

Designing gamification to increase engagement for the software solution KLAR

Nicoline Kjaer Helgstrand

DEPARTMENT OF DESIGN SCIENCES
FACULTY OF ENGINEERING LTH | LUND UNIVERSITY
2021

MASTER THESIS



Designing gamification to increase engagement for the software solution KLAR

Nicoline Kjaer Helgstrand
ni5004he-s@student.lu.se

August 27, 2021

Master's thesis work carried out at Engage.

Supervisors: Günter Alce gunter.alce@design.lth.se

Examiner: Joakim Eriksson, Joakim.Eriksson@design.lth.se

Designing gamification to increase engagement for the software solution KLAR

Copyright ©2021 Nicoline Kjaer Helgstrand

Published by

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

Subject: Interaction Design MAMM01
Division: Ergonomics and Aerosol Technology
Supervisor: Günter Alce
Examiner: Joakim Eriksson

Abstract

With the increasing portfolio of options when looking for new mobile apps and web tools there is a need to excel. One of the possible solutions is to capture and hold on to the users by introducing gamification that motivates the user and gives them the opportunity to feel more engaged with a product. This master thesis examines a possible gamification design for the software solution KLAR. KLAR connects people with different professions that are working at the same building site to increase collaboration to prevent delays and other errors. The thesis investigates if the design makes the target audience feel more motivated to use the software. To do this, the thesis explores the possible use of gamification and the motivational goals for the target audience to find a combination that motivates the possible KLAR users. After the game elements were decided a heuristic evaluation was made to find KLAR strong and weak sides in the design when it comes to good usability. The results were used to create a design that was iterated multiple times both as a Lofi, Mid-fi and Hifi prototype. After the creation of the last Hifi prototype a usability evaluation of the prototype was conducted and was specifically tested with the target audience. It resulted in a Hifi with high appreciation from the target audience for both the added gamification features and new design.

Keywords: Gamification, Engagement, Octalysis, Iterative design, Usability evaluation

Sammanfattning

Med den ökande portföljen av olika lösningar när man letar efter nya mobilappar och webbverktyg finns det ett behov att utmärka sig. En av de möjliga lösningarna för att fånga och hålla fast användarna är genom att införa gamification som motiverar användaren och ger dem möjlighet att känna sig mer engagerade med ens produkt. Detta examensarbete undersöker en möjlig gamification-design för mjukvarulösningen KLAR. KLAR ansluter personer med olika yrken som arbetar på samma byggarbetsplats för att öka samarbetet för att förhindra förseningar och andra fel. Avhandlingen undersöker om designen får målgruppen att känna sig mer motiverad att använda programvaran. För att göra detta, undersöker avhandlingen den möjliga användningen av gamification och motiveringsmålen för målgruppen för att hitta en kombination som motiverar de möjliga KLAR-användarna. Efter att spelelementen hade bestämts gjordes en heuristisk utvärdering för att hitta KLARs starka och svaga sidor i designen när det gäller god användbarhet. Resultaten användes för att skapa en design som itererades flera gånger både som en Lofi, Mid-fi och Hifi prototyp. Efter skapandet av den senaste Hifi-prototypen genomfördes en användbarhetsutvärdering av prototypen som testades specifikt med målgruppen. Det resulterade i en Hifi med hög uppskattning från målgruppen för både de extra spelfunktionerna och designen

Nyckelord: Gamification, Engagera, Octalysis, Iterativ design, Användbarhetsutvärdering

Acknowledgements

This master thesis would not be made possible if it was not for the incredible team at Engage that has given me constant support and full trust. Especially thanks to my Engage supervisor Camilla Kjelstrup and Duy-Tan Do for always being available to answer my questions. Thank you to the rest of the team for a good collaboration and your deep interest in the project. I also would like to give a special thanks my supervisor Günter Alec at LTH for his valuable feedback and guidance. Lastly I would like to thank all of the participants that have been participating in the different user tests. The project would not be made possible without you.

Contents

1	Introduction	5
1.1	Background	5
1.2	Goals	6
1.3	Research questions	6
1.4	KLAR software	7
1.4.1	Application	7
1.5	Scope and limitations	8
2	Theory	10
2.1	Gamification	10
2.1.1	Game mechanics	11
2.1.2	Octalysis framework	12
2.2	Design methods	15
2.2.1	Player experience design process	15
2.2.2	Personas	16
2.2.3	Iterative	16
2.2.4	Prototyping	17
2.2.5	Brainwriting	18
2.2.6	Design principles	18
2.2.7	Heuristic evaluation	19
2.3	Usability testing	19
2.3.1	Metric	20
2.3.2	Semi structured interview	20
2.3.3	System usability scale survey	20
2.4	Tools	20
2.4.1	Figma	20
2.4.2	Octalysis	21

