [30]**.** No one wants to spend wasted time in a sea of content just to find a specific article or information. This leads to wasted time and productivity.
- **Improve the quality of information** [31]**.** Using a specified search engine can unlock the hidden value of data, bringing to light correlations and trends that would otherwise be unknown.

2.2 Interaction design

New products are developed with different users in mind and when engineers design a product, the user's interaction with the product can be forgotten.

The purpose of interaction design is to redress this concern by adding usability into the design process. It is not only about developing a system with imagined functions but developing interactive products that are; easy to learn, use, effective, enjoyable all from a user's perspective [12].

Interaction design is fundamental to disciplines, fields and approaches when designing computer-based systems for people to create positive experiences [12].

The interdisciplinary field of human-computer interaction (HCI) [12] focus on the design of computer technology and in particular the interfaces between humans and computers. This interdisciplinary field is very similar to the description of interaction design that these two concepts can sometimes be used interchangeably.

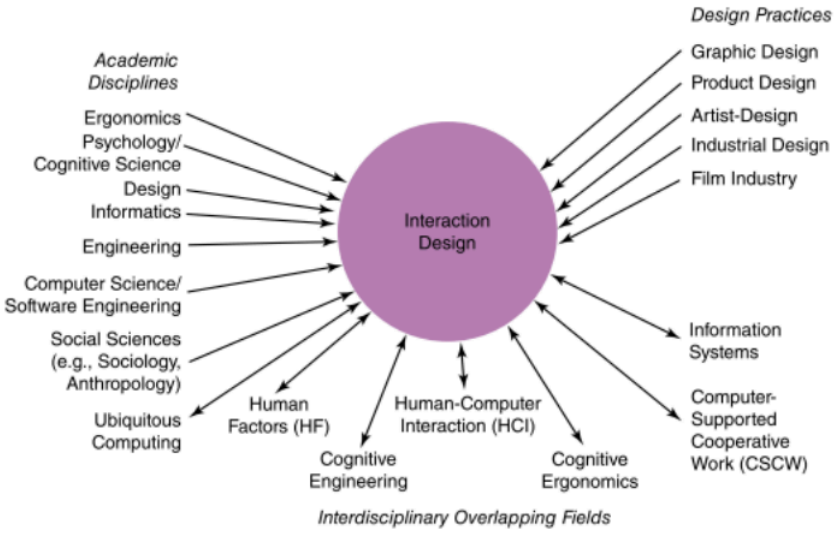

Figure 2.1 Relationship among contributing academic disciplines, design practices, and interdisciplinary fields concerned with interaction design.

Three good rules that are recommended to maintain focus in the user through the process to design a system that is reliable, responsive, easy to learn and useful [32]:

- Early focus on the users
- Empirical measurements
- Iterative design process

To be able to design a system with a desirable interaction design the developers must first understand who the users are and what needs and expectations they have. The users will be a part of the design where needs and expectation are mapped out [32]. User-centered design methodology can be used for studying the user's interaction with a system from the beginning of the design process until the end [12]. By receiving feedback from end-users with no experience with the product can lead to improvements which in turn gain more usable end-result. Involving individuals not working with the product can result in having a different perception of the outcome [38].

Using empirical measurements refers to letting the users be a part of the development in an early stage. The measurements can be objective where the user

is asked to perform a set of tasks, or the measurements can be subjective where the user is asked to give their feedback on the design. By taking these measurements the developers will receive valuable feedback and they can direct their work further based on the users. Working in an iterative design process where empirical measurements are made iterative, will lead to a product that the users will find more desirable [32].

Using an iterative design process it allows to use the same design to receive feedback and improve the design by analysing and understanding the feedback. The process can be performed by involving end-users in every iteration and letting the individuals test the design and give feedback about the product. When the end-users provide information on how to improve the design by each iteration and the changes are done, the process can be repeated by testing a new version. This concept is meant to improve the usability problems the more iterations it goes through [39].

2.2.1 **User experience**

The definition of user experience is wide hence central to interaction design. Nielsen and Norman define it as “all aspects of the end-user’s interaction with the company, its services and its products” [33]. As argued by Preece, Rogers and Sharp, user experience concept is a measurement of how humans feel and their satisfaction when using a product [12].

How the user experience is considered can be affected by aspects such as the functionality, usability, aesthetics, content, feel and look and the sensual and emotional appeal [12]. One cannot design a user experience, only design for a user experience where all these aspects are considered.

2.2.2 **Usability**

The usability of a product refers to the user's interaction with the product, how easy it is to learn, how effective and enjoyable it is to use [12]. Usability can be broken down into the principles listed below [12]:

- **Effective to use (effectiveness)**: How good a product is as doing what it is supposed to do.
- **Efficient to use (efficiency)**: The way a product supports users in carrying out their tasks.
- **Safe to use (safety)**: Involves protecting the user from dangerous conditions and undesirable situations.

- **Having a good utility (utility)**: Refers to the extent to which the product provides the right kind of functionality so that the users can do what they need or want.
- **Easy to learn (learnability)**: How easy a system is to learn and use.
- **Easy to remember (memorability)**: How easy a product is to remember how to use, one learned.

The goal when designing a new product focusing on interaction design is to achieve a good user experience for the user. User experience is increasingly focused on creating systems that are: satisfying, enjoyable, fun, entertaining, helpful, emotionally fulfilling, rewarding, supportive of creativity, aesthetically pleasing and motivating [12].

It is important to recognise the trade-off that must be made to achieve a system that is both useful and provides a good user experience. Not all usability goals and all user experience goals can be achieved. The designers of a system must consult the different combinations of them to fulfil the user's needs [12].

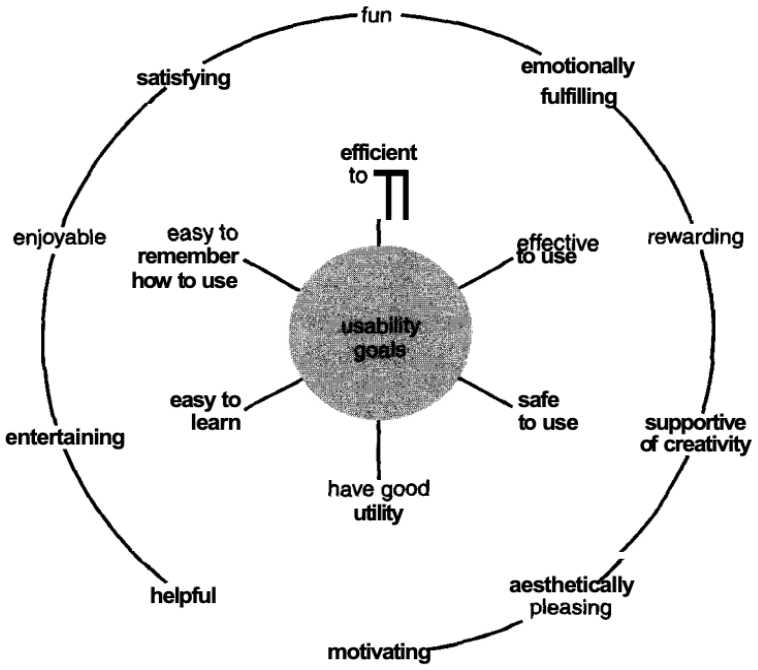

Figure 2.2 Usability and user experience goals. Usability goals are central to interaction design and are operationalized through specific criteria. User experience goals are shown in the outer circle and are less clearly defined.

2.2.3 **Cognition and perception**

Cognition is defined as “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses” and refers to the mental process of relating to the acquisition, storage, manipulation, and retrieval of information [34].

Cognition includes the processes such as attention, memory, language, learning, thought and perception. These processes are used when we incorporate new knowledge and when we make decisions based on said knowledge. Each of these processes work together to form an interpretation of the world around us [35].

For instance, developing products that allow the user to follow the same pattern whenever interacting with it, aims the user to easily handle the new product. When the user performs a certain manoeuvre, the user will learn how the function works and eventually this learning will be remembered. Memory is the concrete result of learning which is one of the cognitive processes [35].

Perception refers to the set of unconscious processes we perceive through our senses such as vision, touch, smell, sound and taste. But also, how we organise and interpret sensory information [36]. The interpretation of a sense happens as a result of a person's experiences; therefore the result of perception differs according to each individual [35]. Due to our perception system’s structure, the Kanzia illusion will look like a triangle even though no triangle is drawn in figure 2.3. When designing an interactive product, it is important to know these functions of how the brain receives and processes information to be able to develop a product that is perceived as the design intended.

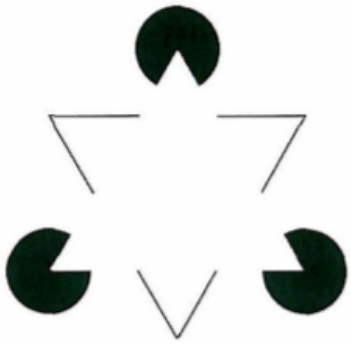

Figure 2.3 The Kaniza illusion: a triangle seems to pop out of the image even though no such triangle is drawn.

Cognition and perception are closely related but the main difference is that cognition includes a series of mental processes such as memory, attention, reasoning and problem-solving. While perception is a process of selection, organisation and interpretation [35].

In the service of a cognitive task, working memory is the ability to actively maintain task-relevant information [37]. How limited the working memory capacity is for each individual differs [37]. At a workspace that is aiming for a knowledge transfer environment, each task-relevant information can be shared with colleagues to provide a wider knowledge throughout the organisation. This could be facilitated by the help of an automated content and monitoring system such as the Hoodin-platform.

2.3 Double diamond design

Design Council has come up with a framework for design methodology called the Double Diamond in the year 2004 [41]. The phrase comes from its shape, looking like two diamonds put together. The figure represents a process of exploring an issue widely, which stands for divergent thinking and then taking focused action, which stands for converging thinking. The framework is divided into four phases of D's [42]:

1. **Discover** - Helps people understand what the problem is. This phase involves speaking and spending time with people who are affected by the issues.

The discover phase, expert interviews and questionnaires were used to assemble qualitative and quantitative data. By using semi-structured interviews, awareness about different experiences, behaviours and perceptions of the interviewee could be obtained. The main purpose of applying a questionnaire was to understand how, when and where individuals use search engines.

2. **Define** - synthesising the information from the discovery phase into a problem definition.

The define phase, user-story mapping was performed to illustrate solutions to the problems uncovered in the discovery phase. User-story mapping is a lean user experience method and is often used within agile teams. Using this method, characteristics were brought out from potential end-users that were important to take into consideration when designing a functional search bar.

3. **Develop** - find solutions to the problem and co-designing with different end-users.

The develop phase, usability testing was performed on the Hoodin-platform with potential end-users. In order to execute usability testing, a test plan and test tasks were prepared. During the test sessions, data was collected by observing the test users with video and audio recordings. Post questionnaires were used after the test session. These were handed out to gain information about the test users thoughts and perceived experience when using the platform. The iteration was executed to analyse and search for potential improvements on the product. Furthermore, a list of improvements was compiled for the upcoming prototype through the analysis.

4. **Deliver** - this phase means testing out different solutions. Pick out the best solution, build that and continue to improve them.

The deliver phase, a high fidelity-prototype with the compiled improvements was designed. In order to test and compare the prototype with the Hoodin-platform, new test sessions were performed with new and previous test users. The conclusion from usability testing of the prototype could then be defined. Main design principles to take into consideration when designing [41]:

- **Put people first**. Mapping the user needs, strengths and goals when using a service.
- **Communicate visually and inclusively**. Sharing understanding of problems and ideas with the users can help them.
- **Collaborate and co-create**. Work together and get inspired by others.
- **Iterate**. Makes it easier to detect errors earlier.

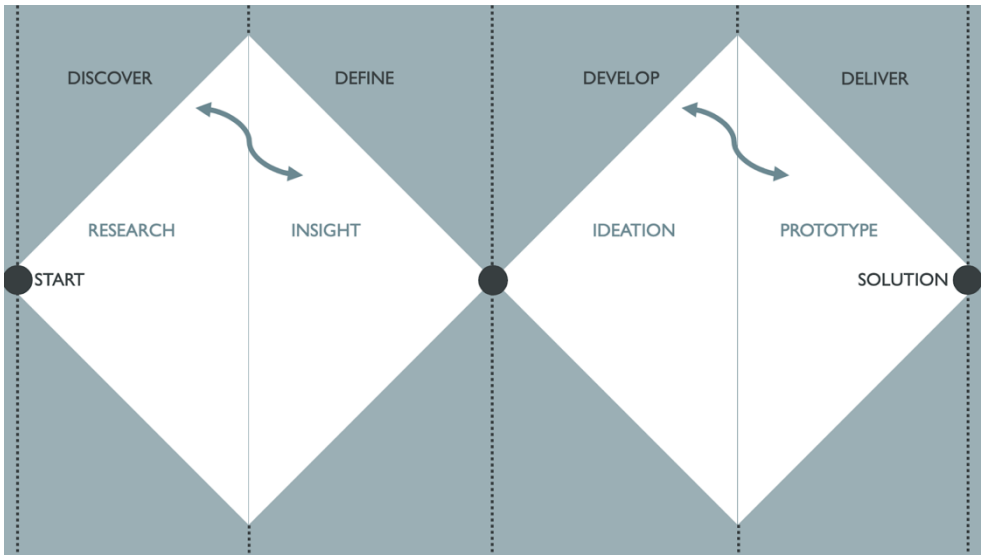

Figure 2.4 Double diamond model presented by the Design Council.

3 Methodology

This section below will describe the design methodology and framework used in the design process.

3.1 Project framework

The framework for the design process in this project will result in a Double diamond design. This method is valuable for understanding the individuals' needs that are involved and re-framing the problem in a human-centric way [40]. This process is non-linear and iterative, which implies the different phases do not always occur sequentially.

3.1.1 **The thesis format**

The Double diamond design and its four phases will be used as a template. Every phase was presented with its own chapter. Moreover, each phase was described thoroughly in the report followed by the results for each segment. The model will not be used to design a completely new product. The Double diamond design was used as a guideline throughout the process, for finding shortcomings in the current Hoodin-platform and how the platform could be improved to meet the scope of the thesis.

4 Discover phase

This chapter presents the Discover phase in the Double diamond model. In this phase, the writers mapped the problem to understand the target challenge. The Discover phase hence involves user research to get a better understanding both widely and deeply and acknowledge the target group and their needs. In this phase interviews and questionnaires will be done and the analysed data will be presented with diagrams and bar graphs.

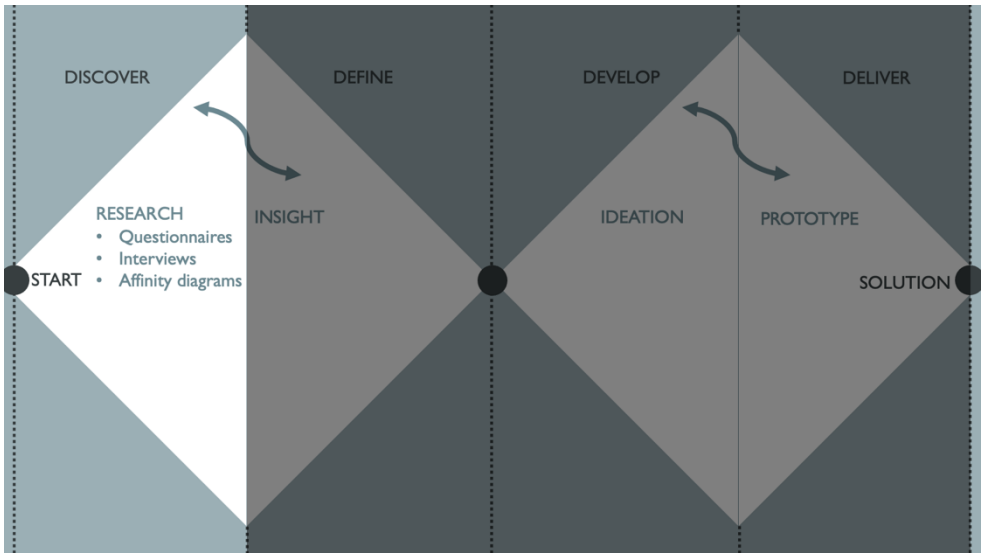

Figure 4.1 Discovery phase in the Double diamond model.

4.1 User research methods

There are different methods to identify problems when understanding end-users and their needs. Nielsen Norman Group suggests that nearly all projects would benefit from multiple research methods and combining insights. It is important to know when to use the right method [43]. Mixing different methods in user research is useful when you would like to avoid assumptions about needs in the

target group [44]. In this master's thesis the expert interviews and questionnaires were applied. Expert interviews were used to collect qualitative data from employees working at Hoodin. Moreover, to obtain understanding of why their product is important and what aspects should be taken into consideration. Questionnaires were used to collect qualitative and quantitative data. The questionnaires were sent to possible end-users working within information technology.

4.1.1 **Semi-structured expert interview**

When investigating and mapping a potential problem, a solution can be found by gathering data. It can be done with different techniques including approaching the target audience as well as using experts within the field [45]. Using experts improves the knowledge in this phase and provides more depth when collecting qualitative data. Semi-structured interviews are beneficial for obtaining awareness about different experiences, behaviours and perceptions of the interviewee [46]. Then, it is possible to distinguish whether there is a common denominator that makes users think a function needs to be improved or think are to advantage. The considered experts in the master's thesis are the employees at Hoodin. The company has employees with various work roles including CEO, developers and sales. Their different roles can contribute to valuable information by having different competencies. The questions asked are presented in the table below.

Table 4.1 Questions asked during the semi-structured interviews.

Interview questions
• What needs did you identify missing in the market that the Hoodin-platform meets? • Does the Hoodin-platform have any similar competitors on the market today? • What does the Hoodin-platform contribute to, which differs from the competitors? • Who are your customers, who have you developed your product for? (ex..CEO, developers etc.) • What do you as a company want to achieve? • Have your customers requested any functions in the Hoodin-platform? • What functions have been requested? • Have they been implemented or not? If not so, why?

4.1.2 **Questionnaires**

Questionnaires were used to collect quantitative and qualitative data from individuals working within the IT-field. It was a suitable method to gather a large amount of information from individuals but additionally for the individual to remain anonymous. The main purpose of developing a questionnaire was to get an understanding of how, when and where individuals use search engines. These questions were asked to get a full understanding of what the end-users' needs are. The questionnaire contained multiple-choice questions and the possibility to answer open questions, see Appendix A1. The questionnaire was sent to 20 engineers working within IT-department in different companies, gender and ages to get a various range as possible. There where 19 persons that responded to the questions. Personal questions were ruled out since Hoodin considers their product is for all employees within IT.