3	First phase	22
3.1	Process	22
3.2	Literature study	23
3.3	Target audience	25
3.4	Business goal and player goals	25
3.4.1	Personas	26
3.5	Heuristic evaluation	27
3.6	Design workshop	31
3.6.1	Preparations	31
3.6.2	Introduction	32
3.6.3	Gamification discussion	32
3.6.4	KLAR solution and its users	32
3.6.5	Brainwriting session	33
3.6.6	Rank	33
3.6.7	Results from workshop	34
3.7	Octalysis framework	34
3.8	Ideas to prototype	35
4	Lofi and Mid-fi phase	37
4.1	First iteration	37
4.1.1	Analyze	37
4.1.2	Design concept	39
4.1.3	Prototype	40
4.1.4	Testing	41
4.2	Second iteration	42
4.2.1	Analyze	42
4.2.2	Design	42
4.2.3	Prototype	43
4.2.4	Testing	44
4.3	Third iteration	45
4.3.1	Analyze	45
4.3.2	Design	46
4.3.3	Prototype	46
4.3.4	Testing	47
5	Hifi phase	49
5.1	Hifi first iteration	49
5.1.1	Design changes	50
5.1.2	Prototype	50
5.1.3	Testing	51
5.2	Hifi second iteration	51
5.2.1	Design changes	51
5.2.2	Prototype	51
5.2.3	Testing	51
5.3	Final design	52
5.3.1	Badges	52
5.3.2	Points	53

5.3.3	Leaderboard	53
5.3.4	UI changes	53
6	Usability evaluation	54
6.1	Purpose	54
6.2	Methods	55
6.2.1	Session	55
6.2.2	Test subjects	55
6.2.3	Scenarios	55
6.2.4	Metric	56
6.2.5	Roles	57
6.2.6	Test environment	57
6.3	Results	57
6.3.1	Observations/Tasks	57
6.3.2	Semi structured interview	59
6.3.3	System usability scale	61
7	Discussion	63
7.1	First phase	63
7.1.1	Target audience	63
7.1.2	Brainstorming	63
7.2	Hifi phase	64
7.2.1	Learning Figma	64
7.2.2	UI changes	64
7.3	Usability evaluation	64
7.4	Research questions	65
7.5	Future work	65
7.5.1	Changing the existing Hifi	65
7.5.2	Other features	66
8	Conclusion	67
	Appendix A Appendice	71
A.1	Semi structured interview questions	71
A.2	Sus form	71

Chapter 1

Introduction

In the following chapter the aim is to give the reader an understanding of this master thesis and why it is of importance. Information regarding the research is introduced followed by the problem and the goal of the project. Limitations of the project is also described and an introduction to the software KLAR and its different modules.

1.1 Background

With the increasing development of mobile apps and web tools software are in need of uniqueness in order to capture and hold on to users. One way of keeping the interest of its users is by implementing gaming features that can increase user engagement by evoking the users emotions. Gaming features beneficial effect of engaging its users has therefore become a popular tool for business software. The company Engage us this technique when designing digital solutions. Their digital solutions motivates behavior change among employees and managers that improve business results while making work more fun. See Figure 1.1 for an overview of Engages different digital solutions. 2020 Engage launched their first version of their software solution KLAR that wants to solve the existing problem with communication between different partners in the construction industry. With improved communication by introducing KLAR that connects different craftsmen responsible for a building project faulty deliveries and wrongdoings will be prevented, saving the companies both money and time. After the launch there is an interest in increasing the engagement and making the different partners feel more engaged by introducing gamification to encourage communication. With this work a future solution for implementing gamification in KLAR will be developed to increase user engagement.



Figure 1.1: Engage logo and the icons of its four different digital solutions: Shine on sales, Shine on safety, Moodstories and KLAR

1.2 Goals

The research will be divided into different parts starting with a theoretical part that deepens the knowledge regarding gamification. Second part is the design iterations with a user focus mindset where multiple prototypes will be created, tested and evaluated.

The application strives to help workers collaborate at different building sites to minimize mistakes that leads to unnecessary damage to the materials, delays, unexpected costs and wastage of the world's resources. With this master thesis the goal is to continue the development of the application in compliance with UN's global goal nine [9] for sustainable development, infrastructure, industrialization and innovation.

Sub-goals:

- Gamification research
- Creating prototypes with a user focused approach creating multiple design iterations
- Creating Sustainable development by increasing user engagement

1.3 Research questions

The following research questions have been formed with the goals and purpose of this project in mind and in close collaboration with Engage.

- How can gamification engage and motivate users to communicate in KLAR?
- What type of gamification features would best engage and motivate users to communicate?
- How can the gamification features be implemented?

1.4 KLAR software

KLAR is a software solution that enables communication between workers at different building sites to increase collaboration. The software solution connects people of different professions to ensure that they can stay connected in order to solve the existing collaboration problems. The software will ensure that colleagues at the site can reach each other and ensure that the building site is ready for the next profession before they arrive at the site.

Summer 2020 the software was released for a small amount of users and was further developed before released for a bigger launch January 2021, see Figure 1.2 and 1.3 for pictures from app store. The goal for KLAR is that every profession working with the building site will be able to connect through KLAR. Today the software solutions is used for the profession driver and fitter [11].

Today the app is used by multiple users to coordinate building project but what has been discovered is that the drivers communicate with the fitters but the fitters rarely answers. The hope is that by introducing gamification the engagement for all of the different user could increase and that the fitters would potentially change behaviour and start to communicate more with the drivers.