4.1.3 **Affinity diagrams**

To analyse qualitative data including ideas, opinions and issues during the research phase, affinity diagrams were used. The qualitative data was based on the interviews as well as open-ended responses from questionnaires. Affinity diagrams were used to find relations between a large amount of data. Furthermore, this is a method that helps to organise and group the data based on the relations [47]. The procedure was as follows:

1. Put pieces of data onto post-it notes and put them up on a wall chart.
2. Take one post-it note and make it the first post-it note on the board.
3. Take the next post-it note and compare if the post-it is similar or different compared to the first. Then you place it in the group or into its group.
4. This process is continued until all the post-it notes have been grouped.
5. The different groups are given a name based on their themes in each cluster.
6. Ranking the clusters are based on their importance. The importance is based on which values are most emphasised such as the user's priorities, the company's or your own.

4.1.4 **Bar graphs**

To analyse qualitative data from user research, bar graphs were used. The users filled in checkboxes and added several choices that fitted them the most.

4.2 User research results

The results from the user research are presented below. Quantitative and qualitative data were analysed using bar graphs. The questionnaires were only given out to employees within the IT-department but at different companies. The questionnaire was distributed to 20 suitable employees and was conducted by 19 employees.

4.2.1 **Bar graphs**

Two questions in the questionnaire were asked to identify the age-range and gender among the users. As seen in figure 4.2, more than two thirds of the respondents were male. This is not deviant since the IT-industry is male dominated [48].

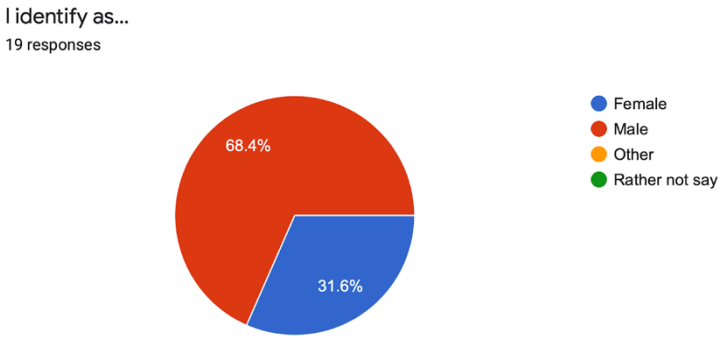

Figure 4.2 Results from the question "I identify as…"

When asking how old the individuals were, the majority of them were between the ages of 18-30. The conclusion made was that a larger part of the individuals in this survey are younger and are fairly new in the IT-sector. As seen in figure 4.3, the age range may vary and different ages and these gaps should be taken into consideration in this industry.

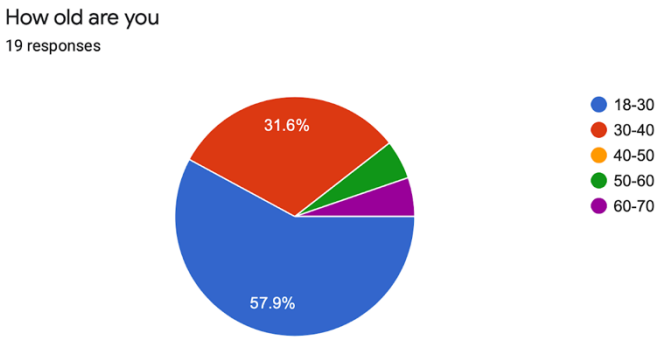

Figure 4.3 Results from the question "How old are you"

The answers from the questionnaire will be presented in bar graphs below:

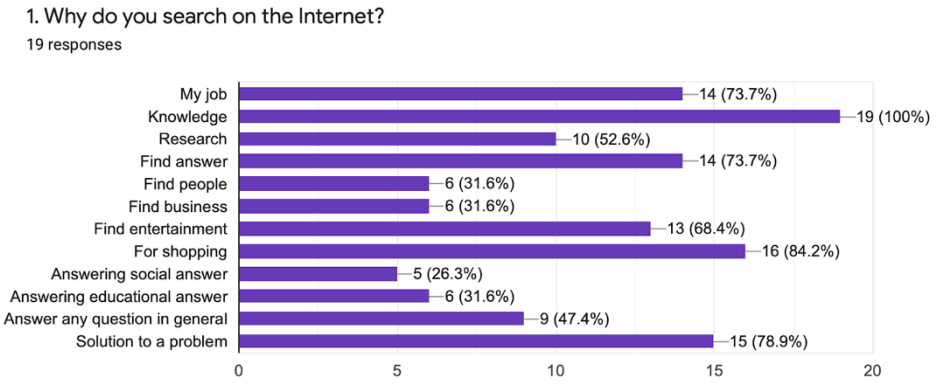

Figure 4.4 Results from the question "Why do you search on the Internet?"

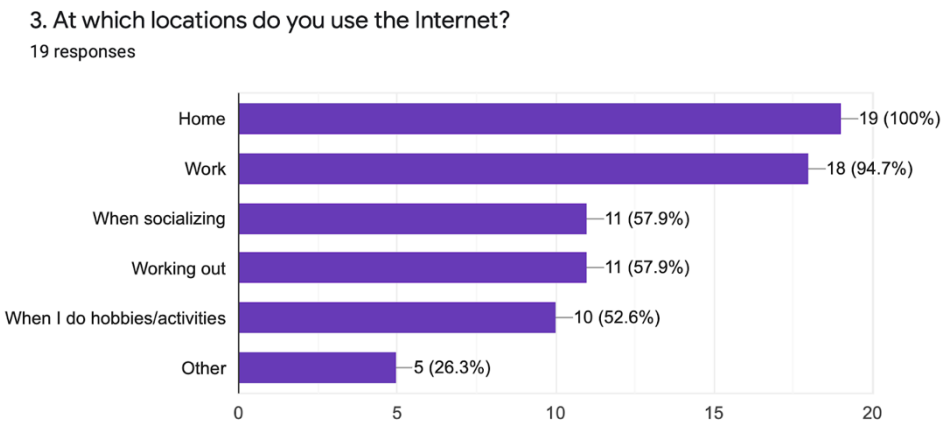

Figure 4.5 Results from the question "At which locations do you use the Internet?"

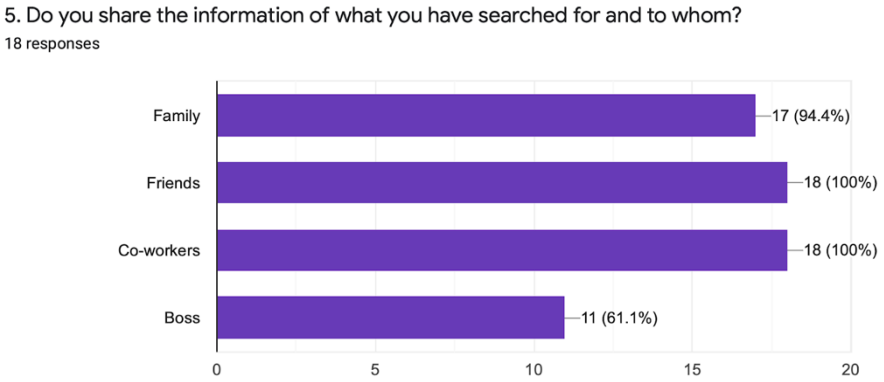

Figure 4.6 Results from the question "Do you share the information of what you have searched for and to whom?"

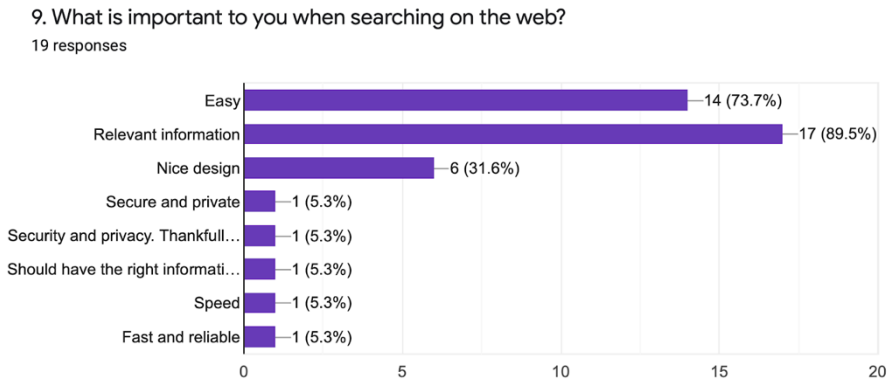

Figure 4.7 Results from the question "What is important to you when searching on the web?"

As presented in figure 4.4, all the individuals answering the questionnaire say they use the internet for gaining knowledge. The majority use the Internet at home or the workplace (figure 4.5). Sharing the information that has been found, is mostly shared with family, friends and co-workers (figure 4.6). Lastly, the majority of the individuals answered that when searching on the web that it should be easy and relevant information should exist (figure 4.7).

4.2.2 **Qualitative data**

The qualitative data from the user research consisted of interview data as well as open-ended responses from the same questionnaire given above, see appendix A1. To organise and structure the data, affinity diagrams were used with help of the online collaborative whiteboard platform Miro. By using affinity diagrams, quotes, opinions and sentences that were aligned with the scope were collected on post-it notes and then grouped into different categories relating to the same theme [49].

This process was done by collecting the first post-it note and categorising as the first group. Then all the post-it notes were picked one by one and compared to the first group. Moreover, if the note did not belong to the theme in the first group, a new group was created. This was done until all the post-it notes were divided into groups. When the categorization of all the post-it notes were done based on their relations, four themes were named based on their common themes. Examples of the affinity diagrams can be found in the Appendix A2.

The themes used to categorise the data were following:

- Effectiveness
- Learnability
- Satisfying
- Reliability

4.2.3 **Conclusion from user research**

The findings from both the qualitative and quantitative analysis were compared to get a conclusion from the user research. In the quantitative data, all the individuals answered that they use the internet for gaining knowledge, seen in figure 4.2. Secondly, most of the individuals answered that when searching on the web, it should be easy as well as resulting in receiving relevant information, seen in figure 4.5. These subjects appeared to be related to qualitative analysis. The individuals expressed that when searching information on the Internet, search results should be relevant since it is used to gain and share knowledge, as the theme *learnability*. The information should be both easy to access and up to date, as stated in the theme *effectiveness*.

The themes of *learnability* and *effectiveness* were chosen to be proceeded with. Furthermore, these themes were highly presented and emphasised in the analysis and were chosen to continue the research with. The end-users agreed that these are relevant to a potential platform in terms of the user experience. It agrees with the development of concepts in terms of the Hoodin-platform's interaction design for eventual upgrades. The themes of *learnability* and *effectiveness* are presented in more detail in tables 4.3 and 4.4. The end-goal for Hoodin is to gain new customers and keeping their current customers using their products and services. Though their costumer will not use it daily, it must have a learnable design.

Table 4.2 Sub-themes, key findings and quotes related to the theme effectiveness.

Theme: Effectiveness		
Sub-theme	***Key findings***	***Quote***
Efficiency	Many feel that using search engines are an easy and quick way to access relevant information in both their private and professional life	"It is easy to access and quick to get relevant answers most of the time" "A simple way to find the information that I need"
Up to date	Many feel that they have the need of staying up to date with the latest technology when it comes to work-related tasks especially	"To learn new things and be up-to-date" "In my work I need to stay up-to-date with the latest technology and the only way is to use search engines online"

Table 4.2 Sub-themes, key findings and quotes related to the theme learnability.

Theme: Learnability		
Sub-theme	***Key findings***	***Quote***
Searching information	Many say that they are using search engines to get more advanced information about topics they already have some understanding in, as well as searching for completely new information	"General answers to different questions" "A simple way to find the information that I need"
Knowledge sharing	Many say that they have the need of sharing knowledge with primarily co-workers since they are working in a field where they must know about the latest technology	"Knowledge in general to be able to understand and sharing more subjects with my co-workers" "Gather knowledge about a certain field in my work"

The themes, *Satisfying* and *Reliability*, developed from the analysis will not be chosen to proceed. Functionalities as well as comparing several sources and showing filtered information are a part of the Hoodin-platform. They therefor overlap with the themes *Satisfying* and *Reliability*.

5 Define phase

This chapter presents the Define phase in the Double diamond model. This phase was gathered insights from the Discovery phase. The collected data was defined from the Discovery phase and was used in user-stories. Lastly, a more specific and defined goal was decided.

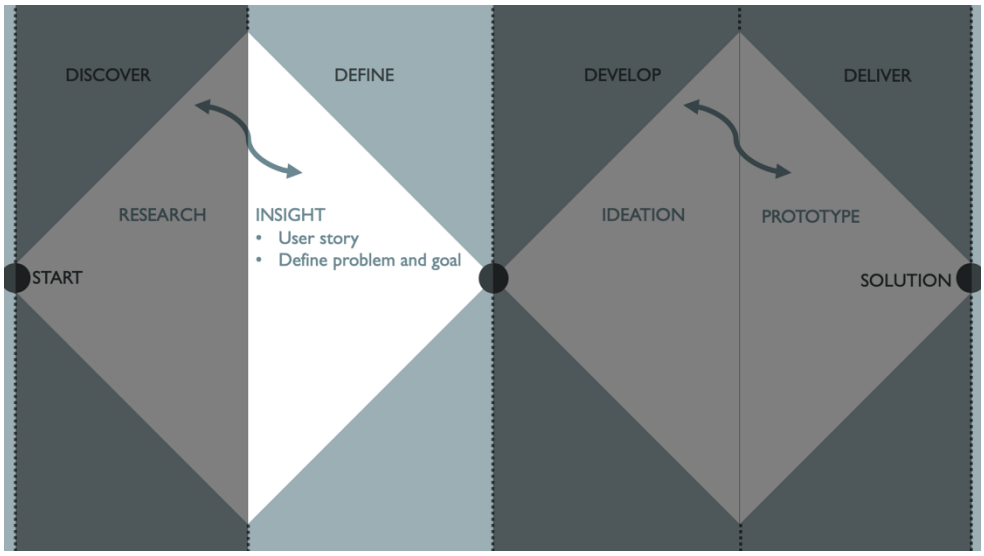

Figure 5.1: Define phase in the Double diamond model.

5.1 User-story

User-story mapping is a lean user experience mapping method and is used within Agile teams. Sticky notes and sketches are used to outline the interactions the team expects users to experience in order to complete their goals in a digital product.

User-story map is divided into three parts with different levels of details:

- **Activities (the most general actions):** represent the high-level tasks that users aim to complete in the digital product.
- **Steps (the most specific actions):** is underneath activities and displayed in sequential order. It can be seen as specific subtasks that the user needs to go through in the product to complete the activity above.
- **Details:** signifies the third level of the story map and describes the lowest level of defined interactions the potential end-user will experience to complete the step above.

This method is a beneficial way to illustrate solutions to the problems uncovered in the research [50].

5.1.1 **User-story result**

When interviewing Hoodin developers, important features were expressed when using the platform. These features were to create monitoring feeds and create reports out of the monitoring feeds thus knowledge can be shared between co-workers. The activities *Create new monitoring feed* and *Reports* were mapped as two important activities and were taken into consideration when making the user-stories.

Figure 5.2 demonstrates the user-story mapping where the two chosen activities *Create new monitoring feed* and *Reports* are broken down into smaller parts. Furthermore, it demonstrates the user's steps through the platform. When creating the two tasks, the steps and details must be followed. The figure demonstrates post-it notes branched out. Moreover, its significates the options when reaching a specific task. The following steps below varies on which option was made.

Figure 5.2 User-story map: Hoodin-platform feature for monitoring feeds.

The user stories are summarised based on the user research combined with the user story result as below:

“As a user I want the Hoodin-platform to be effective as it should be easy to access the information so that it’s simple to find relevant information”.

“As a user I want the Hoodin-platform to be learnable as in it should be easy to gather information so that I can collect and share the information”.

5.2 Problem and goal definition

As defined in the Discovery phase two main themes were developed: *effectiveness* and *learnability*. These characteristics were derived from potential end-users and are considered important in a functional search bar. Going forward to the next phase the activities *Create new monitoring feed* and *Reports* stated above will be tested on potential end-users with the theme’s *effectiveness* and *learnability* in mind. These tests will be completed when the acceptance criteria are reached.

The acceptance criteria for each activity seen in figure 5.2:

- Create new monitoring feed - the user is done when a monitoring feed is created.
- Reports - the user is done when reports can be saved as pdf or csv.

6 Develop phase

This chapter presents the Develop phase in the Double diamond model. In this phase, usability testing on the Hoodin-platform with potential end-users was performed. An iteration was done to analyse potential improvements on the product.

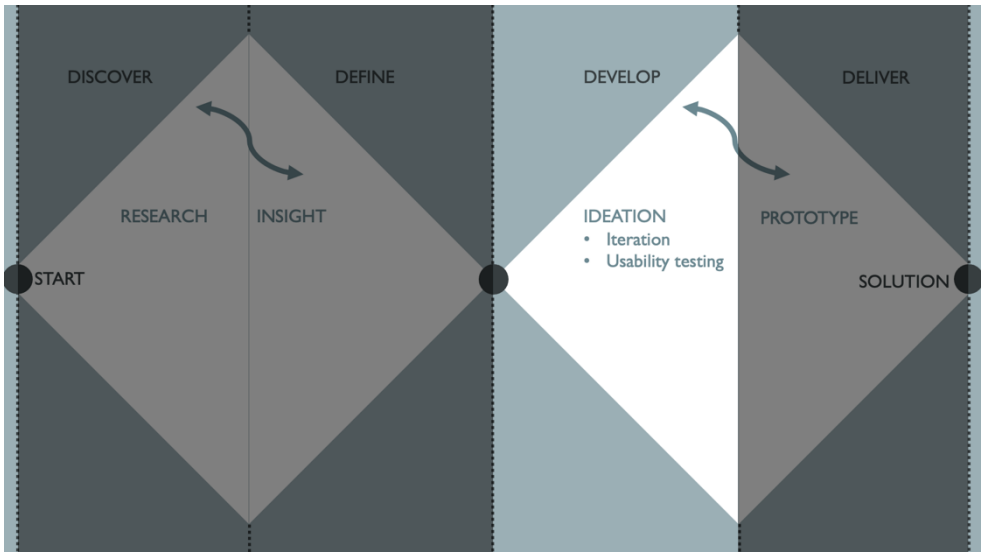

Figure 6.1 Develop phase in the Double diamond model.

6.1 The first iteration, Hoodin-platform

The Double diamond model is used when a new concept is brought forward from the beginning. The model was used as a guideline to concept generation and evaluation. This was to gather more information about the user's wishes and expectations. The users are taken into consideration when designing rapid prototypes.

In the Double diamond method, there is a method called minimum viable product that is used in this phase. Moreover, there are limited versions of the product with

minimal features to make it workable [51]. The end-users can test the prototype and the team can evaluate the product/service in a real-life scenario. The team uses the feedback to improve the final complete product [51]. Since this thesis was examining a finished product, the platform's full service was usability tested in this phase. Usability testing was used with user-centered design to evaluate and test the product on potential end-users [52]. Furthermore, a test plan was assembled and was divided into eight subcategories, as seen below.

6.2 Test plan

To investigate the Hoodin-platform in more detail, a test plan was constructed. The purpose of a test plan is to get an idea of what is supposed to be tested, why these steps are tested and the outcome of the tests. It was done by drawing up a thorough test plan from the beginning. This method describes what resources are needed and constitute a milestone hence the writers would plan according to the test plan [53].

6.2.1 **Purpose and goals**

The purpose of the test was to investigate the eventual problems and what improvements that could be done on the Hoodin-platform from a user's perspective. To answer the master's thesis purpose:

- *To which degree is the Hoodin-platform suitable to meet the needs and requirements of potential customers and if not, how should it be designed to improve the user experience?*

- *By mapping and proposing measures for Hoodin, how can the interaction design of the platform be improved?*

Following questions was categorised based on the themes *effectiveness* and *learnability*:

- How appropriate and satisfying is the search filter in the monitoring feed? obj.quant/obj.qual
- How user friendly is it to create a new report? obj.quant/obj.qual
- How easy is it to understand the monitoring feed? obj.qual
- How expedient and intuitive is the function to share a report? obj.qual/obj.quant
- How user friendly is the function to create recurring reports? obj.quant/obj.qual
- How user friendly is it to change a monitoring feed? obj.quant/obj.qual

User friendly was defined out of following goals:

- **Effectiveness:** How useful was the platform.
- **Learnability:** How easy the task is to learn and remember.

During the usability tests, the tasks were given to examine if the test persons could solve the tasks effectively and if it was easy to learn. These were the themes that were discovered during the Discovery phase, *learnability* and *effectiveness*.

6.2.2 **Data to collect**

The questions were divided into subjective/objective and qualitative/quantitative for when usability testing the platform. The questions were categorised into four types of data [54].

- **Objective/Qualitative data:** the issues are an anecdotal description of wrongdoing.
- **Subjective/Qualitative data:** collect the user experience the test person has during use.
- **Subjective/Quantitative data:** test person can rate the simplicity using a scale 1-5 of a task.
- **Objective/Quantitative data:** data collected by seeing how long it takes for an individual to solve a task.

6.2.3 **Test tasks**

The test tasks are brief descriptions based on each question formulated in 6.2.1. Each question was broken down separately. It was important that the test cases were sufficiently broken down to add answers to the thesis. When doing these test

tasks, definition of the Successful Completion Criteria [53] needed to be decided. This was done to eliminate some of the human factors when assessing a task was considered to be completed correctly. The tests were performed more uniformly and the result was more accurate. The definition of max time is the recommended time to finish the task within.

Table 6.1 Shows the tasks the test person needs to execute.

Task	***Subtask***	***Completion condition***	***Max time***
1. Create new monitoring feed with word “JavaScript” and matching word “Angular” and name it “JavaScript updates”	1.1 Click new monitoring feed 1.2 Click development insights 1.3 Click programming languages 1.4 Select sources 1.5 Add matching words in” articles must include all of these words or phrases” 1.6 Add matching words in “articles must include at least one of these words” 1.7 Name the monitoring feed 1.8 Click preview all content 1.9 Click save monitoring feed	When a new monitoring feed is occurred on the wizard page	7 min
2. Change monitoring feed that has been set up and exchange the word “Angular” to “React”	2.1 Click on a random article 2.2 Click on link title “edit monitoring feed” 2.3 Click “next” 2.4 Change the word angular to “react” and delete the word “angular”	When an updated monitoring feed is occurred on the wizard page	10 min

3.	Create a report based on the monitoring feed you have set up	3.1 Click on menu 3.2 Click on create reports 3.3 Choose a random name on the report 3.4 Choose the Use cases "Development insights" 3.5 Choose Monitoring feed "JavaScript updates" 3.6 Choose time span 3.7 Click preview 3.8 Click on "Create a single report"	When test person sees that the report could be downloaded as pdf or csv	7 min
4.	Create recurring reports of the monitoring feed you have set up and share with "dic12cma@student.lu.se	4.1 Click on menu 4.2 Click on create reports 4.3 Choose a random name on the report 4.4 Choose the Use cases "Development insights" 4.5 Choose Monitoring feed "JavaScript updates" 4.6 Choose time span 4.7 Click preview 4.8 Click "Create recurring reports" 4.9 Choose timespan 4.10 Add receiver dic12cma@student.lu.se	When test person sees that the report could be downloaded as pdf or csv	7 min

6.2.4 **Selection of test users**

To map a problem, 4-5 test users are recommended [53]. Four test users were selected since the purpose and goal in this thesis was to identify the eventual problems in the Hoodin-platform. The criteria's of being a test user in this project was an individual working within the information technology department. There were four people chosen working within the IT-department.

6.2.5 **Role distributions**

Test leader: was responsible for the interaction with the test user, presented the test cases and made sure the test session was successful.

Protocol keeper: was responsible for setting up audio, video and wrote down observations during the test session. This person in addition kept track of the time thus the user would not exceed the time frame.

6.2.6 **Test environment**

The tests took approximately 30 minutes where the test users were given the assignments by the test leader. The test users' manoeuvres were both documented in film and sound. A computer was needed to do the tests since Hoodin-platform is cloud based.

6.2.7 **Reported results**

The collected data was assembled, analysed and the result was presented closer in chapter 6.5.

6.3 Setup of testing

This section describes how the usability testing was prepared and what methods were used.

6.3.1 **Orientation script**

The test person started with signing a non-disclosure agreement before the actual testing session. This was done to secure information essential for the operation and future of Hoodin, since the test was recorded and participants' identity could be compromised. The agreement in addition, informs the participant about what the information collected during the session was going to be used for. The test users had to sign the agreement in order to participate. Furthermore, the test leader was given the test person an orientation of what would happen during the test, what kind of product was going to be tested and the time required for each test [53]. For the script, see Appendix B1.

6.3.2 **Background questionnaire**

Background questionnaire was handed out to the test person before the test. The questionnaire was intended to supplement the screening that has already been performed on the test person. By distributing the survey, quantitative data was collected. For background questionnaires, see Appendix B2.

6.3.3 **Observations**

To get objective data, observations were made during the testing of the platform. The observer wrote down comments from the test participants and problems that occurred during the tests, which would be of interest for the end analysis of the test.

6.3.4 **Post questionnaires**

Post questionnaires were applied to capture the test person's impression of the product. A System Usability Scale survey was used to gain information. In this survey, the test person would scale statements between 1-5. 1 meant *strongly disagree* and 5 meant *strongly agree* on how much each statement agreed with the person's experience of the Hoodin-platform. System Usability Scale survey is an adequate way for measuring perceived ease of use and can be used for a broad range of digital products and services to help user experience experts to determine if there is an overall problem with a design solution. The scale is made up of the following characteristics: effectiveness, efficiency and satisfaction [55].

The System Usability Scale-score was calculated and can have a score between 0-100. The score 68 and above is considered above average. Scores below 68 points indicate issues with the design. The problems should be researched and resolved. Scores higher than 68 can indicate the need for minor improvements to the design. This type of post questionnaire is a good tool to use as it captures both good and bad aspects. It is also easy to compile and obtain an average value from all test persons' perceptions. For post questionnaires, see Appendix B3.

6.3.5 **Pilot testing**

Before the real test sessions began, a pilot test with a person who met our user profile took place. The purpose of performing a pilot test was to make sure that all technology would work correctly - set up cameras, audio and computers. In addition, provided guidelines for how long a test person needed for each test scenario, called *Maximum time to Complete* [53] was provided.

6.4 Test result and analysis

The tests were performed in a quiet environment. A screen video and audio were recorded during all tasks. During the tests', written observations were noted by the test leader. The screen and audio records gave the opportunity to calmly observe various test users and their manoeuvres afterwards as they performed the test tasks. The users had a maximum time on each task.

The video records showed the test users' interactions with the platform; which buttons were pressed, in what order the scenarios were made and where the test user struggled to perform the task correctly. The audio recordings demonstrated how the user thought in the different tasks since they have been asked to think aloud; which tasks were easy to perform, where problems occurred to finish a task and where they got frustrated and why.

6.4.1 **Background questionnaire**

To get to know the potential end-users better some questions were asked. Out of four individuals, two were male and two were female, seen in figure 6.2.

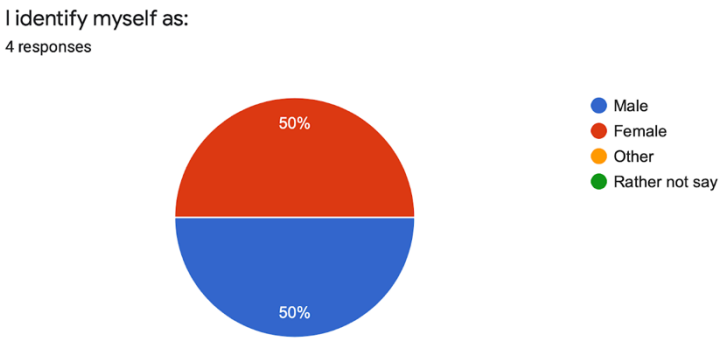

Figure 6.2 Out of total of four individuals half of them were male and rest of the half were female.

The ages between the four individuals with the youngest being 28, and the oldest 31. All of them had a job position within the IT-field and all of them were graduated engineers. The difference between them was their engineering degree, where one had a Higher Vocational Education, one had a bachelor's degree and the two had a master's degree. The individuals average usage of search engines during work was with 2 searchers per day. When asking the individuals if they had an enterprise search within the company they work for, all of them answered no as seen in figure 6.3.

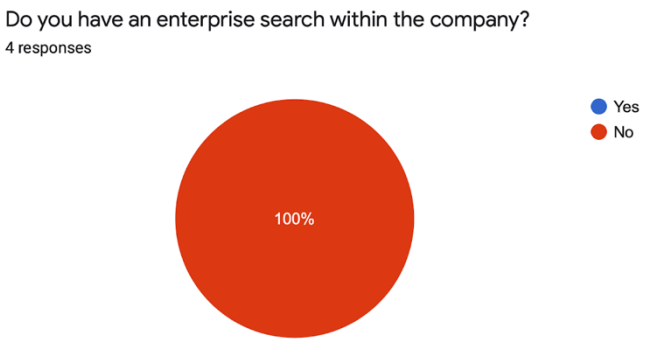

Figure 6.3 Out of total of four individuals all of them said they do not have an enterprise search within the company.

6.4.2 **Observation**

Task 1: Create new Monitoring feed with word *JavaScript* and matching word *Angular* and name it *JavaScript updates*.
Definition of the Successful Completion Criteria: When a new monitoring feed is occurred on the wizard page, max time 7 minutes.

To create a new monitoring feed the user must press the button + *New monitoring feed*. This was performed correctly and straight forward by all the test users and no problems were noted. The test users then had to choose *Use case templates* and *Monitoring feed Development insights* in two different steps. The test leader noted that two of the test users said that they thought there was a lot of steps to create the new monitoring feed and had appreciated if the subtasks could be merged into each other to achieve a more efficient flow.

During the subtask 1.8 *Click preview all content* all of the test users were confused on which alternative they should pick between *Preview all content* and *Automatically select and share all content*. When choosing one of the alternatives there was no option to go back and choose the other alternative therefore the test was done when the test user's pressed either button. The confusion was noted in both the audio records and noted by the test leader but all of them finally chose the correct selection *Preview all content* and were able to finish the task.

All the test users were done with the task within the max time of 7 minutes and the completion conditions were a success. A reason why all the test users were able to finish the task successfully could be that the platform's interface is clearly cohesive according to the task. Once the user has pressed the button *Create*

monitoring feed, that is visible in the top left interface, all the following steps are straight forward. It does not have any other option to be able to create a monitoring feed and the users understand that all of the steps must be done to be able to finish the given task.

Task 2: Change monitoring feed that has been set up and exchange the word *Angular* to *React*.
Definition of the Successful Completion Criteria: When an updated monitoring feed is occurred on the wizard page, max time 10 minutes.

To be able to edit a monitoring feed the users must click on a random article in their feed and then press the *Edit*-button in the article. None of the test users were able to find the *Edit*-button and all of them expressed a frustration of where to find the button. All of the test users tried to find the *Edit*-button below the monitoring search bar by clicking on the different options and in the top menu but could not find the button.

Zero out of four test users managed to complete the task successfully within the given time. All the test user's expressed frustration that they couldn't find the way to edit a monitoring feed. The video and audio records show that none of the test users thought of the idea of pressing an article in the feed to proceed to the next step and they were not even close to finishing the task.

Task 3: Create a report based on the monitoring feed you have set up.
Definition of the Successful Completion Criteria: When the test person sees that the report could be downloaded as pdf or csv, max time 7 minutes.

When creating a report all the test users first tried to press the button *Select* on the articles in their feed in expectation that the selected articles would be collected and grouped to then be able to create a report out of. After a few attempts with no success the test users continued to investigate the platform and finally after some noted frustration as "I do not know where else to look" and "I would like the button to be more visible" they found the *Create report*-button in the menu dropdown. All the test users addressed that they would like the option to create a report to be more visible.

The test users performed subtask 3.4 - 3.6 without any hesitations, but once reaching the preview, three out of four test users were a bit confused as to why to repeat steps 3.5 and 3.6 again. This is not a must to repeat or change, but the test leader noted a few comments as "Did I not just fill in this information" and "Do I have to repeat these steps again to be able to create a report?".

Four out of four test users achieved the task within 7 minutes and the successful completion criteria were a success, with some noted comments. Even though the task was finished within the given time, the video records show that all the test users took several detours before finding the correct button. This indicates that the interface is not optimally developed to meet the user experience.

Task 4: Create recurring reports of the monitoring feed you have set up and share with "provided email".
Definition of the Successful Completion Criteria: When the test person sees that the report could be downloaded as pdf or csv, max time 7 minutes.

When creating recurring reports, the test users have to press the button *Create reports* once again. Since this step was done in Task 3, all the test users found their way to the menu at first attempt and subtasks 4.1 - 4.9 were done without any problems noted.

Two out of four test users had some minor problems with step 4.10, *Add receiver*. The test users understood how to add the receiver in the *Add receiver* field, but once the receiver was added they were unsure if the receiver was selected and thus will receive the report. Test leader and the audio record stated that the test users would like the selected receivers to be more highlighted as a feedback that they are not only added to the list but also selected as a receiver of the report.

Four out of four test users achieved the task within 7 minutes and the successful completion criteria were a success. The video records show that all of the test users knew right away where to find the *Create report*-button since they already did a similar task in task 3. This shows that the test user's learnability in the interface is good, since they only needed to do the task once before to be able to know how to do it the next time.

6.4.3 **System Usability Scale-questionnaire**

The result from the System Usability Scale-questionnaire after the test can be seen in figure 6.4. The total average of the System Usability Scale-score was calculated to 37,5. System Usability Scale-score above a 68 would be considered above average and anything below 68 is below average.

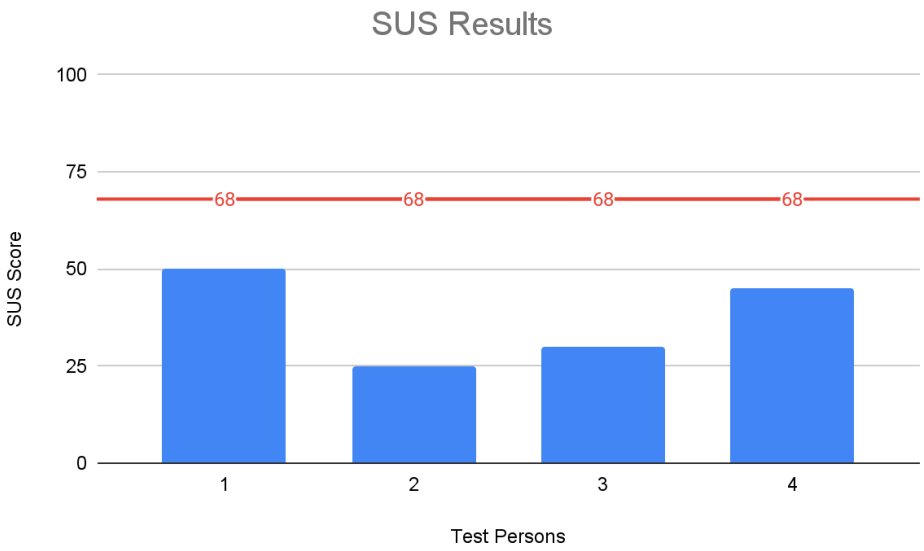

Figure 6.4 System Usability Scale results from the first iteration.

6.5 Conclusion from usability testing of the Hoodin-platform

Combining the observations made from the test users' testing sessions and the results of the System Usability Scale-questionnaire, some suggestions were made for changes in the platform to provide a better user experience regarding the users. Following improvements stated below has been identified:

In test task 1, the test leader noted that two of the test user's thought there was a lot of steps to go through to create a new monitoring feed. In order to meet the test users' requirements, the steps should be compromised to create a more efficient platform. Instead of letting the user go through five steps, this should be merged into fewer steps to create a more efficient flow.

Zero out of four test users managed to edit a monitoring feed. Moreover, this is considered a critical task to improve from a user-friendly perspective. By having the *Edit*-button only concealed within the articles forced the users to first click and open an article in the feed and then press the small *Edit*-button. Furthermore, a new *Edit*-button should be added visibly at the top of the page above the search field. By adding an *Edit*-button, it provides easier access to the edit function.

Hence, the user does not have to search within the articles to edit the monitoring feed. It would make the function more effective to use.

When the test users were asked to create a report, a lot of the time was spent to find a *Create report*-button. Though four out of four test users' managed to create a report, the video records show that all of the test user's took several detours before finding the correct button. The video records showed how the test users tried to find the *Create report*-button below the search bar. Moreover, to avoid problem and give the test users the satisfaction of quickly finding the button, a new *Create report*-button should be added in the interface. The button must be visible at the homepage and be placed below the search bar. This will lead to a more efficient platform since the users hopefully will spend less time searching for the correct button.

When the test users were asked to create a single report and a recurring report, three out of four test users were confused. They were able to perform subtask 3.4-3.6 without any hesitation, but then they thought they had to perform subtask 3.5-3.6 once more. This confusion occurred during step 3.7 when test users saw a preview of their default selections in previous steps. The preview can easily be interpreted as having to fill in your choices once more that was made in the steps 3.5-3.6. To avoid this confusion the interface is suggested to be improved that the user does not see the preview above the *Create report*-button.

When the test users were asked to create and share a report with the email address, two out of four users had some minor problems. The test users understood how to add a new receiver. Furthermore, users became confused when lack of feedback was not given. To provide a good interaction design, feedback needs to be provided. Feedback communicates the results of any interaction, making it both visible and understandable [56]. To provide this feedback, checkboxes are suggested to be added beside the receiving email addresses, which makes it easy for the users to select or deselect receivers of the report.