1.4.1 Application



Figure 1.2: App icon for the app

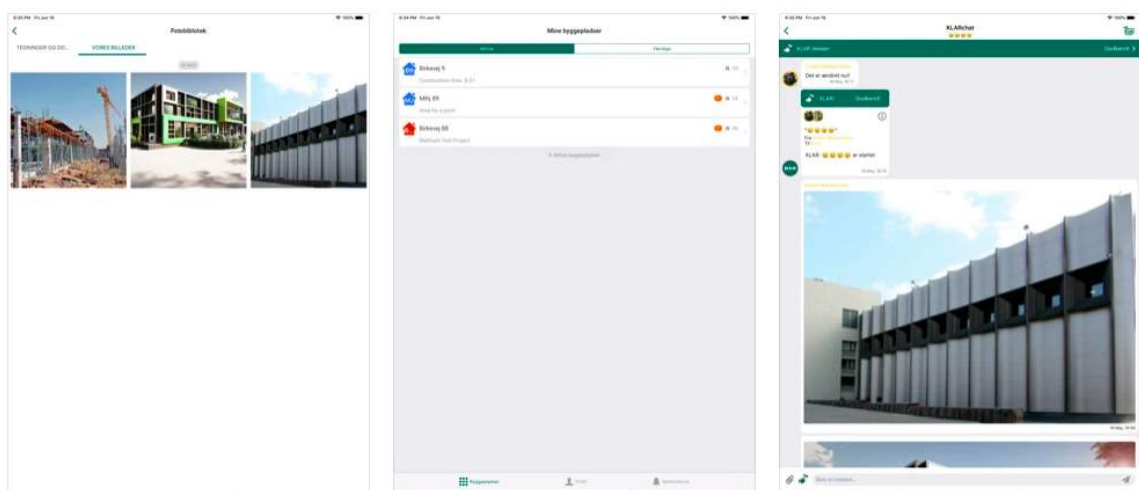


Figure 1.3: Pictures from app store demonstrating the app

The app is both available at app store and google play store and is used by both drivers and fitters. With the app KLAR the users can engage in a chatroom for the specific building site and use the following features.

- Chat with your colleagues connected to the building site
- Overview of the different people connected to the building site
- Coordinate and create agreements for deliveries in order to ensure they are delivered in time and the materials are proper placed
- Instructions for the different building materials
- Documentation of the different agreements

In the app, communication can both be between the hole team at the building site in the building site chatroom or one to one communication called a "KLAR" between two users at the building site. The feature "KLAR" is called prepass in this report to avoid confusion with the name of the application which is KLAR. The feature prepass enables one user to fill out an agreement and send it to one other user at the building site. The agreement creates a private chatroom between the sender and receiver. With the agreement pictures can be added and a message that the receiver can either agree or question. The sender and receiver can discuss the conditions in the chat room and decide what to agree on. The users will also be notified if their are made any changes to the agreement. The users in the app have the same availability to the different features and it is possible for the other users to see which is your profession in order to coordinate and collaborate with the right user depending on the stage of the project.

With the KLAR app there is also a web tool that has multiple different user types due to limiting access depending on the users profession and company.

The existing user types in the web tool are super admin user and admin user. The web tool for KLAR is a tool that can be used by admin users that needs to add people to the different projects. This includes coordinators from the different companies that pick which employee who is working on a specific building site. The super admin role is the one that adds the admin roles to the project.

1.5 Scope and limitations

The scope of this master thesis will include the app for the software solution KLAR and focus on the user group fitters and drivers. Figure 1.4 demonstrates an example of communication in the app for the user group fitters. The finished product will not include an implementation of the design into the product due to code being outsourced and therefore not accessible for the writer.

One limitation for this project is the limited time that is 20 weeks. The 20 week time limit sets the ability to what is possible to do with the project. The project is also conducted during a ongoing pandemic which affects the choices of how to conduct the different user tests and meetings. In respect of others, health and safety is prioritised and may lead to complications along the way.



Figure 1.4: Demonstration of possible communication with KLAR for the user group fitters.

Chapter 2

Theory

This chapter goes through the theoretical background for this master thesis. Firstly it will go further into explaining what gamification is before moving on to the different game mechanics that are commonly used. Next section will focus on player centered design that is closely connected to gamification before explaining the different design methods.

2.1 Gamification

Gamification is the concept of introducing game mechanics and design in a non gaming environment [4, 2]. The goal of introducing gamification is to engage and motivate users to reach their goals. With good design users that achieves their goals will also achieve the organization goals. Moreover gamification affects people on an emotional level and together with motivation it is the core function of gamification and how it engages users. Compared to transactional engagement that is commonly introduced in organizations today gamification introduces emotional engagement that should be a focus if we want increase motivation [2]. Gamification is not a new concept and has been around for some time. 2008 the first paper mentioning gamification was published [4]. Since then multiple papers, posts and videos have been made regarding the subject of gamification. By using tools from gaming it is possible to both improve user experience and user engagement. With the increasing use of software and technology in the profession and teaching world the demand for gamification has increased due to it benefits in motivating and engaging users. Craig miller in [14] orders employers and professors to take action and introduce gamification in the daily used software to increase creativity, innovation but also make your workers more efficient and become a more attractive workplace.