In terms of giving the users more feedback in the platform task 1, *Create a new monitoring feed*, step 1.5 and 1.6 was altered to provide a better user experience. When adding matching words of *articles must include all of these words or phrases* and *articles must include at least one of these words* a new interface should be altered. Hence, to give the users a visual appearance of the words chosen to match. Rather than each word being written in separate search bars, the added matching words should be visible and clear for the user.

The possible areas of improvements are summarised in the list below as:

- Compress the number of steps in the platform for a more efficient flow.
- Add a new, more visible, *Edit*-button.
- Add a new, more visible, *Create report*-button.
- Improvements of the *Create report* interface.
- Feedback of selected report receivers.
- Improvements of the *Add matching words* interface.
- General feedback on buttons.

7 Deliver phase

This chapter presents the Deliver phase in the Double diamond model. In this phase, a developed concept was developed with improvements that was listed in the list of features. The concept was transformed into a high fidelity-prototype and a second iteration of the prototype was performed. The second iteration included a final usability testing session. The result was analysed and examined if the generated concept was better than the original platform. A method investigation where the methods were used throughout the thesis will be introduced.

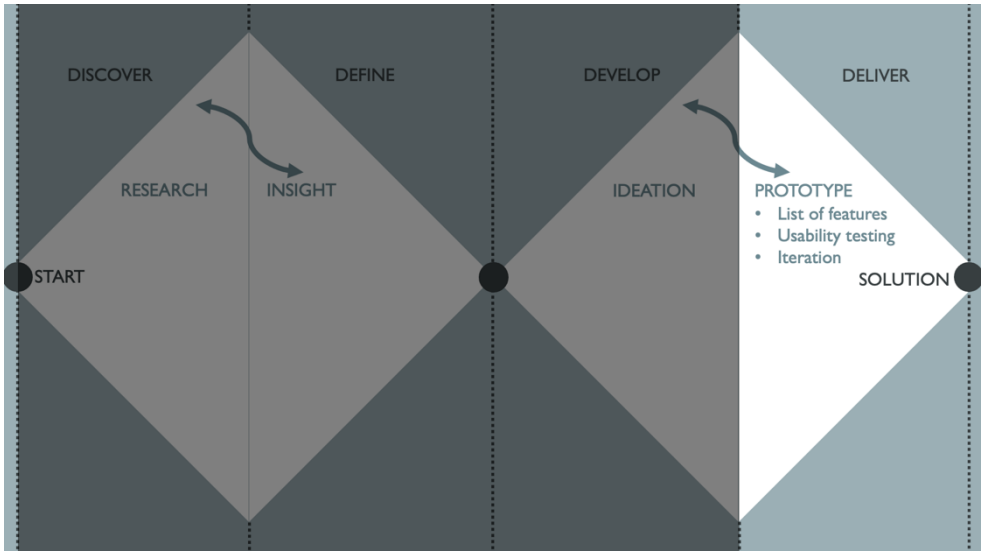

Figure 7.1 Deliver phase in the Double diamond model.

7.1 List of features

A list of improvements was done for the potential prototype. These functions were introduced when the Hoodin-platform was usability tested together with a potential end-user. The list contains main functions for a better solution to increase the usability of the main product. This list includes all possible features and what themes have been fulfilled. This list is presented in table 7.1.

Table 7.1 List of functions and features.

Function	***Feature***	***Theme***
Compress the platform	Merge the steps of creating a new monitoring feed	Efficiency Learnability
Add a new *Edit*-button	Add an *Edit*-button beside each monitoring feed	Effectiveness Efficiency Satisfaction
Add a new *Create report*-button	Add a *Create report*-button below the search bar	Effectiveness Efficiency Satisfaction
Improvements of the *Create report* interface	Merge the steps of creating a new monitoring feed and remove the preview	Efficiency Satisfaction
Feedback of selected report receivers	Add visual feedback when a receiver is selected	Satisfaction
Improvements of the *Add matching words* interface	Add visual feedback of the matching words	Learnability Satisfaction
General feedback on buttons	Enhancing colours and changing width when choosing options	Learnability Satisfaction

7.2 The prototype

The prototype and the features for possible improvement of the functions were made in a web-based program called proto.io. The prototype will be presented below in picture format. Moreover, the original prototype was a high fidelity-prototype that was integrable. The main functions and features listed above were implemented into a final concept which are seen in the figures 7.2-7.7.

7.2.1 **Compress the platform**

To create a new monitoring feed in the Hoodin-platform, the user needs to go through five steps before the feed is complete. To make this process more efficient, the five steps were merged into three steps.

When creating a new monitoring feed in the Hoodin-platform, the user needed to choose a *Use case template* and then choose a *Monitoring feed* in two different steps as seen in figure 7.2 (a) and figure 7.2 (b).

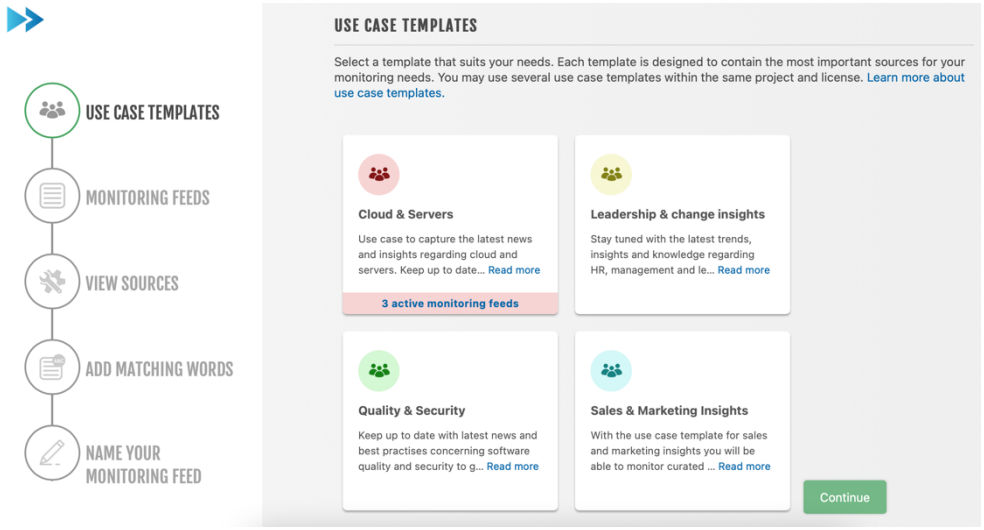

Figure 7.2 (a) First step in the Hoodin-platform for creating a new Monitoring feed starting with choosing a Use case template.

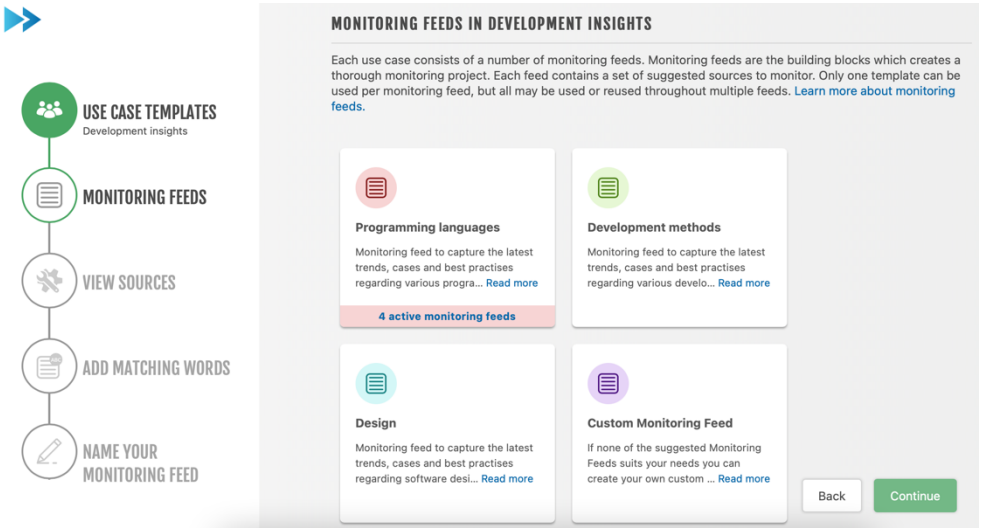

Figure 7.2 (b) Second step in the Hoodin-platform when creating a new Monitoring feed is Monitoring feed in Development insights.

In order for the user to avoid first choosing a *Use case template* and then move on to the next step and choose a *Monitoring feeds in Development insights*, these steps were compressed into the same page. This was done by creating a block system where the user simply chooses a *Use case template* and then the matching *Monitoring feed in Development insights* appears as options below the chosen *Case template* in the same step.

Different case templates with associated development insights can be found by pressing the blue arrows to the right and left of the interface. The chosen template is marked in a blue faded colour to indicate and give feedback to the user that this specific *Use template* has been chosen, in this case *Development insights* as seen in figure 7.2 (c).

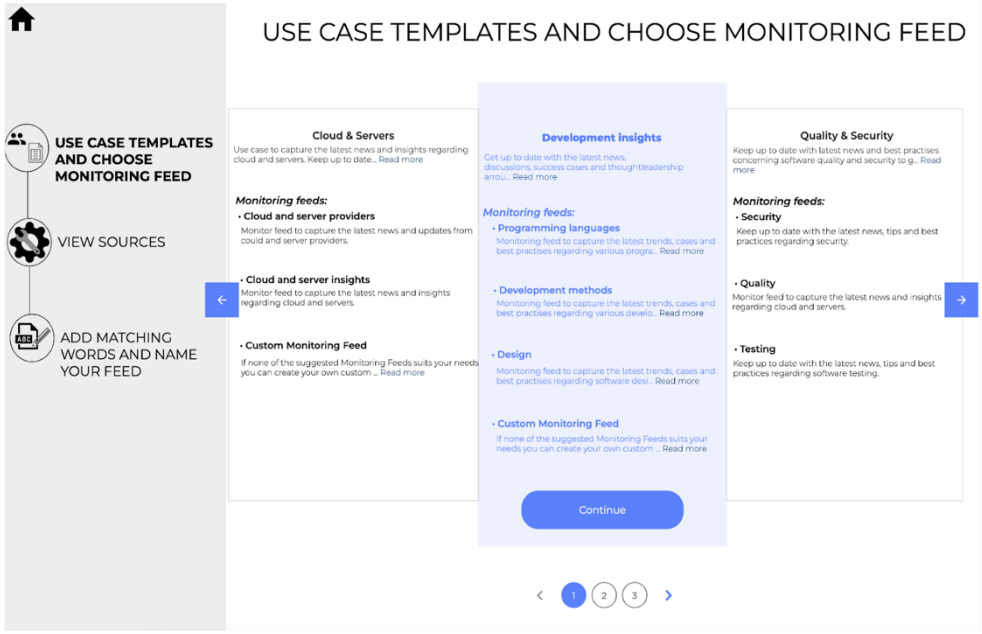

Figure 7.2 (c) Use case templates and Monitoring feeds merged into one step to create a new Monitoring feed.

After a case template has been chosen and a specific *Monitoring feed* has been selected, the selected *Monitoring feed* will be marked with a blue triangle to indicate to the user that this is the selected monitoring feed, in this case *Programming languages* as seen in figure 7.2 (d).

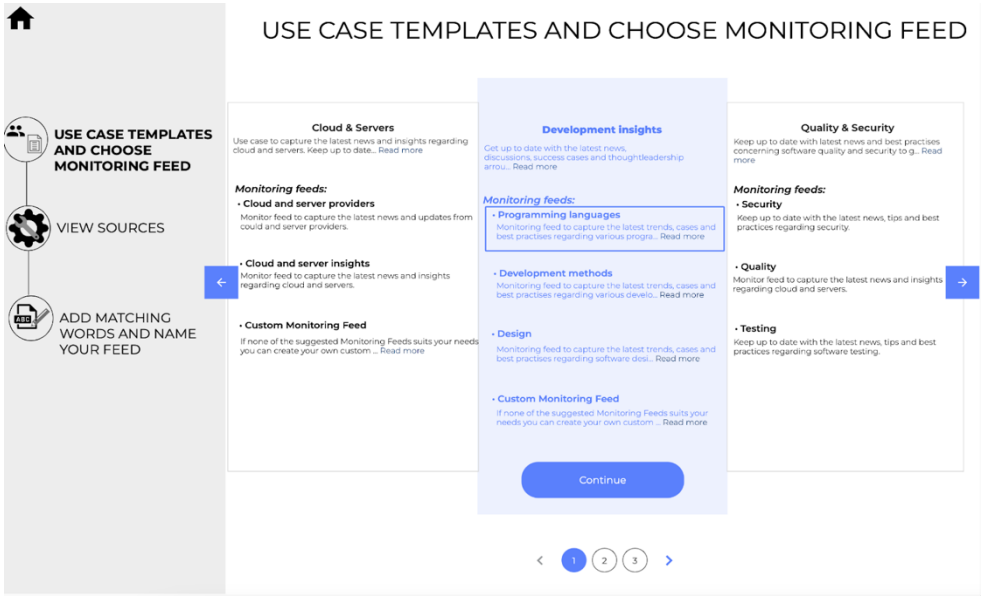

Figure 7.2 (d) Use case template Development insights and chosen Monitoring feed Programming languages.

7.2.2 **Add a new Edit-button**

Figure 7.3 (a) shows a glimpse of the Hoodin-platform homepage and the search bar located above the monitoring feed with related articles. For a user to edit a monitoring feed, the user needs to press on a random article below the search bar in the monitoring feed and then press the *Edit*-button located inside of the different articles.

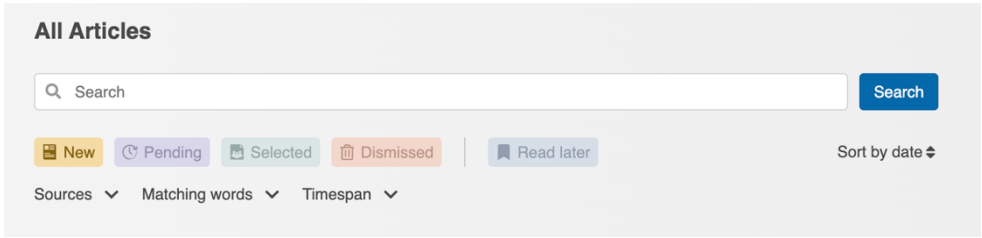

Figure 7.3 (a) Hoodin homepage with a search bar for searching saved articles.

To facilitate the procedure of editing a monitoring feed, an *Edit*-button was added above the search bar next to the name of the selected monitoring feed, in this case *JavaScript Update* as seen in figure 7.3 (b).

Figure 7.3 (b) An Edit-button was implemented above the search bar in the prototype.

7.2.3 **Add a new Create report-button**

To create a report in the Hoodin-platform the user needed to navigate to the *Create report*-button which is located in the top right menu at the homepage, seen in figure 7.4 (a).

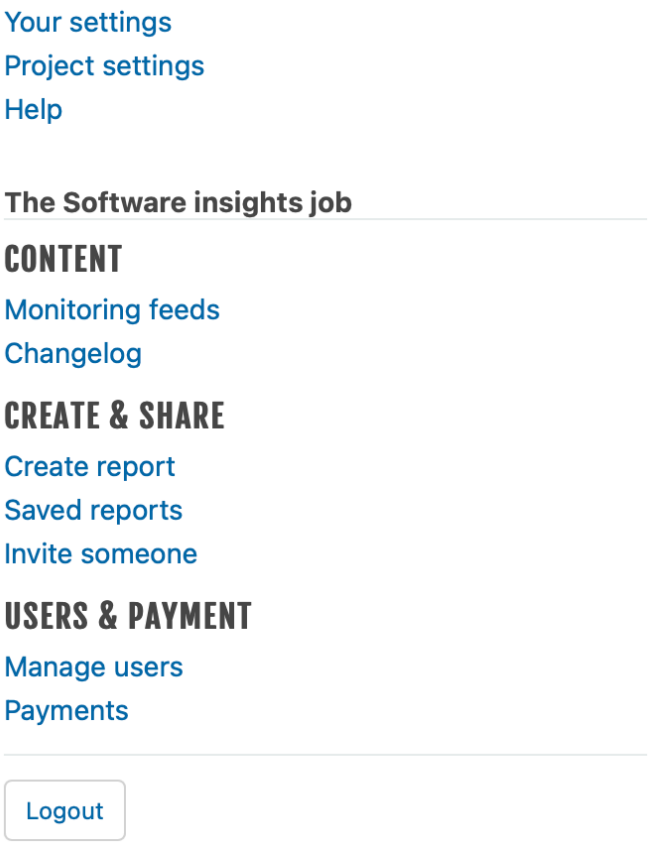

Figure 7.4 (a) Create report-button located in the menu in the Hoodin-platform.

To make this manoeuvre more efficient and easier for the user to find, a purple *Create report*-button was implemented at the interface homepage, below the search bar as seen in figure 7.4 (b).

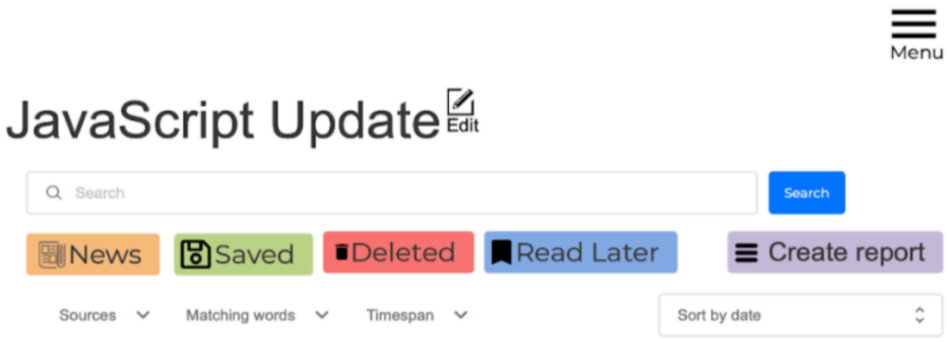

Figure 7.4 (b) Added a purple Create report-button below the search bar.

7.2.4 **Improvements of the Create report interface**

When pressing the *Create report*-button in the Hoodin-platform, the user was routed to a page where the user needed to fill in information settings before creating a report. Information such as: Name of the report, *Use cases*, *Monitoring feeds* and *Timespan* needed to be filled in before continuing to the next step. When the information was filled in, the user pressed a button *preview* to continue to the next step. In the next step the user got a visual preview of the report, but also the option of modifying the report settings made in the first step. Below the option of modifying the settings the user can choose between the options of *Create single report* and *Create recurring reports*, seen in figure 7.5 (a).

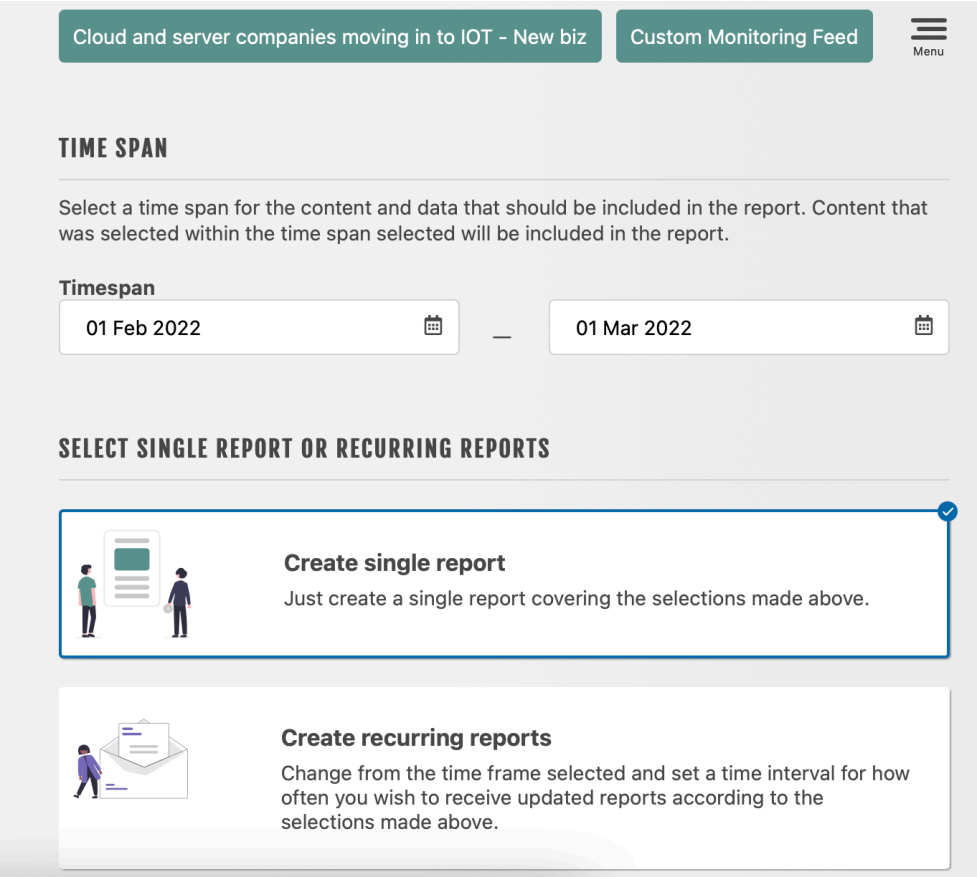

Figure 7.5 (a) Second view of Creating a report in the Hoodin-platform.

During the usability testing test users were confused about the preview interface, since they thought they needed to fill in the same information once again as they

made in the first step. To avoid this, the preview view was removed in the prototype.

When pressing the *Create report*-button in the prototype, the user was directly routed to a page where the user could choose which type of report he or she wanted to create, by either pressing *Create single report* or *Create recurring reports*, marked as *1* and *2* as seen in figure 7.5 (b). When the user chose what type of report to create, the user filled in the same information as done in the Hoodin-platform as; Name of the report, Use cases, Monitoring feeds and Timespan. When creating *Recurring reports,* the user also had to add selected users of the reports as seen in figure 7.5 (b).

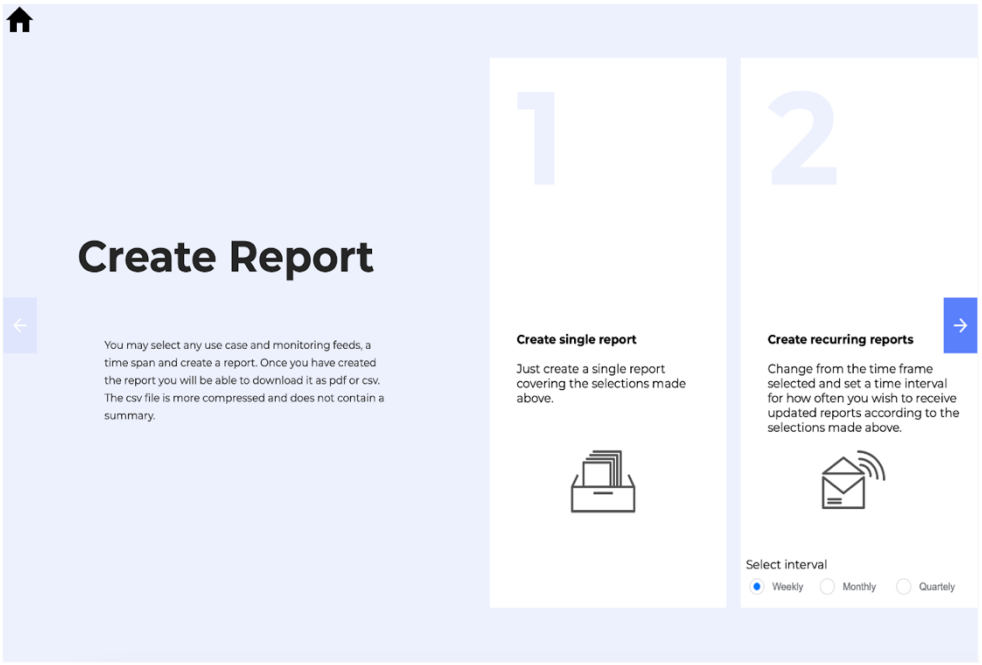

Figure 7.5 (b) Shows the second page of when Creating a single report or Recurring report.

When a type was selected, feedback was shown to the user in the form of the selected type is marked by a grey frame, seen in figure 7.5 (c). To continue to the next step of creating a report, the user could press the blue arrow located to the right of the interface.

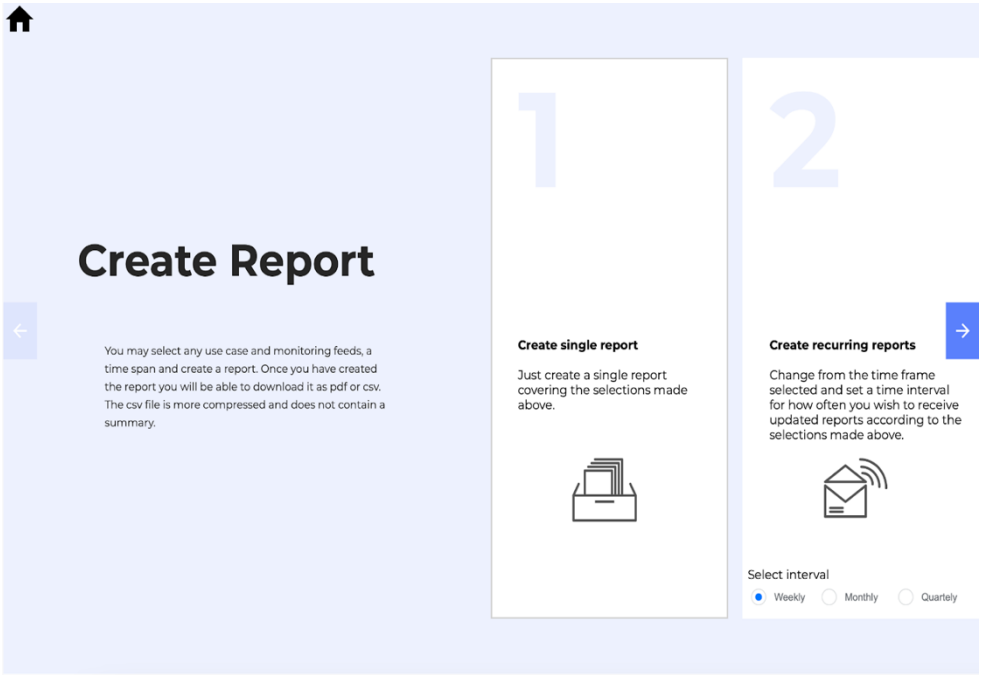

Figure 7.5 (c) When the user chooses the kind of report needed, the system will give feedback on what kind of report has been chosen by marking the rectangle in a grey colour.

7.2.5 **Feedback of selected report receivers**

When creating recurring reports, the user needed to add which receivers he or she wanted to receive the reports. Figure 7.6 (a) shows an added receiver of the reports

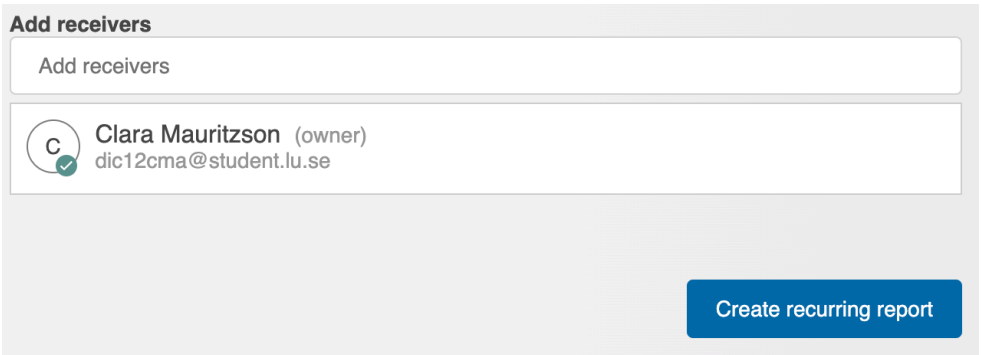

Figure 7.6 (a) Hoodin-platform interface of Add receivers.

During the test phase, some test users thought that there was a lack of feedback of which receivers that were selected. They thought that the list of receivers beneath the search bar were only selectable receivers and that they were not actually selected to receive the reports. To make this clearer for the users, a checkbox was added to the left of each added receiver to indicate rather or not the receiver is selected to receive the reports. Then the user could add as many receivers as possible to save in the list. When creating recurring reports the user could only check or uncheck the checkboxes on the selected receivers of the report, seen in figure 7.6 (b).

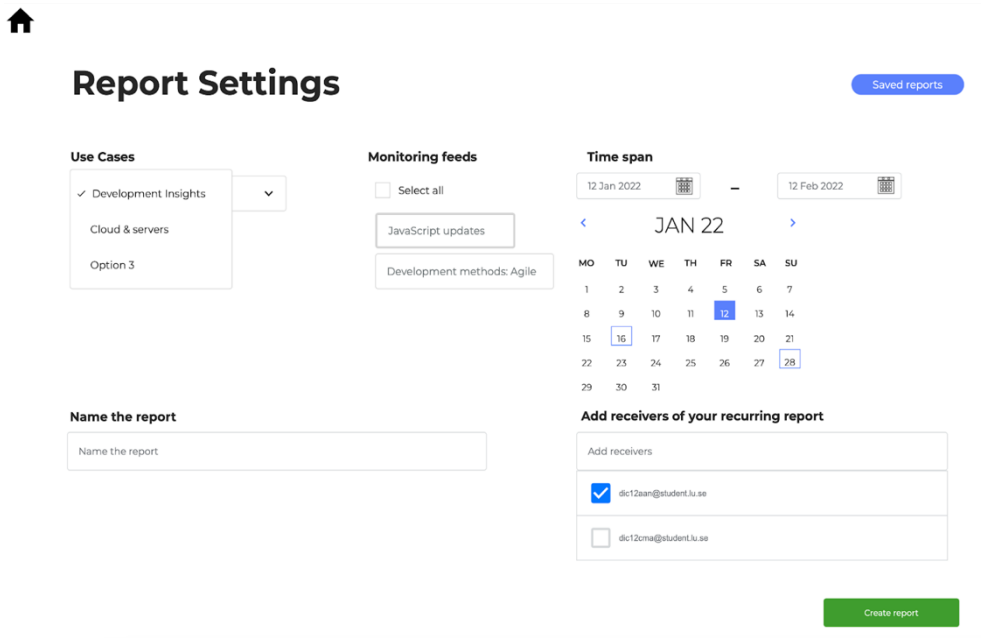

Figure 7.6 (b) Selected receiver of the recurring report.

7.2.6 **Improvements of the Add matching words interface**

When creating a new monitoring feed, the second step was to *Add matching words* as seen in figure 7.7 (a). The function *Add matching words* represented which articles should be displayed in the user's feed.

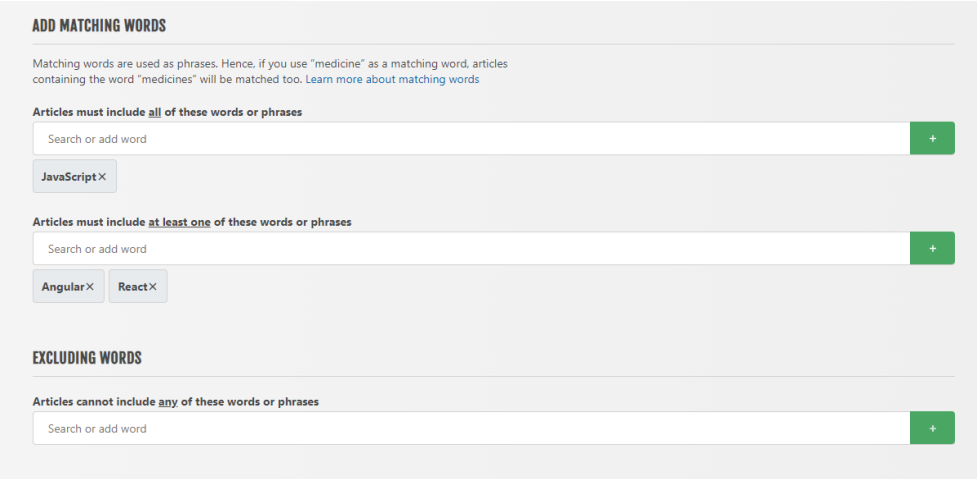

Figure 7.7 (a) Shows how the user can make a search by adding words in the Hoodin-platform

In the Hoodin-platform, the words were compiled separately on different lines as seen in figure 7.7 (a). To give the user a better understanding of adding words that are compiled together, the interface was improved to give the user better visual feedback.

When adding the word *JavaScript* in the first search bar as well as *Angular* and *React* in the second search bar, the user got feedback on what searches will be made in the monitoring feed as seen in figure 7.7 (b). This feature was added to provide a better understanding of how the search works since it is not an ordinary search engine. The monitoring feed was saved after pressing the green button located at the lower right corner of the interface, seen in figure 7.7 (c).

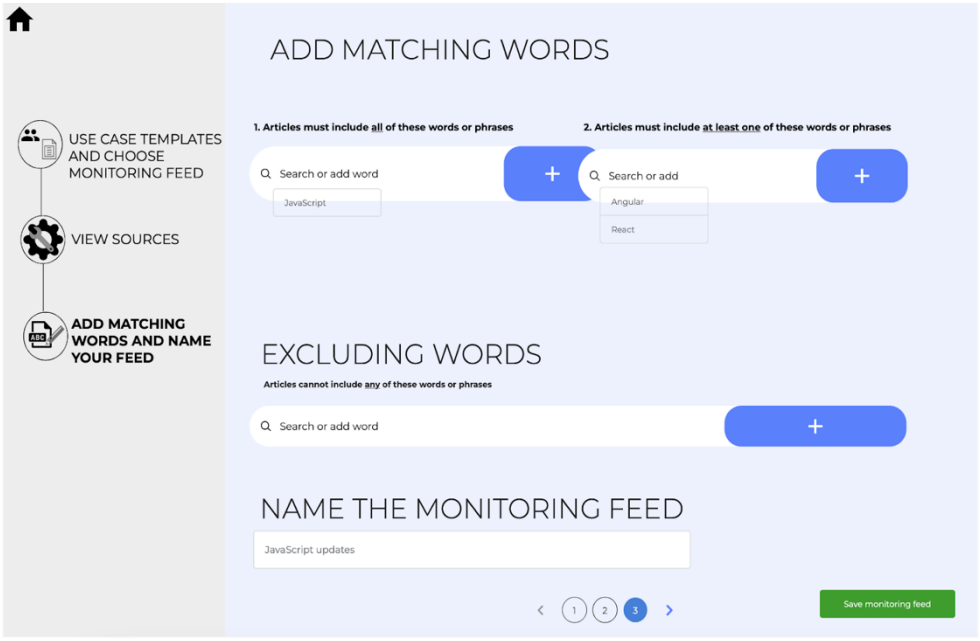

Figure 7.7 (b) Shows how the user can make a search by adding words in the prototype.

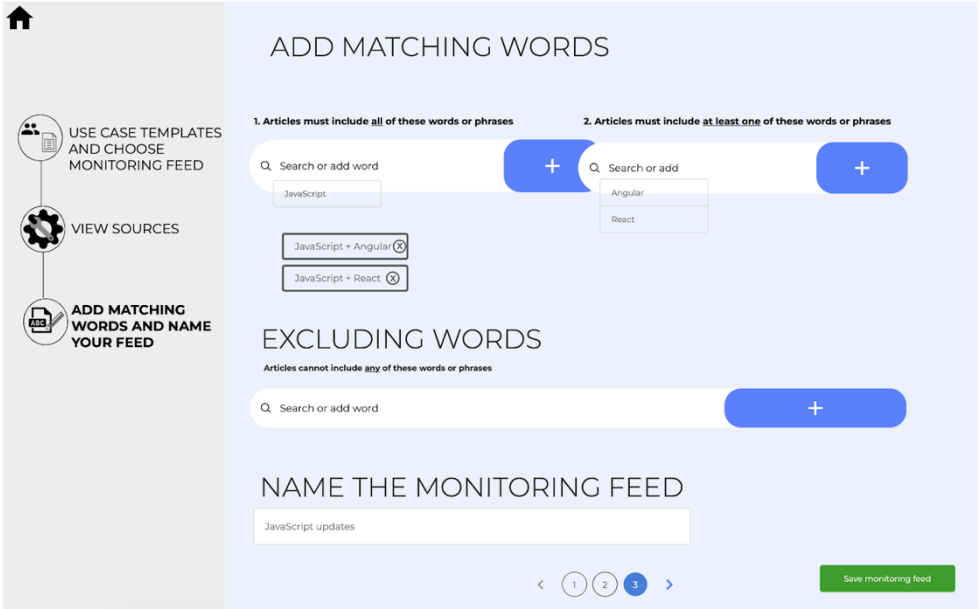

Figure .7.7 (c) When adding words, the system will give the user feedback of how the search will be made.

7.2.7 **The second iteration, Prototype**

Usability testing was performed on the new prototype with the implemented alterations found in the first iteration. This method was an observational methodology to uncover problems and opportunities in design of the new prototype. In a usability-testing session, the test leader was asking the test user to perform tasks on the user interface, shown in chapter 7.2. While the test users completed each task, the test leader observed the participant's behaviour and listened for feedback. The goal of usability testing was to identify potential problems of the design on the new prototype. Furthermore, this was to discover where there was room for improvement and learning about the potential user's behaviour and preferences [57] for a newer and an updated version of the Hoodin-platform.

7.3 Test plan

To investigate the Hoodin-platform in more detail, a test plan was constructed. The purpose of a test plan is to get an idea of what is supposed to be tested, why these steps are tested and the outcome of the tests. It was done by drawing up a thorough test plan from the beginning. This method describes what resources are needed and constitute a milestone hence the writers would plan according to the test plan [53].