Game mechanics are central for gamification and can both be build with the software or be added on after introducing a software. Game mechanics can be badges and points that are commonly used in the gaming industry and can be used in order to motivate users to change behaviour, drive innovation or develop skills. Importantly their is a big difference between a

game and gamification. The different concepts has different goals of what to achieve with the users. Games focus is to entertain the user whereas gamification want to motivate the user [2]. The concept of gamification is big and has multiple different guidelines and frameworks. To get a better understanding of gamification and how it can be introduced Yu kai Chous framework can be used [3]. The framework Octalysis introduced 8 core drives that can be of help when introducing gamification. If their is no desire drive behind an action it is mostly likely that their is no motivation and the users will not use the action and the behaviour designed is lost. Gamification has a huge impact on changing employees behaviour and has



Figure 2.1: The framework Octalysis

been used in multiple different industries to improve safety, change culture and nudge people to comply with different policies[2].

2.1.1 Game mechanics

Game mechanics are the game components that are used in a game or gamified solution. Their are multiple different game mechanics and they and depending on the game rules for the solution they can be used in different ways [25]. Game rules describes what happens to a user depending on their action. Some of the most common game mechanics are leaderboards,

points and badges. There are many more game mechanics and they can be combined in different ways and individually designed in a particular way to engage and motivate users in different ways.

Leaderboards

Shows the user where they are compared to other users. They need to be designed in the right way to motivate users [25] to keep them motivated. There are multiple different ways to design leaderboards. They can be designed so that the user only sees other users that are close to them in the leaderboard or for the whole organisation [2].

Points

Points are one type of rewarding system. A point system can both be points that can be used in the real world like vouchers or points for an inner economy in the system. For some solutions game rules are also used so that you can both gain or lose points depending on your activity and the game rules.

Badges

Badges just like points are game mechanics that reward the user. Badges can both be unpredictable in order to surprise the user or visible where the game rules are clear for how to achieve a new badge. Example of a badge can be seen in Figure 2.2.



Figure 2.2: Example of a badge

Levels

Levels are a game mechanic where the user when improving or making progress gets the reward of going to a new level. The level can be dependent on points, time or how much the user uses the system or has learnt the features. Badges can also be used as a way of introducing levels [25].

2.1.2 Octalysis framework

Octalysis is a framework for gamification created by Yu-Kai Chou. The framework analyzes different building strategies and how they engage users through eight different core drives. The framework was created after Yu-Kai Chou saw the potential but also pitfalls by introducing gamification. He believes gamification has great potential if introduced the right way and using game elements that are connected to the different core drives [3].

The framework shown in Figure 2.1 introduces the eight core drivers that motivates users to engage with different game mechanics. The right side of the framework introduces core drivers that appeals to the intrinsic motivation and the left side extrinsic motivation. Furthermore the top of the framework is positive motivation meaning that the drivers are connected to positive emotion also called white hat. Bottom is considered negative drives also called black hat with game mechanics connected to these drivers introducing negative emotions [3].

In order to get long time motivation from the users by introducing gamification it is important that companies design to satisfy the right side of the Octalysis framework that appeals to the instinct motivation. Moreover the type of motivation and what emotions to engage when introducing game mechanics must be considered through the framework.

Meaning

The first driver is epic meaning and calling. This core drive is connected to purpose when a person believe they are part of something bigger than themselves. Yu-Kai Chou [3] explains that contributors to Wikipedia does not do their job because they get paid they do it to secure that the facts are right in order to ensure that the world has the right information. This is much bigger than themselves. Except having an impact on the world this drive is also connected to "beginners luck" were you have the feeling of talent. This core drive awakens positive emotions and are effective for onboarding phases of a product but at the same time it is hard to make it believable. Examples for when a user feel epic meaning or calling:

- Narrative: Building a narrative that creates the story for a higher good. It can both be a magical meaning but also company level.
- Use world missions: Donating for a higher cause when using a product or buying it.
- Beginners luck: If a new user wins a trophy that they know is hard for experienced user to win they will feel that they a descent to do it and the chosen one.
- Elitism: groups that gather around a subject important to them and through that has a group pride.

Accomplishment

The second core drive development and accomplishment shows the user how far they have gotten and what is left to reach a goal. Points, badges and leaderboards are strongly connected to this drive and is one of the most commonly implementation of gamification. Game techniques that uses the second driver:

- Progress bars: This shows the user what to do in order to complete their profile or other tasks. It is often used for onboarding.
- The rockstar effect: Creates the scenario were the users feel that other users need to interact with them.
- Achievement symbols: Are different types of symbols with the primary mission to symbolize the users achievement. They are only useful if they do make the user feel accomplished.

- Leaderboards: For this game mechanic if the user has no chance of feeling achievement their will be no action. Important is that the leaderboard is relevant for the user.

Empowerment

The third core drive is empowerment of creativity and feedback and is the most wanted but also hardest to implement correctly. It is wanted due to its ability to engage user with positive emotion long time. This drive is found when users are engaged in creative process where they learn things. The need is not only to be creative in different ways but also to get feedback. Yu Kai Chou mentions Legos as being the perfect example where the users can be creative and get feedback and after some time they entertain themselves by building new things.

- Boosters: Gives the user during a limited time boosted power. This is a strongly motivator towards the wanted action.
- Milestone unlock: When you reach a new level you get a new set of skills making you wanting to try them.

Ownership

Core driver ownership and possession is when users feel motivated due to the feeling of ownership and control. The user can both feel ownership from earned points and badges but also from an avatar when they have used time to personalize it or from a process or organisation.