7.3.1 **Purpose and goals**

The purpose of the test was to investigate the eventual problems and what improvements that could be done on the Hoodin-platform from a user's perspective. To answer the master's thesis purpose:

- *To which degree is the Hoodin-platform suitable to meet the needs and requirements of potential customers and if not, how should it be designed to improve the user experience?*

- *By mapping and proposing measures for Hoodin, how can the interaction design of the platform be improved?*

Following questions was categorised based on the themes *learnability* and *effectiveness*:

- How appropriate and satisfying is the search filter in the monitoring feed? obj.quant/obj.qual
- How user friendly is it to create a new report? obj.quant/obj.qual
- How easy is it to understand the monitoring feed? obj.qual
- How expedient and intuitive is the function to share a report? obj.qual/obj.quant
- How user friendly is the function to create recurring reports? obj.quant/obj.qual
- How user friendly is it to change a monitoring feed? obj.quant/obj.qual

User friendly was defined of the following goals:

- **Effectiveness:** How useful was the platform.
- **Learnability:** How easy the task is to learn and remember.

During the usability tests, when the tasks were given, the goals was to see if the test persons can solve it effectively and if it is easy to learn. These were the themes that were discovered during the discovery phase, *learnability* and *effectiveness*.

7.3.2 **Data to collect**

The questions was divided into subjective/objective and qualitative/quantitative for when usability testing the platform. The questions was categorised into four types of data [54].

- **Objective/Qualitative data:** the issues are an anecdotal description of wrongdoing.
- **Subjective/Qualitative data:** collect the user experience the test person has during use.
- **Subjective/Quantitative data:** test person can rate the simplicity using a scale 1-5 of a task.
- **Objective/Quantitative data:** data collected by seeing how long it takes for an individual to solve a task.

7.3.3 **Test tasks**

The same test tasks were used as stated in 6.2.1 but since the subtasks have changed, a new table will be presented below to show each step that has to be made for the task to be completed. The tasks are presented below in table 7.2.

Table 7.2 Shows the test task the user needs to complete.

Task	***Subtask***	***Completion condition***	***Max time***
1. Create new monitoring feed with word "JavaScript" and matching word "Angular" and name it "JavaScript updates"	1.1 Click new monitoring feed 1.2 Select development insights and click programming languages and click continue 1.3 Add matching words in "articles must include all of these words or phrases" 1.4 Add matching words in "articles must include at least one of these words" 1.5 Name the monitoring feed 1.6 Click save monitoring feed	When a new monitoring feed is occurred on the wizard page	7 min
2. Change monitoring feed that has been set up and exchange the word "Angular" to "React"	2.1 Click on the button *Edit* next to the headline 2.2 Click next 2.3 Change the word angular to "react" and delete the word "angular"	When an updated monitoring feed is occurred on the wizard page	10 min
3.Create a report based on the monitoring feed you have set up	3.1 Click on the button *Create report* 3.2 Click on create reports 3.3 Choose the Use case "Development insights" 3.4 Choose the Use cases "Development insights" 3.5 Choose Monitoring feed "JavaScript updates" 3.6 Choose time span 3.7 Click preview 3.8 Click on "Create report"	When test person sees that the report could be downloaded as pdf or csv	7 min

4.Create recurring reports of the monitoring feed you have set up and share with "dic12cma@student.lu.se	4.1 Click on the button *Create report* 4.2 Click on create recurring reports 4.3 Choose the Use cases "Development insights" 4.4 Choose Monitoring feed "JavaScript updates" 4.5 Choose time span 4.6 Name the report 4.7 Add receiver "dic12cma@student.lu.se" 4.8 Click "Create report"	When test person sees that the report could be downloaded as pdf or csv	7 min

7.3.4 **Selection of test users**

As stated in 6.2.4 to map a problem, 4-5 test users are recommended [53]. Four test users were selected since the purpose and goal in this thesis was to identify the eventual problems in the Hoodin-platform. The criteria's of being a test user in this project was an individual working within the information technology department. There were four people chosen working within the IT-department.

7.3.5 **Role distributions**

Test leader: was responsible for the interaction with the test user, presented the test cases and made sure the test session was successful.

Protocol keeper: was responsible for setting up audio, video and wrote down observations during the test session. This person in addition kept track of the time thus the user would not exceed the time frame.

7.3.6 **Test environment**

The tests took approximately 30 minutes where the test users were given the assignments by the test leader. By documenting the test users' manoeuvres both in film and sound was easily analysed. A computer was needed to do the tests since Hoodin-platform is cloud based.

7.3.7 **Reported results**

The collected data was assembled, analysed and the result will be presented closer in chapter 7.5

7.4 Steps of testing

This section describes how the usability testing was prepared and what methods were used. The same steps between 6.3.1 - 6.3.5 were used.

7.5 Test result and analysis

The tests were performed in a quiet environment. Both a screen video and audio were recorded during all tasks. During the tests', written observations were noted by the test leader. The screen and audio records gave the opportunity to calmly observe various test users and their manoeuvres afterwards as they performed the test tasks. The users had a maximum time on each task.

The video records showed the test users' interactions with the platform; which buttons were pressed, in what order the scenarios were made and where the test user struggled to perform the task correctly. The audio recordings demonstrated how the user thought in the different tasks since they have been asked to think aloud; which tasks were easy to perform, where problems occurred to finish a task and where they got frustrated and why.

7.5.1 **Background questionnaire**

To get to know the test users better some questions were asked. Out of four individuals, two were male and two were female, seen in figure 7.8.

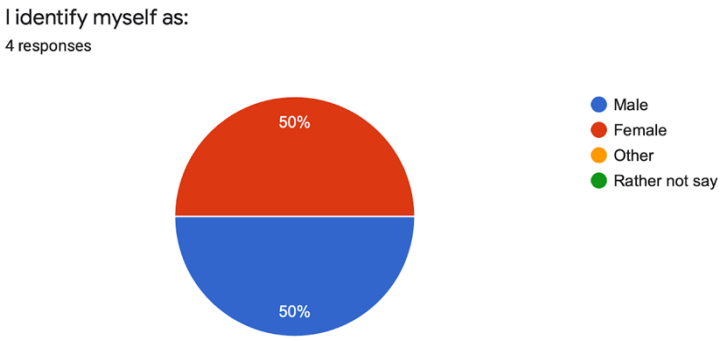

Figure 7.8 Out of total of four individuals half of them were male and rest of the half were female.

The ages between the four individuals were the youngest was 27 years old and the oldest 31 years old. All of them had working positions within IT-department and all of them were graduated engineers as seen in figure 7.9. The difference between them was their engineering degree, one had a bachelor's degree and the rest had a master's degree. The individuals average usage of search engines during work was 3 searchers per day. When asking the individuals if they had an enterprise search within the company they work for, all of them answered no.

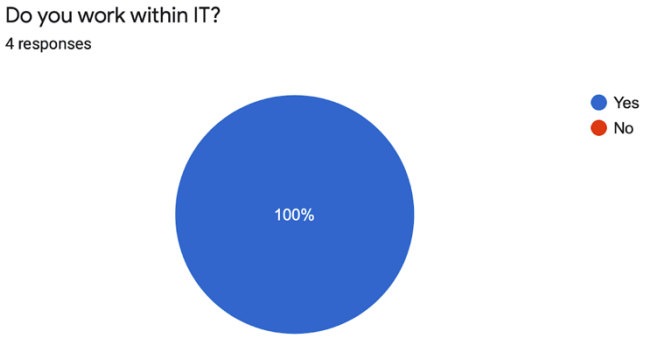

Figure 7.9 Out of total of four individuals, all of them said they work in an IT-department.

7.5.2 **Observation**

Task 1: Create a new monitoring feed with word *JavaScript* and matching word *Angular* and name it *JavaScript updates*.
Definition of the Successful Completion Criteria: When a new monitoring feed is occurred on the wizard page, max time 7 minutes

To create a new monitoring feed with the new prototype the user must press the button + *New monitoring feed*. This was performed correctly and straight forward by all the test users and no problems were noted. Instead of having to press *Use case templates* and *Monitoring feed Development insights* in two different steps, this has been merged into one step. The test leader noted that the two of the test user's that also participated in the first iteration said that they thought it felt more "easy to handle" the platform when the two steps had been merged to one.

When the test users went through the steps 1.4 - 1.5, adding matching words, both test user's from the first iteration mentioned that they enjoyed the visual change of how the adding words were presented more visibly.

During the subtask 1.8 *Click preview all content* in the first iteration, all of the test users were confused on which alternative they should pick between *Preview all content* and *Automatically select and share all content.* The *preview all content* view has been removed and the test leader did not note any confusion at this iteration.

All the test users were done with the task within the max time of 7 minutes and the completion conditions were a success. Once the user pressed the button *Create monitoring feed* that was visible in the top left interface, all the following steps were straight forward. There was no other option to create a monitoring feed. Furthermore, the users understood all the steps must be done to finish the given task.

Task 2: Change monitoring feed that has been set up and exchange the word *Angular* to *React*.
Definition of the Successful Completion Criteria: When an updated monitoring feed is occurred on the wizard page, max time 10 minutes.

To edit a monitoring feed, the users had to press the *Edit*-button at the homepage located above the search bar. Four out of four test users found the *Edit*-button and pressed it.

One of the two new test users mentioned that he was not sure if the *Edi*t-button at the wizard page was meant to edit the current feed. The test person tried to right click on the *JavaScript Updates*. When the person understood he could not do that, he tried pressing the *Edit*-button and acknowledged the path to continue the task. The other new test user struggled finding the *Edit*-button but she succeeded to find it at last.

Four out of four test users managed to complete the task successfully within the given time. The two test user's that tested the platform during the first iteration mentioned that they did not feel the same frustration finding the *Edit*-button this time.

Task 3: Create a report based on the monitoring feed you have set up.
Definition of the Successful Completion Criteria: When the test person sees that the report could be downloaded as pdf or csv, max time 7 minutes.

When creating a report all the test users saw the purple button *Create report* at the wizard page and clicked on the button. The test users performed subtask 3.3 - 3.7 without any hesitations and the reports were successfully made.

Four out of four test users achieved the task within 7 minutes and the successful completion criteria were a success, with some noted comments. The comments made were when creating a report and when the system gives feedback, it should be more highlighted and have a wider edging. One of the test users mentioned that the *Report Setting* page was a bit sparse.

Task 4: Create recurring reports of the monitoring feed you have set up and share with dic12cma@student.lu.se.
Definition of the Successful Completion Criteria: When the test person sees that the report could be downloaded as pdf or csv, max time 7 minutes.

When creating recurring reports, the test users had to press the button *Create reports* once again. Since this step was done in task 3, all the test users found their way to the menu at first attempt and subtasks 4.1 - 4.6 were done without any problems noted.

During the first iteration, two of the test users had some minor problems with the subtask *Add receiver*. They understood how to add the receiver in the *Add receiver* field, but when the receiver was added they were unsure if the receiver was selected. During this iteration the test leader did not notice any problems with selecting receivers and the recurring reports were created.

Four out of four test users achieved the task within 7 minutes and the successful completion criteria were a success. The video records show that all of the test users knew right away where to find the create report button since they already did a similar task in task 3.

7.5.3 **System Usability Scale-Questionnaire**

The result from the System Usability Scale-questionnaire after the test can be seen in figure 7.10. The total average of the System Usability Scale-score was calculated to 87. The suggested average score is 68 and above when experiencing a system.

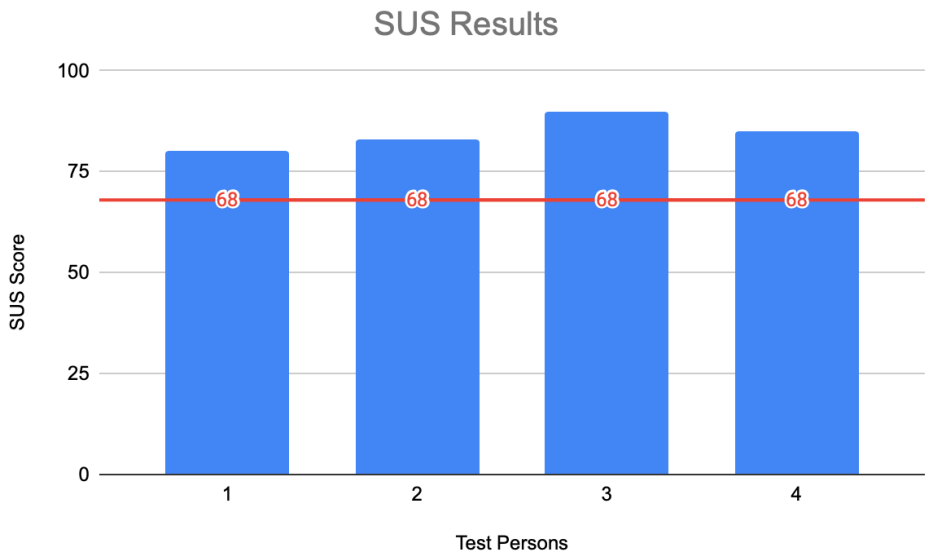

Figure 7.10 System Usability Scale results from the second iteration.

7.5.4 **Conclusion from Usability testing of the Prototype**

Since the first usability testing was done, the following improvements has been implemented in the new prototype:

- Compress the number of steps in the platform for a more efficient flow.
- Add a new, more visible, *Edit*-button.
- Add a new, more visible, *Create report*-button.
- Improve the preview when creating a new report.
- Feedback of selected report receivers.
- Improve the visual appearance of the *Add matching words* interface.
- General feedback on buttons.

In test task 1, the test leader noted that zero out of four test users had complaints about the number of steps to create a new monitoring feed. Thus, the two test users who participated in the first test iteration stated that they thought the platform was easier to handle since the five steps had been merged into three. Both test users from the first iteration stated that they enjoyed the visual change of how the adding words were presented more visibly. This indicated that the new implementation that was made during this task were successful out of the test user's user experience and satisfaction.

During the first test iteration zero out of four test user's managed to edit a monitoring feed. During the second iteration the new *Edit*-button was implemented, located at the homepage. Four out of four test users were able to finish the task within given time. One of the new test users stated that it was not fully clear of what the *Edit*-button located at the homepage was supposed to do. Furthermore, when pressing the button, the test user was directed to the edit page of the *Monitoring feed*. The two test user's from the first iteration mentioned they did not feel the same frustration during this test session when trying to edit the monitoring feed. Combining these experiences, this indicates that the new *Edit*-button was successful but still has room for improvements.

Since the new *Create report*-button was implemented below the search bar at the homepage, the time until the test users found the button was sharply reduced compared to the first iteration. Zero negative comments about the position of the *Create report*-button were noted by the test leader. Since the first iteration, the *preview* page of the create report settings were removed, thus there were no negative comments mentioned about this view. The implementation of the *Create report*-button and the removal of the preview page was interpreted as a positive change since the first iteration based on the observations made.

During the first iteration two out of four test user's had some minor problems when adding receivers of the recurring report because of the lack of visual feedback. To avoid this confusion, a checkbox was added to the left side of each added receiving email address. This made it possible to select or deselect receivers of the recurring reports and confusions were reduced. Four out of four test user's managed to finish the task and no comments were noted.

The visual appearance of the *Add matching words* interface was improved before the second iteration to provide better feedback towards the users. The two new test users did not comment the implementation, nor good or bad, but both test user's from the first iteration stated that they enjoyed the visual change of how the adding words were presented more visibly.

There was a change when comparing the results of the System Usability Scale-questionnaire between the first and the second iteration. The System Usability

Scale-score can have a score between 0-100. The score 68 and above is considered above average. Scores below 68 points indicate issues with the design; the suggested average score is 68 when experiencing a system. The scale is made up of the following characteristics: effectiveness, efficiency and satisfaction [55]. During the test iterations, the score went from 37,5 compiled after the first iteration and increased to 87 after the second iteration. This indicates that the implementations that were made to improve the platform's efficiency, effectiveness and satisfaction were successful.

7.6 Method investigation

During the process of this thesis, reasoning about the choices of methods was made. Each of the methods and their advantages and disadvantages are presented in a table 7.11 below. These methods will be further reflected under the chapter Discussion.

Table 7.10 Each phase and the chosen methods used throughout the thesis.

Discover		
Method	Questionnaires from individuals within IT-department	Semi-structured Expert Interviews
Advantages	• A good way of handling sensitive topics that resulted in honest answers • A good way of collecting a lot of information in short time • The possibility of having a multiple-choice questions where the answers could be extended by having open-ended follow-up questions resulted in valuable information	• A good way of receiving information from individuals working with the product

Disadvantages	• Not a guarantee of diversity among the individuals • Individuals thought only of their own opinions	• Since this is not a target group, they see it from a business perspective
Takeaways from phase	Important themes were created for making an ultimate service	
	Define	
Method	User-story	
Advantages	• Brought users closer by understanding the user's perspective, challenges and opportunities that needs to be addressed • Reduced risk by eliminating various potential risks	
Disadvantages	• Lack of information concerning the method of development and design interface	
Takeaways from phase	A well-defined problem and goal were defined	
	Develop and Deliver	
Method	Usability Testing	
Advantages	• Helped to understand the end users' needs and what frustrated the individuals while using the product • Meting the user's expectations by testing if the product aligns with the needs • Improved users' experience • Discovered potential hidden issues with the product	

Disadvantages	• Selecting the right target group can be tricky • Usability test outcomes are arguable
Takeaways from phase	Pros and cons from the Hoodin-platform and the prototype

8 Discussion

In this chapter a discussion regarding the conditions of the thesis together with the project framework will be described. The methodology in each phase of the Double diamond model and its result will be examined. Furthermore, the final concept will be reviewed and recommendations for future development are introduced.

The purpose of this master's thesis was to study the new launch of Hoodin-platform based on a user experience and its user interface. The needs of potential customers were identified and studied to see if there was room for improvement of the new Hoodin-service. The users' needs were obtained through interviews and questionnaires which became the common thread throughout the project. Furthermore, usability tests were performed to analyse the interaction with the product. By taking the users' needs and their feedback from the usability tests, a high fidelity-prototype was built. Lastly, the prototype was user tested once more to confirm whether advancement was made or not. It showed enhancement among the test users, but the prototype needs to be further developed to confirm actual verification.

8.1 Conditions of the thesis

Initiating the master's thesis was time consuming due to defining the correct purpose and goals since it changed frequently.

The majority of the time was spent within the Discover phase. As a result of identifying current, along with proactively detect problems which could arise whilst using the product. The authors had to understand the width and the depth of the potential difficulties that occur using the service. When all data were assembled, the authors created themes which was needed to further evaluate the product. Four themes were identified, yet only two were chosen due to the scope and the other two were considered for future work.

8.2 Framework

The Double diamond design process and its four phases were used as a template for this master's thesis. The process is mostly used when designing a new product and/or service. The Hoodin-platform does not match the criteria since the service is an existing product. However, the authors have not been engaged in the design phase of the platform. Therefore, the Double diamond design was used as a guideline throughout the process.