- Build-from-scratch: Giving the user the opportunity to build for example their avatar. It will increase their sense of ownership of their creation.
- Collection sets: Users get a few items like badges and then they are told if they collect specific items it is part of a collection set. It makes the user wanting to complete the collection set.

Social influence

This core drive is the motivation that comes from all social elements like feedback, relationships, competition and envy. Users often tend to go closer to people or things that they think are relatable and friendships can create a sense of need for something a friend accomplishes or buys.

- Brag button and trophy shelves: Brag button is explicitly showing what the user has accomplished whereas trophy shelves implicitly show what they have accomplished.
- Group quests: Requires the group participation to win the quest. This is a good technique for collaborative play.
- Social treasures: Rewards that the user only can get through friends or other players.

Scarcity

The drive scarcity and impatience is awoken from game elements that stops the user from doing thing immediately. Forcing the user to wait motivates the user.

- Dangling: Were the user is constantly shown what they can have if they pay something.
- Appointment Dynamics: The user has to perform the desired action during a specific time slot in order to get to the win state.

Unpredictability

This core driver keeps the user constantly engaged and sparks the part of our brain that get exited when something unpredictable happens. It awakened our senses and is one of the primary drivers for addiction.

- Mystery boxes/random rewards: When completing an action the user receives an unknown reward.
- Easter eggs: Compared to the mystery box and random rewards, Easter eggs are rewards that are given at an unexpected trigger.
- Lottery/rolling reward: Lottery were the chance of winning increase when the user is active, rolling rewards are like "employee of the week".

Avoidance

The last core driver is loss and avoidance and is the users motivation to not loose things like projects, points. What motivates the user is to make sure that nothing negative happens and this leads this core drive to connect to negative emotions [12],[2].

- Evanescent opportunities: If the user does not take the desired action immediately the opportunity will disappear.
- Countdown timers: It is a timer that is presented to the user for a specific event it can both be counting down to the end of the event of for its beginning.

2.2 Design methods

In this section the theory for the different design methods are explained.

2.2.1 Player experience design process

In order to succeed with gamification it is not enough to add different game mechanics to our software. We have take the user into account and find the balance between business goals and user goals[2]. This is also known as player centered design or user centered design (UCD) [12]. By introducing the user through the design process it is more likely that the product appeals to the user in the way wanted. The action of the user can be tested before the release of the product and design mistakes can be hindered in an early stage. More about UCD is described in the design methods that are chosen to be UCD friendly.

2.2.2 Personas

Personas are a good method to use when you want to keep the users in focus. They can be used in order to focus discussions on the user and not only on business goals or what developers think that the user needs. The method is an important part to learn more about the user group before deciding on a design or functionality in order to secure that it is of use for the expected targeted users. Personas are descriptions of non existing people that represent the different characteristics of real people that exist within a user group. Personas can be used in order to focus on the users that a product is designed for and creates a focus during the discussions [2]. When creating personas it is important that the users goals and motivations are explained and that the personas have different goals and motivations.

2.2.3 Iterative

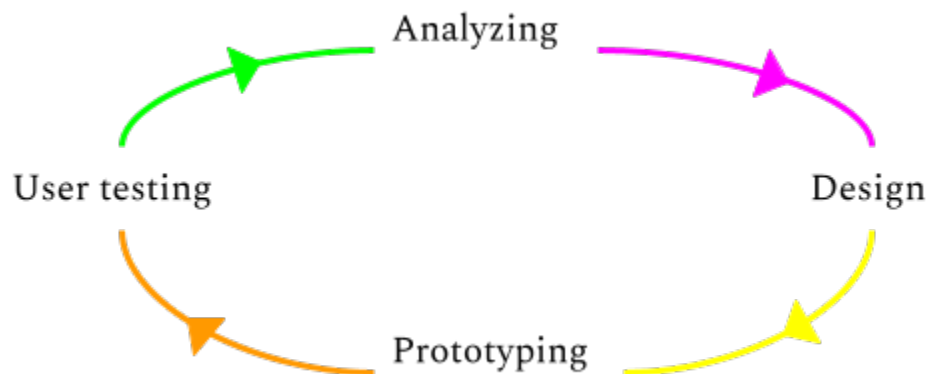


Figure 2.3: Shows the four steps in a iterative design process

Iterative design process is a process for creating the best functionality and design through a iterative process with phases of designing, prototyping, testing and analyzing the results.

A iterative design process is an important part of a user centered design(UCD) process and is a great method to secure the user focus in a early stage. By following the four iterative stages and iterate the design or functionality that are created and test with users it is possible to find design or functionality flaws early and change them before it becomes expensive [10, 24]. Next the four different stages of iterative design are explained. See Figure 2.3 for the four stages.

Analyzing

For the first iteration the analyzing stage build on research regarding the functionality that is going to be used and why. Different methods to map the users and their needs can also be used creating a base of information that creates different conclusion that can be used for the design process. Though after a user test it is also important that the result are analyzed and conclusions made from the test are later represented in the next design [10].

Design

Next part of the iterative process is to take the results from the analyzing phase and start with the design. In this part different methods can be used to decide on the design or functionality that is going to be used in the end product and in the process being tested in the next step. Designers can choose to work after designing principles and use idea generating methods. This part of the process is creative and the result can be sketches, words or inspirations from other existing products [10].

Prototype

After deciding on a wanted design or functionality the next step is to create a prototype that can later be tested to evaluate if your idea work as intended. In the beginning prototyping can be very basic only using paper and a pen but as the work proceeds it looks more and more like the end product after a few iterations [15]. Prototypes can have multiple different purposes. They can help the designer explore different opportunities or be used as a tool to communicate with product owner or other stakeholder and lastly as a tool to test with the end user [24].

User testing

Last part of the iterative process is to test the ideas and designs with the end users. User testing is often conducted in a controlled environment and different methods can be used to collect data from the user. It can both be surveys and interviews with the end users and more importantly testing of the prototype. User testing are conducted to make sure that the design or functionality created are a good fit for the intended end users. Metrics that can be used during a user test is the time it takes a user to conduct a task or the amount of errors a user does during a test. After the data is collected it is later to be analyzed [10].

2.2.4 Prototyping

When prototyping there are many different ways it can be done and also depending on how mature the project is the prototype can be advanced or less advanced. In this section three different types of prototypes are explained.

Lofi

Lofi prototype stands for low fidelity meaning that this type of prototype is not close to an functioning app [28]. The Lofi prototype is usually a type of sketch that is not detailed and visually appealing to a user. This enables the designers to test the users on the high interaction level and the users not focusing on details. Furthermore Lofi prototyping is a quick and cheap way to test the high interaction and evaluate if the ideas are valuable or if it has to be changed before more money and time are used on implementing details and a finished product. Other advantages with Lofi prototyping is that due to it being easy to create designers have the opportunity to test and be creative with the ideas that they present for the users. If they are not good ideas they can later be scraped without the designers have wasted too much time. Though a drawback with Lofi prototypes is that they can feel unprofessional

and therefore designer at times chooses a higher fidelity prototype to show possible ideas [28].

Hifi

The next type is the Hifi high fidelity prototype. This type of prototype is the last prototype created before the functionality or design is implemented. Just like the Lofi prototype the Hifi prototype can be tested and changed multiple times before it is fully designed and finished. With the Hifi prototype more details are added and it is much closer to the finished product with both look and feel. The advantage of the Hifi prototype is that it is more realistic interaction. It also represent the different design possibilities better. Compared to the Lofi prototype the Hifi prototype is more time consuming and expensive to create and change. This leads to designers not always exploring the different design possibilities due to the hard work to change and create a Hifi prototype [28].

2.2.5 Brainwriting

Brainwriting is a idea generating technique that can be used to generated ideas in different group settings. During brainwriting the ideas are written silently onto papers. Their are multiple different brainwriting techniques that have different benefits. For this master thesis the technique *brainwriting pool* was chosen. Brainwriting pool is a technique were the were a group leader is selected and then five to seven participants are chosen to engage in the session. The first step is to use a timer and during the first iteration all group members silently writes down a decided amount of ideas on a paper. When the time is out the paper is handed to another participant. This makes the participants able to see others ideas for inspiration. They can both choose to build on the ideas already existing on the paper or continue with new ideas. The process continues for 20 - 30 minutes before all of the ideas are collected [27].

2.2.6 Design principles

In this master thesis the design principles that are going to be used is Don Normans design principles [18]. Don Normans fundamental principles of interaction are Affordance, signifiers, mapping and feedback.

Affordance

Affordance is a relationship between the user and the object and is what the object possibly can be used for. For some objects a anti affordance can also be introduced. Don Norman gives the example that a glass door that affords transparency but at the same time does not afford physical passage. This is its anti affordance and is shown when birds flies into the door [18].

Signifiers

Signifiers are the property that shows were a action can take place. Example a button is a signifiers. The word signifiers was introduced by Don Norman after designers started to use

the word affordance incorrectly. But both signifiers and affordance are needed. Signifiers shows where something can be done and affordance is what can be done [18].

Mapping

Mapping is the relationship between elements. This can be the placement of text relating to a button. This concept is an important concept for design and is used when laying out displays. If the mapping is done in a good way it is easy for the user to figure out how to use controls and devices [18].

Feedback

Feedback is when you in some way get a sign that the system is responding to your action. Important with feedback is that it must be given immediately. If it is too slow users can start doing the action again or stop using the product. The feedback also has to be understandable for the user so they know what action they should take. Do they need to do something else or do they just have to wait for the system to perform [18].

2.2.7 Heuristic evaluation

There are multiple different ways to evaluate and find usability problems in an interface and Heuristic evaluation is one method [17]. When conducting a heuristic evaluation it is common to have multiple evaluators that individually evaluate a user interface from the usability principles. The usability principles for the heuristic evaluation are called the heuristics and are the 10 following principles that are shown in Figure 2.4. After the evaluators have judged how

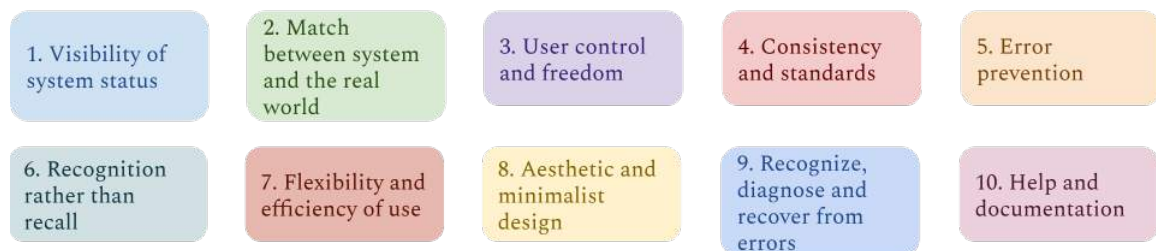


Figure 2.4: The 10 heuristics principles

well an interface complies with the 10 usability principles it is possible to discover usability problems so that they can be fixed. Benefit with heuristic evaluation is that it is very cost efficient and is therefore preferred to use when budget and time is limited [17, 16].