Other models could have been chosen to investigate the platform but would not offer the same level of detail as this framework contains four different phases. Depending on if the phase was divergent or convergent, resulted in both thinking broadly but also detailed thinking by identifying one or two key problems and/or solutions. The project framework was non-linear and has been an iterative process between the different phases. It was a new way of working for the writers and was sometimes challenging to keep track of the different phases.

8.2.1 **Discover**

Methods for collecting data in the Discover phase were semi-structured expert interviews at Hoodin and questionnaire for potential customers fitting into the criteria of working within the IT-department. Due to the pandemic and the employers working from home, the interviews were done online. It might have affected the result due to the loss of non-verbal cues such as facial expressions, gestures and body language which can help by giving more context to the result [58]. Hence, this product is recently launched the only experts considered are the Hoodin employees. The limitation of the data source could sway the outcome due to biased experts.

Gathering data through questionnaires was convenient due to easy accesses through Google Forms. It resulted in a wide range of target group, both in gender and age. The questionnaire was sent out to different companies with an IT-department for their employees. The structure of the questionnaire was multiple choice questions with additional follow-up questions for the individuals to answer. The form was a success where the answering ratio was at 95%. The questionnaire was anonymous which possibly could have led to the individuals to answer freely and give trustworthy answers [59]. Furthermore, a large amount of valuable data was obtained. A potential problem with questionnaires that could have occurred was when the follow-up questions were to be answered, some individuals had more elaborated answers than others. For an ultimate result, supplementary interviews could have been done to reassure the individual responses and/or add additional answers for gaining ideal data.

Affinity diagrams were used to find relations between the large amount of data. Moreover, this is a method that helps to organize and group the data based on the relations [47]. The data brought four different themes the potential users considered was important for a developing search bar program to have which resulted in: *effectiveness*, *learnability*, *satisfying* and *reliability*.

8.2.2 **Define**

The collected data from the Discover phase was brought into the Define phase. Hence, the Define phase is convergent, the authors decided to narrow what themes were considered most important and needed for the potential customers. It resulted in continuing with the themes *effectiveness* and *learnability*. These themes laid the foundation for the upcoming phases.

The chosen method in this phase were user-stories which is a beneficial way to illustrate solutions to the problems uncovered in the research [50]. This technique fit the thesis overall limited time frame the best considering they are easy to understand and to get started with. Since the Hoodin-platform has many features and is a fully functional product, a decision was made to limit the number of features and identify the most important functions from the service. In the Discover phase it was stated from the expert interviews that *Creating a New Monitoring Feed* and *Creating a Report* was the main purpose with their service. These features were chosen to be used in the user-stories and it helped the writers to shift focus by instead of writing down the features, to discussing the features.

Though there are advantages with user-stories, the approach should be taken into consideration with possible problems that could occur. The problem with user-stories could include many assumptions and does not acknowledge causality. Format of the user-stories is: as a [type of user], I want [some action], so that [outcome]. It resulted in no room for asking the question “why”. Another method that could have been used to solve this problem was to use job-stories. This process gives more context and causality by having a format of: when [situation], I want to [motivation], so I can [expected outcome]. Job-stories could have been a more suitable method to use in this phase to clarify assumptions compared to user-stories.

8.2.3 **Develop**

The result from the Define phase was taken into account in the Develop phase. A more defined problem and goal definition was created. Furthermore, it contributed to specify what features that were to be analysed in the Develop phase. The chosen method in the Develop phase was usability testing as the authors were to examine

an existing product. By choosing this methodology, the end-users were aimed to test the prototype and evaluate the product/service in a real-life scenario. The team used the feedback to improve the final complete product [51]. The purpose of the testing sessions was to gather deep information when the potential end-users interacted with the platform. Moreover, understanding if the functionality matched the requirements stated from the Define phase. In addition, to eventually making changes based on the results from the users' needs and their feedback from the usability tests. When the test where executed a clear pattern was obtained for where and when users encountered problems in the platform. In several cases, the end-users had similar problems when performing the same test case. It strongly indicated that the function needed to be improved from a usability perspective.

To have a successful testing, selecting the right target group is important. Furthermore, trying to recruit individuals for testing the platform could be considered tricky. This was not a problem since requested individuals wanted to contribute. The difficulties occurred when the individuals had to perform the actual usability test. The tests were performed during the pandemic. Hence to the restrictions, majority of individuals worked from home and limited their interaction with people. This resulted in a limited number of participants. The recommended number for mapping a problem are between four to five individuals [53]. The authors limited the testing session to four individuals, and it could have affected the outcome.

The think aloud method was performed during the complete test session. It provided information of how the users were thinking and collecting their thoughts. In addition, opinions about the actual platform were expressed. This method has advantages but could also interfere with the main task the individual has to perform. It could have resulted in low reliability, but the method was complemented with both audio and video recordings. These methods were added to examine if what the user said was consistent with the actions and limit the error margins. It was noticed that several of the test-users expressed the same frustration at the same functionalities during the test-sessions. This reinforces the indication that some of the functionality in the platform needs to be improved for the sake of usability. To obtain more depth and detailed usability testing, eye tracking method could have been used to diminish error margins furthermore, but it is an expensive method that the authors did not have access to.

As for gathering data and results in this phase different methods were chosen; success rate, duration a task required and users' subjective satisfaction. For each test task completion conditions and max time for a user to reach were set. The successful completion criteria were reported with a deep level of detail. Only if the user succeeded to accomplish the task within the time frame was documented. For a more detailed conclusion, measuring how long each task took to solve could have been documented for a better result.

The users' subjective satisfaction was measured with a System Usability Scale. It was a fast and efficient way of gathering statistically valid data which gave the team a clear and reasonably precise score to examine further in the master thesis. As argued by Preece, Rogers and Sharp, user experience concept is a measurement of how humans feel and their satisfaction when using a product [12]. How the user experience is considered can be affected by aspects such as the functionality, usability, aesthetics, content, feel and look and the sensual and emotional appeal [12]. One cannot design a user experience, only design for a user experience where all these aspects are considered.

Using the System Usability Scale to measure the users' satisfaction made it possible to obtain more specific statics of the users' subjective satisfaction while using the platform. During the first test iteration, the compiled score was 37,5 and recommended points for the System Usability Scale is 68 and above. This was a clear indication that the functionalities of the platform needed to be improved.

8.2.4 **Deliver**

In the final phase, Deliver phase, a list of functions and features was made from the results in the Develop phase. As the Double Design methodology specifies, this phase means testing the different solutions, pick out the best solution, build that and continue to improve them [42]. Specifying a list with functions and features made it possible to create a final concept which resulted in a high fidelity-prototype, resembling the Hoodin-platform. The prototype was made in proto.io and contained the solutions from the list of functions. The program offered 15 days of full-featured trial and therefore was a time limit to consider when starting the second iteration.

When the prototype was finished, a second round of usability testing was set up as in the Develop phase. Furthermore, to examine both iterations and then compare the iterations if improvements were made. The difference between the two test sessions regarding the test users were that in the first test session, all the test users were beginners. During the second test session, two of the test users from the first test session were participating. It was decided to combine both beginners and experienced test users in the second iteration for the reason to examine increased or decreased satisfaction when using the prototype. A potential problem considered was, since two of our test users were experienced, this could increase the results since they already had some experience of using the platform. This is linked to the cognitive behavior that when the user performs a certain maneuver, the user will learn how the function works and eventually this learning will be remembered. Memory is the concrete result of learning ,which is one of the cognitive processes [35]. Even though the functionalities in the prototype were developed, some functionality remained.

By using the System Usability Scale to measure the users' satisfaction it was possible to obtain more specific statics of the users' subjective satisfaction while using the platform. During the first test iteration, the compiled score was 37,5 and recommended points for the System Usability Scale is 68 and above [12]. During the second iteration the score increased to 87. This indicates that the changes made in the prototype were successful referred to how the test users felt when using the platform and their satisfaction.

8.3 The prototype

The second purpose and goal of the master's thesis were to map and propose measures for the Hoodin-platform if the interaction design could be improved. To achieve improvements regarding the interaction design in the prototype, all of the previous phases stated in the Double diamond methodology had a great impact.

The improvements resulted in a high fidelity-prototype which was produced from needs of potential customers. The second iteration presented an increase of positive results. Due to implementing the list of features and doing minor adjustments the results were achieved. The test users conducting both iterations were complimenting the prototype and thought that the user experience was further added when they compared the two different products. Since the prototype is not a fully functional service it cannot be established if the product has met the goal. There are indications suggesting it could have met the goal with the boosted results in the second iteration.

The main purpose of evaluating the prototype was to study if the potential customers could navigate and solve each task without further problem. The importance of using the prototype was to guide the test users by adapting the main component within the features, *learnability* and *effectiveness*. The two main tasks solving was examine the user could *Create a new monitor feed* and *Create report*. Hence, these two tasks were most essential parts of the service as stated by the employees at Hoodin in the Define phase. By improving the digital solution with constant iterations and usability tests, it was the best way of reaching the target audience and possibly widen the potential customers.

8.4 Future development

Other potential features that were brought up in the design process that could be interesting and beneficial to add in the concept:

- **Make the Edit-button more accessible and visible** - even though changes were made from the first to second iteration to make the *Edit*-button more visible by adding figure and text, the users still struggled to find the edit function. Suggested improved feature is to move the headline + it's edit-button to under the searched articles.
- **Using the Proximity principle within design** - some users commented that the similar buttons close to each other did not interact the same way. Using this principle stated that items closer together are likely to be perceived as part of the same group and are sharing the same functionality and/or traits.
- **Feedback in form of thicker and highlighted buttons** - this was implemented already in the prototype, but the test users pointed out that this feature could be further improved.
- **Choice of vocabulary** - some buttons with text on them were considered in the first iteration weird and not quite understandable. Some of these were improved in the second iteration of the prototype but it was pointed out that there was still room for improvement.
- **Eliminate text** - the test users noticed that there was a lot of text on the platform and was emphasised that it confused the users and was suggested to eliminate the amount of text on the platform.
- **Easier search-function** - even though this feature was updated from the first iteration to the second iteration it was a concept that was still difficult to understand. The concept of having two search bars and understanding of how the search shall come into use was a new format of thinking. This feature is originally made for employees within the MedTech-industry and is a typical way for them to search. Since this platform is for people within the IT-department this concept could be more evaluated and find a simpler way of having a search bar given that it is implemented with people in the MedTech-industry from the beginning. It was difficult for the users to grasp the concept.

As stated, the prototype was not complete and there were some functionalities that were not perfectly done. To exemplify, when choosing a value, the pre-selected button was to be un-toggling before choosing other options. For reaching the optimal user experience these features need to be implemented correctly.

8.5 Importance of User Experience

User experience design is broad and can be applied to a larger scale of existing product/services or before producing them. How the user experience is considered can be affected by aspects such as the functionality, usability, aesthetics, content, feel and look and the sensual and emotional appeal [12]. This concept could favor products in general but also services similar to the Hoodin-platform, to generate a more positive interaction with the product. User experience importance tries to fulfill the user's needs. The aim is to provide a positive experience that will make a user loyal to a product and/or brand. It is difficult to define a good user experience thus there is no right answer, as user experience is different for everyone. Principally, for the authors of the thesis, the significance of when designing a web and/or a user interface is to remember that you are not the end-users. There should be no assumption of what the end-users want or need.

Regardless of the type of product and/or service, it is important to put users in focus. It is central to get close to the users by talking to them, let them use the product, get into their mindset and ask about their decisions. The end-users will teach about the product therefore listening, observing and asking the right question is essential. In general it is vital to put the customer in focus to guarantee they are recurring and/or permanent, which is usually what companies strive after and could be taken into account.

9 Conclusion

This chapter answers the questions that were stated in the first chapter under the subsection Purpose and goals.

The main purpose of the master's thesis was to examine Hoodin's new launch of their service for companies aimed towards IT-industry. The study was focused on a user experience and user interface of the platform based on potential customers of Hoodin. The needs of potential customers were identified and studied to see if there was room for improvement of the new launch. By taking the users' needs and feedback, improvements were mapped and presented in a high fidelity-prototype. The purpose and goals will be answered below.

- *To which degree is the Hoodin-platform suitable to meet the needs and requirements of potential customers and if not, how should it be designed to improve the user experience?*

After the first and the second usability test session, the test user's subjective satisfaction was measured with a System Usability Scale. During the test iterations, the score went from 37,5 compiled after the first iteration and increased to 87 after the second iteration. Furthermore, the points indicates that the first iteration had shortage in recommended points and had room for improvements. The implementations that were made in the second iteration to improve the platform's efficiency, effectiveness, learnability, and satisfaction were successful.

By comparing the Hoodin-platform to the developed prototype, there was significant improvements in several areas according to the user's interaction with the platform. The time it took for a test user to complete a test case improved during the second iteration and the test users did not express as much frustration as during the first iteration. This can be directly linked to how good a product is at doing what it is supposed to do, *effectiveness*.

During the second iteration the test users managed to complete all test cases compared to the first iteration. Moreover, indicating that the prototype was easier to use. From this a conclusion can be stated that the prototype achieved the usability principal *learnability*, how easy a system is to learn and use [12].

The conclusion was made by combining the score of the System Usability Scale and the effect of the changes in the design after the second iteration that the user experience was improved by the changes that were made.

- *By mapping and proposing measures for Hoodin, how can the interaction design of the platform be improved?*

During the second iteration, implementations of alterations were made based on the problems found during the first iteration. During the second iteration, all the test users managed to complete all the tasks. Moreover, to conclude the changes made were to improve the platform's interaction design. The changes made included:

- Compress the number of steps in the platform for a more efficient flow.
- Add a new, more visible, *Edit*-button.
- Add a new, more visible, *Create report*-button.
- Improvements of the Create report interface.
- Feedback of selected report receivers.
- Improvements of the *Add matching words* interface.
- General feedback on buttons.

The changes in the design achieved to improve the usability of the platform. In addition, it indicates to the user's interaction with the product, *effectiveness* and how enjoyable it is to use. The platform changed to being more efficient to use in terms of the way a product supports users in carrying out their tasks. This was presented during the task where the users were asked to edit the monitoring feed. During the first iteration zero out of four users were able to finish this task, but during the second iteration all the users managed to finish the task.

The test users found the results of the prototype to be more desirable when applying the recommended feedback. By implementing the changes, the platform also became easier to learn, *learnability*. Less time was spent on finishing each task, less mistakes were made and the test leader noted less negative feedback and frustration after the second iteration. By mapping and proposing measures for Hoodin outlined in the new prototype, the conclusion of the thesis is that the interaction design was improved based on users' opinions, measurements and statements.

References

[1] C. Meske, "DIGITAL WORKPLACE TRANSFORMATION – ON THE ROLE OF SELF-DETERMINATION IN THE CONTEXT OF TRANSFORMING WORK ENVIRONMENTS," *Proceedings of the 27th European Conference on Information Systems,* pp. 8-14, June 2019.

[2] J. H. Christiansen, "Using RESTful web-services and cloud computing to create next generation mobile applications," *Proceedings of the 24th ACM SIGPLAN conference companion on Object oriented programming systems languages and applications,* pp. 627-634, October 2009.

[3] M. Neugschwandtner, G. Neugschwandtner and W. Kastner, "Web services in building automation: mapping KNX to oBIX," *Proceedings 5th IEEE International Conference on Industrial Informatics,* pp. 87-92, 23 July 2007.

[4] G. Breiter, D. Jall, M. Mueller, A. Neef and M. Reitz, "U.S. patent no. 8,812,424," U.S. Patent and Trademark Office, Washington, 2014.

[5] A. Quintero, J. Fedor, A. Quan, K. Richardson, D. Scott and P. KA, "U.S. patent no. 8,812,424," U.S. Patent and Trademark Office, Washington, 2005.

[6] I. Leshko, Y. Firstenberg and K. N, "U.S. patent application no. 13/528,873," U.S. Patent and Trademark Office, Washington, 2013.

[7] P. Colton and S. U, "U.S. patent no. 8,291,079," U.S. Patent and Trademark Office, Washington, 2012.

[8] T. S, "Use of Internet and electronic resources for medical science information: A case study," *The Social Sciences,,* pp. 364-367, 2010.

[9] L. Chyrun, A. Gozhuj, I. Yevseyeva, D. Dosyn, V. Tyhonov and Z. M, "Web Content Monitoring System Development," *COLINS,* 2019.

[10] "What is accessibility?," [Online]. Available: https://developer.mozilla.org/en-US/docs/Learn/Accessibility/What_is_accessibility. [Accessed 22 February 2022].

[11] J. Nielsen, "Usability 101: Introduction to Usability," NN/g Nielsen Norman Group, 3 January 2012. [Online]. Available: https://www.nngroup.com/articles/usability-101-introduction-to-usability/. [Accessed 22 February 2022].

[12] H. Sharp, J. Preece and Y. Rodgers, Interaction design beyond human-computer interaction, Hoboken: John Wiley Sons Inc, 2015.

[13] G. Chowdhury and C. S, Information sources and searching on the World Wide Web, London: Library Association Pub., 2001.

[14] A. Poutler, D. Hoim and T. G, The Library and Information Professional's Guide to the Internet, London: Library Association Publishing, 1997.

[15] A. Lashkari, F. Mahdavi and V. Ghomi, "A boolean moden in information retrieval for search engines," *International Conference on Information Management and Engineering,* pp. 385-389, 3 April 2009.

[16] C. D. Manning, P. Raghavan and S. Hinrich, Introduction to Information Retrieval, Cambridge: Cambridge University Press, 2008.

[17] B. J. Jansen and S. Rieh, "The Seventeen Theoretical Constructs of Information Searching and Information Retrieval Archived," *Journal of the American Society for Information Sciences and Technology,* pp. 1517-1534, 4 March 2016.

[18] G. G. Chowdhury, Introduction to modern information retrieval, London: Facet Publishing, 2010.

[19] A. Manconi, E. Vargiu, G. Armano and M. L, "Literature retrieval and mining in bioinformatics: state of the art and challenges," Advances in bioinformatics, Segrate, Cagliari & Barcelona, 2012.

[20] J. Schmitt, C. Debbelt and S. FM, "Too much information? Predictors of information overload in the context of online news exposure," *Information, Communication & Society,* pp. 1151-1167, 3 August 2018.

[21] A. Halavais, Search Engine Society, Cambridge: Polity Press, 2017.

[22] D. Dave, "Meet the 7 Most Popular Search Engines in the World," 3 March 2021. [Online]. Available: https://www.searchenginejournal.com/seo-guide/meet-search-engines/#close. [Accessed 7 December 2021].

[23] G. Smyth, "The Importance of Search Engines," Inetasia Solutions Limited, [Online]. Available: https://www.inetasia.com/resources/articles-the-importance-of-search-engines.html. [Accessed 25 November 2021].