2.3 Usability testing

Mentioned in section 2.2.3 testing is one part of an iterative design process. During a usability test multiple different methods can be combined and used [10]. The techniques are used to find usability problems by collecting quantitative user data [29]. Theory and the different methods used during this master thesis are presented below.

2.3.1 Metric

During a usability test both performance data and preference data can be collected. Performance data are the data that will be collected during the test like the time it takes a user to perform a task and or error rates. Preference data are the data that is the participants thought and opinion regarding the product. Preference data can be collected in surveys and interview after or before the test but also during the test where they express personal opinions. Furthermore both performance data and preference data can be subjective, objective, quantitative or qualitative. Objective data being data collected from observations and describing the results that have been observed. Subjective data comes from how a user perceives a situation. For the quantitative data measures how well a user performs whereas qualitative data focus on understanding why a user solves a task in a specific way [20].

2.3.2 Semi structured interview

A semi structured interview is an interview form where there are a structure to gain answers to the research question but with the flexibility of studying the interviewees and adapting to the answers and situation. The method enables the ability to ask follow up questions to get elaborated answers from the interviewees if necessary. This has led to a broad use of the method [6].

2.3.3 System usability scale survey

System usability scale (SUS) is a survey used to measure usability of a system by collecting subjective data from users. The method is both an efficient and inexpensive way to evaluate usability and has been used since its founding in 1986 by John Brooke [1]. It is typically answered right after a user has used a system and is therefore suitable to use after a user has completed their tasks in a usability test. The survey consists of 10 statements that state the usability of the system. The statements are answered on a 1-5 scale from "Strongly disagree" to "Strongly agree". The answers are converted to a score that is between 0-100 [26, 23]. From evaluating multiple different studies where SUS has been used the score 68 has been decided as a benchmark where a lower score means bad usability and higher good usability [26].

2.4 Tools

In this section different tools that are going to be used during this master thesis are presented.

2.4.1 Figma

Figma is a collaborative design tool that can be used to design wire-frames, Lo-fi or Hi-fi prototypes. The tool can also generate code and is a product that can be used during the whole design process. For Hi-fi prototyping it is possible to create hot-spots on the different frames in the Figma canvas creating a connection that can show the user flow [5].

2.4.2 Octalysis

Octalysis has a webtool that makes it easy to insert your gamification elements in the framework and get feedback in what ways you should further develop your gamification elements [19]. The framework is being used in this master thesis and is described in further detail in section 2.1.2

Chapter 3

First phase

3.1 Process

In this section the process for this master thesis is further described. The process is also shown in picture 3.1. The first pillar of the master thesis consisted of a literature study regarding the subject gamification. This was done in order for the writer to gain more knowledge regarding the subject and collect relevant theory. After relevant theory was found and analyzed the next step was to collect the knowledge from the company regarding the software KLAR. When all the relevant information had been collected the next phase was to gather the company for a design workshop to discuss the possible gamification solutions for the software KLAR. Next phase is to use the generated ideas and create Lofi to Hifi prototype through design iterations were the prototypes are tested and evaluated. Before the prototypes are created a heuristic evaluation is conducted to learn more about possible flaws existing in the application today. The last phase is a user test of the Hifi prototype.

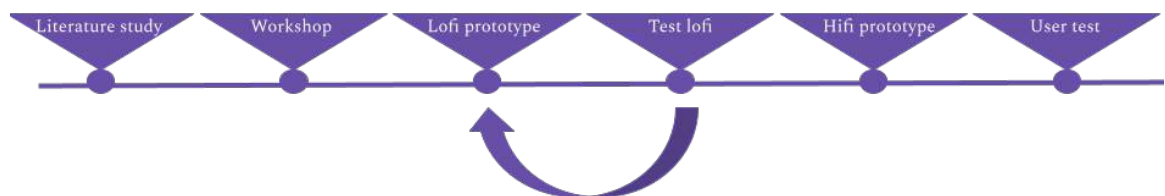


Figure 3.1: The process of this master thesis

3.2 Literature study

In order to make good decisions regarding the different possible design features to prototype, a literature study was conducted. The literature study purpose was to gain valuable knowledge regarding gamification in order to properly choose gamification features. Firstly the question that was answered was "what is gamification?" followed by looking into different possible frameworks and later different methods used when introducing gamification. For the literature study Google scholar[7] was used with search words like *gamification*, *gamification frameworks*, *gamification at work*, *gamification features*, *business software and gamification*. Furthermore two books were used beyond the literature that was found online and in was *Gamify* [2] and *Actionable gamification beyond points, badges and leaderboards* [3]. Due to KLAR being a business software that wants to increase communication and collaboration. Enterprise solutions and their use of gamification was of particularly interest.