[24] M. Rangraz and P. L, "Workplace work-integrated learning: supporting industry 4.0 transformation for small manufacturing plants by reskilling staff," *International Journal of Lifelong Education,* pp. 5-22, 20 January 2021.

[25] E. Demerouti, "Turn Digitalization and Automation to a Job Resource," *APPLIED PSYCHOLOGY: AN INTERNATIONAL REVIEW,* pp. 1-6, 8 July 2020.

[26] "World Economic Forum," [Online]. Available: https://www.weforum.org/projects/learning-4-0. [Accessed 6 December 2021].

[27] M. White, "Critical success factors for enterprise search," *Business Information Review,* pp. 110-118, 1 July 2015.

[28] M. White, "Digital workplaces Vision and reality," *Business Information Review,* pp. 205-214, 19 December 2012.

[29] P. Cleverley and B. S, " Enterprise search: A state of the art," *Business Information Review,* pp. 60-69, 11 June 2019.

[30] O. Alhabashneh, R. Iqbal, N. Shah, S. Amin and J. A, "Towards the development of an integrated framework for enhancing enterprise search using latent semantic indexing," *International Conference on Conceptual Structures,* pp. 346-352, 25 July 2011.

[31] P. Dmitriev, N. Eiron, M. Fontoura and E. Shekita, "Using annotations in enterprise search," *Proceedings of the 15th international conference on World Wide Web,* pp. 811-817, 23 May 2006.

[32] J. D. Gould and C. Lewis, "Designing for Usability: Key Principles and What Designers Think," *Communications of the ACM,* pp. 300-311, 1 March 1985.

[33] D. Norman and J. Nielsen, "The Definition of User Experience (UX)," NN/g Nielsen Norman Group, [Online]. Available: https://www.nngroup.com/articles/definition-user-experience/. [Accessed 8 November 2021].

[34] "What is cognition? Cognition is essential for everyday functioning - here's why," Cambridge Cognition, 19 August 2015. [Online]. Available: https://www.cambridgecognition.com/blog/entry/what-is-cognition. [Accessed 14 December 2021].

[35] "CogniFit research," [Online]. Available: https://www.cognifit.com/cognition. [Accessed 14 December 2021].

[36] M. Ward, G. Grinstein and K. D, Interactive Data Visualization, Cambridge: Apple Academic Press Inc., 2015.

[37] F. T. Durso, Handbook of Applied Cognition, Hoboken: John Wiley & Sons Inc, 2007.

[38] D. A. Norman, The Design of Everyday Things, New York: Basic Books, 2013.

[39] N. J, "Iterative user-interface design," *IEEE,* pp. 32-41, November 1993.

[40] R. Dam, "5 Stages in the Design Thinking Process," Interaction Design Foundation, 16 April 2021. [Online]. Available: https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process. [Accessed 21 December 2021].

[41] "What is the framework for innovation? Design Council's evolved Double Diamond," Design Council, 18 March 2015. [Online]. Available: https://www.designcouncil.org.uk/news-opinion/what-framework-innovation-design-councils-evolved-double-diamond. [Accessed 8 November 2021].

[42] D. Gustafsson, "Analysing the Double diamond design process through research & implementation," Aalto University, Espoo, 2019.

[43] C. Rohrer, "When to Use Which User-Experience Research Methods," NN/g Nielsen Norman Group, 12 October 2014. [Online]. Available:

https://www.nngroup.com/articles/which-ux-research-methods/. [Accessed 3 March 2022].

[44] J. J. Mazzola, E. J. S. K. Walker and P. E. Spector, "Examining Stress in Graduate Assistants Combining Qualitative and Quantitative Survey Methods," *Journal of Mixed Methods Research,* pp. 198-211, 10 March 2011.

[45] A. Bogner, B. Littig and W. Menz, "Introduction: Expert Interviews – An Introduction to a New Methodological Debate," *Interviewing Experts,* pp. 1-13, January 2009.

[46] J. Horton, R. Macve and G. Struyven, "Qualitative Research: Experiences in Using Semi-Structured Interviews," *The Real Life Guide to Accounting Research, A Behind-The-Scenes View of Using Qualitative Research Methods,* pp. 229-357, December 2004.

[47] R. Dam and T. Y. Siang, "Affinity Diagrams – Learn How to Cluster and Bundle Ideas and Facts," Interaction Design Foundation, 2020. [Online]. Available: https://www.interaction-design.org/literature/article/affinity-diagrams-learn-how-to-cluster-and-bundle-ideas-and-facts. [Accessed 16 January 2022].

[48] "Gender Equality Index 2020: Digitalisation and the future of work," European Institute for Gender Equality, 2020. [Online]. Available: https://eige.europa.eu/publications/gender-equality-index-2020-report/men-dominate-technology-development. [Accessed 29 March 2022].

[49] K. Boogard, "An affinity diagram is a powerful tool to organize your team's ideas — and make them easier to act on," Miro, [Online]. Available: https://miro.com/blog/create-affinity-diagrams/?utm_source%3Dgoogle%26utm_medium%3Dcpc%26utm_campaign%3D%26utm_adgroup=%26utm_custom%3D16249053040%26utm_content%3D582645045745%26utm_term%3D%26matchtype=%26device=c%26location=9062395&gclid=CjwKCAiAprGRBhBg. [Accessed 4 March 2022].

[50] A. Kaley, "Mapping User Stories in Agile," NN/g Nielsen Norman Group, 24 January 2021. [Online]. Available: https://www.nngroup.com/articles/user-story-mapping/. [Accessed 1 February 2022].

[51] R. Elmansy, "The Double Diamond Design Thinking Process and How to Use it," Designorate, 9 February 2021. [Online]. Available: https://www.designorate.com/the-double-diamond-design-thinking-process-and-how-to-use-it/. [Accessed 29 March 2022].

[52] L. Manzari and J. Trinidad-Christensen, "User-Centered Design of a Web Site for Library and Information Science Students: Heuristic Evaluation and Usability Testing," *Information Technology and Libraries,* pp. 163-169, 1 August 2009.

[53] J. Rubin, D. Chrisnell and S. J, Handbook of Usability Testing, New York: John Wiley Sons Inc, 2008.

[54] P. Mirza-Babaei, “UX Research for the Gaming Industry Requires Looking through a Unique Lens,” User Experience The Magazine of the User Experience Professionals Association, December 2018. [Online]. Available: https://uxpamagazine.org/ux-research-for-the-gaming-industry/. [Accessed 6 March 2022].

[55] A. Smyk, “The System Usability Scale & How It’s Used in UX,” Adobe, March 2017. [Online]. Available: https://xd.adobe.com/ideas/process/user-testing/sus-system-usability-scale-ux/. [Accessed 28 February 2022].

[56] J. Natoli, “Feedback: 5 Principles of Interaction Design To Supercharge Your UI (5 of 5),” TWOFOLD LLC, 2020. [Online]. Available: https://givegoodux.com/feedback-5-principles-interaction-design-supercharge-ui-5-5/. [Accessed 5 March 2022].

[57] K. Moran, “Usability Testing 101,” NN/g Nielsen Norman Group, 1 December 2019. [Online]. Available: https://www.nngroup.com/articles/usability-testing-101/. [Accessed 6 March 2022].

[58] K. Balushi, “The Use of Online Semi-Structured Interviews in Interpretive Research,” 2018.

[59] B. Gillham, Developing a Questionnaire, London & New York: Continuum International Publishing Group Ltd., 2008.

Appendices

Appendix A Discover

This chapter presents the questionnaire and affinity diagrams from the Discover phase.

A.1 Questionnaire

Section 1: Reasons for searching on the Internet.

This section will cover of why an individual user uses search tools/search engines and what causes them to do that:

---

1. Why do you search on the Internet?

- ☐ My job
- ☐ Knowledge
- ☐ Research
- ☐ Find answer
- ☐ Find people
- ☐ Find business
- ☐ Find entertainment
- ☐ For shopping
- ☐ Answering social answer
- ☐ Answering educational answer
- ☐ Answering societal answer
- ☐ Answer any question in general
- ☐ Solution to a problem

2. Choose one or several of the options chosen above and explain in further detail why you search these topics on internet.

   Long answer text:

   _____
   _____
   _____
   _____
   _____
   _____
   _____

3. At which locations do you use the Internet?

- ☐ Home
- ☐ Work
- ☐ When socializing
- ☐ Working out
- ☐ When I do hobbies/activities
- ☐ Other

Searching on the Internet among individuals

This survey contains nine questions and is anonymous. It will take approximately 5-10 minutes to complete.

By answering this survey you are confirming your participation. Each question is voluntary but for purpose of collect the right data we would be grateful if you answered all the questions.

Thank you,
Alice and Clara

I am consenting to participate in this survey *

- ☐ Yes

I identify as...*

- ☐ Female
- ☐ Male
- ☐ Other
- ☐ Rather not say

How old are you? *

- ☐ 18-30
- ☐ 30-40
- ☐ 40-50
- ☐ 50-60
- ☐ 60-70

---

4. Choose one or several of the options chosen above and explain in further detail when you are searching on the Internet and why at that location.

   Long answer text:

   _____
   _____
   _____
   _____
   _____
   _____
   _____

Section 2: Processing information on the Internet.

This section will cover on when receiving information, how these processes are made and how to transfer knowledge:

---

5. Do you share the information of what you have searched for and to whom?

- ☐ Family
- ☐ Friends
- ☐ Co-workers
- ☐ Boss

6. Choose one or several of the options above and explain in further detail why you share information with these people.

   Long answer text:

   _____
   _____
   _____
   _____
   _____
   _____
   _____

Section 3: Final section.

7. How do you keep yourself up-to-date with information?

   Long answer text:
   _____

8. Something else you want to add related by getting information, search engines and knowledge transfer?

   Long answer text:
   _____

9. What is important to you when searching on the web?

- ☐ Easy
- ☐ Relevant information
- ☐ Nice design
- ☐ Other_____

A.2 Affinity diagram

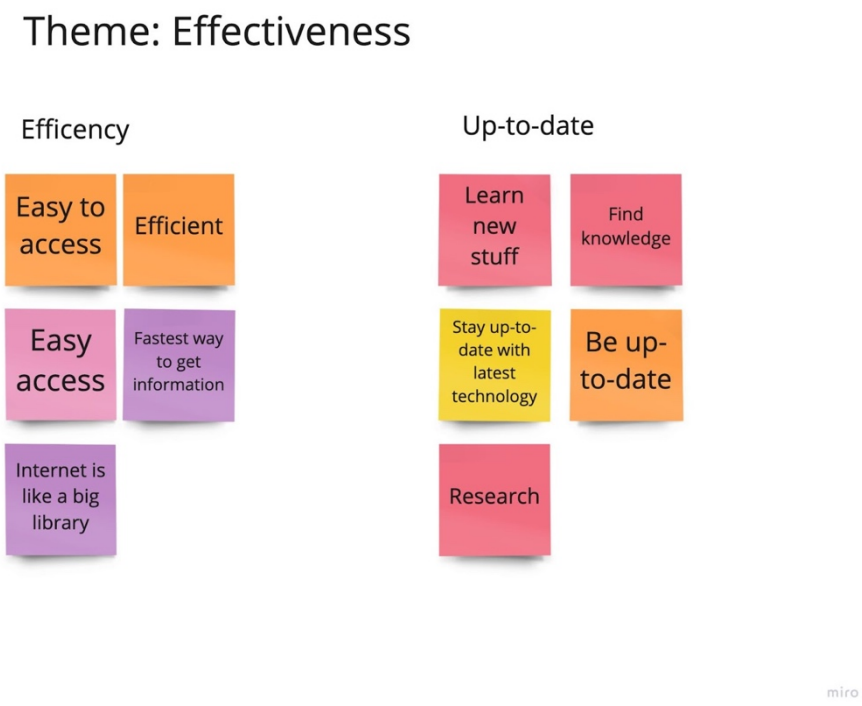

Figure A.1 Affinity diagram for the theme effectiveness with sub-themes as a cluster.

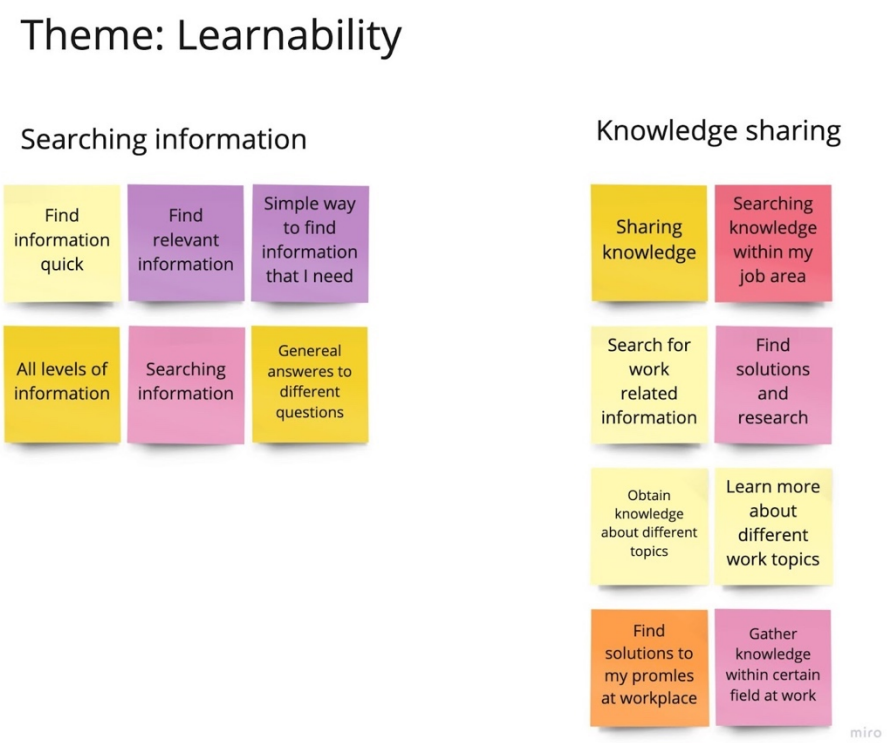

Figure A.2 Affinity diagram for the theme learnability with sub-themes as a cluster.

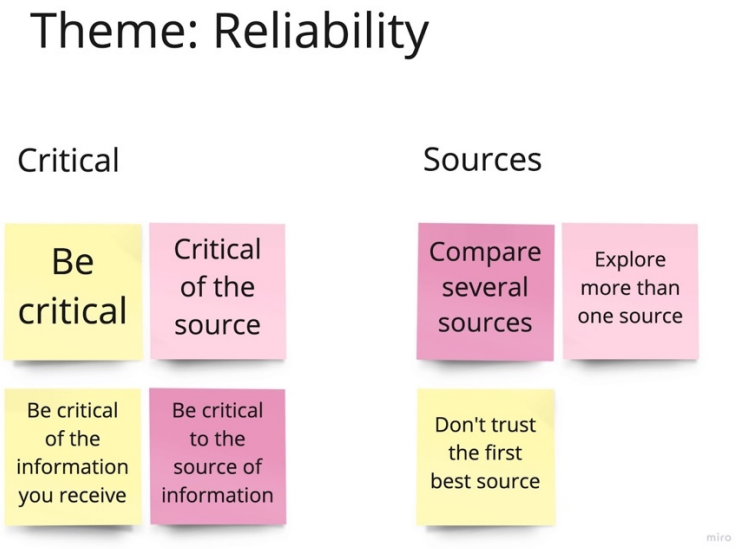

Figure A.3 Affinity diagram for the theme reliability with sub-themes as a cluster.

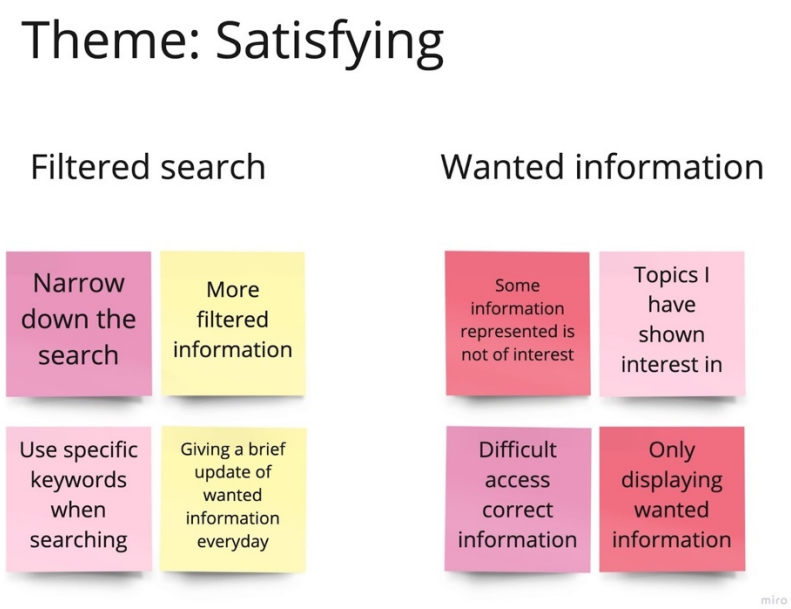

Figure A.4 Affinity diagram for the theme satisfying with sub-themes as a cluster.

Appendix B Develop/Deliver

This chapter presents material used during the usability testing both during the Develop and Deliver phase.

B.1 Orientation script

The purpose of this test is to evaluate the Hoodi- platform to see how user-friendly it is for different users. The interesting thing is not whether you succeed to solve the task or not but to see how you interact with the app. I will read different scenarios for you and you are meant to perform these as best you can. You do not have to feel pressured to do it as quickly as possible. Take the time you need. In case you get stuck in a scenario and do not know what to do, try it out as best you can until you feel ready. Some scenarios can be solved in several ways. I will not be able to guide you how to do in case you get stuck, so when you feel ready we will move on to the next task. The entire testing session will take about 30 minutes in total.

Good luck!

Figure B.1 Shows what was written in the orientation script.

B.2 Background questionnaire

1. I identify myself as:
   - ☐ Male
   - ☐ Female
   - ☐ Other
   - ☐ Rather not say

2. How old are you?

_____

3. What education do you have?

_____

4. Do you work within IT?
   - ☐ Yes
   - ☐ No

5. For how long have you been working (write in years)?

_____

6. How often per day do you use search engine when working?

_____

7. Do you have an enterprise search within the company?
   - ☐ Yes
   - ☐ No

B.3 Post questionnaire

Statement	*Scale between 1 (strongly disagree) to 5 (strongly agree)*
1. I think that I would use this platform frequently	
2. I found the platform unnecessarily complex	
3. I thought the platform was easy to use	
4. I think that I would need the support of a technical person to be able to use this platform	
5. I found the various functions in this platform were well integrated	
6. I thought there was too much inconsistency in this platform	
7. I imagine that most people would learn to use this platform very quickly	
8. I found the platform very cumbersome to use	
9. I felt very confident using the platform	
10. I needed to learn a lot of things before I could get going with this platform	

Table B.1 Shows the statements the test users needed to answer after the actual tests.