In common for the literature regarding gamification is that they highlight that in order to succeed and reach the goals of the business the users goals needs to be in center. Without following the users goals the game elements added will not engage or motivate the user. This has been a problem during recent years where gamification has become a trend and the most common elements points, leaderboards and badges has been added to different software to motivate users and make them feel more engaged. Though only adding the game mechanics does not itself make the user feel more engaged or motivated if they are not connected to the users motivation in some way. Therefore in the literature it is highlighted that to gamify a solution it is more than just adding the game mechanics and depending on the users it has to be adapted to their motivation.

Central for the framework octalysis is the 8 core drives that are the core to our motivation. Due to gamifications nature of engaging and motivating users if used in the right way it is central to look at human motivation when starting to think about adding game mechanics to a product. When the game mechanics are used in the right way the motivation can drive innovation, change behaviour or develop skills of customers or employees. In the book *Gamification at work : designing engaging business software* by Janaki Mythily Kumar [12], Kumar states different motivational drivers that is to be considered when using gamification. To get a better overview the motivational drivers were compared to octalysis framework that is later to be central for this master thesis, see Figure 3.2.

Octalysis	explained	Kumar	explained
Meaning	Doing something greater than themselves	Reciprocity	Giving free stuff can motivate
Empowerment	Empowerment of creativity & Feedback	Feedback	Feedback motivates us to continue doing what we are doing.
		Self expression	We want to express ourselves by having the option to choose
Social influence & relatedness	All social elements that motivate. social acceptance.	Connecting	Being part of something bigger than ourselves, community,
Unpredictability	Core of constantly being engage, you do not know what happens next		
Avoidance & loss	Avoid something negative to happen.		
Scarcity & Impatience	Wanting something because it is rare.		
Ownership & possession	Own or control something. avatar , process	Collecting	We like collecting things, coins, points, friends.
		Blissful Productivity	Feeling of control at the right level.
Accomplishment	Internal drive for making progress	Achievement	We want to try hard to achieve success.

Figure 3.2: The motivational driver from Octalysis and Kumar

Learnt from the comparison of the different motivator are that the framework Octalysis has three parts that are not included in Kumars motivational research which is the three black hat motivators. The black hat motivators are the core drivers that connects to our negative emotions. At first that can seem bad and not useful but it is the techniques that is commonly used in games and is the addictive part of games.

After collecting the research regarding what motivates users it was time to figure out how the different motivators connect to gamification elements. For example if we would like to use the motivational driver Meaning what possible game mechanics speaks to that motivational driver.

Table 3.1: Common gamification features and their connection to different core drives.

Features	Motivational driver
Badges	Collection, Achievement, Ownership, Accomplishment
Leaderboards	Achievement, Accomplishment
Points	Feedback, Accomplishment
Narrative	Achievement, Epic meaning
Deadlines	Achievement, Scarcity
Group quests	Connection, Social influence
Progress bar	Blissful Productivity, Accomplishment
Onboarding	Blissful Productivity, Accomplishment
Challenge	Achievement, Epic meaning

What is visible in the table and from the research made is that each game mechanic can be related to one or more motivational drivers depending on how it is designed. This means that it is not only picking which motivational driver you want your product to reflect and then pick a game mechanic connected to that specific motivator. More has to be done in order to properly connect the right motivation driver to a specific game mechanic.

3.3 Target audience

Following the player experience design process the next is to identify the target audience. The software solutions KLAR has multiple different users though the software is targeted to professions within the building industry. The app is used on specific building projects where walls from one of Engages customers is delivered. The software was recently launched and at the time of this master thesis there are both admin and normal users using the software but the main business process that is used is the communication and collaboration between a driver and fitter. Therefore the target audience is drivers for the wall company and fitters.

3.4 Business goal and player goals

Next step in the process was to create business goal and further find the player goals. Important is that the business goal can be validated in the future and has a metric [2]. For the business goal a meeting was held with the product owner Age: 54, Male, project leader of the software KLAR Age: 32, Male and COO Age: 53, Male that took 45 minutes. The business goal that was decided on:

- 50% of the fitter answers driver before they deliver the walls

The business goal is a guideline for what the product hopefully will succeed in the nearby future. Adding gamification may engage and motivate the fitters to answer the drivers if implemented correctly. In order to discover what motivates the users and their user goals further research regarding the users needed to be conducted.

3.4.1 Personas

In order to evaluate what motivates the targeted audience it was valuable to get to know the targeted group better. When getting to know the users and also designing for a specific user group personas can be used. More about persona can be found under the section 2.2.2. Personas are created through collecting information regarding the different users. The writer has been in contact with users for onboarding of the app during the first launch while working at Engage prior to this master thesis. The writer therefore have some previous experience with the users daily struggles and how they perform their daily work. This is knowledge that was gained before this master thesis and more knowledge had to be collected in order to create personas.

The first step was to look into the gained organisation knowledge regarding their users. This was done by reading through different user research and tests that they have performed. It helped getting more information regarding the user but not at much as wanted in order to create personas. Therefore it was decided to gather a few people from the company and create personas together.

The personas was created during a two hour meeting with the head of design *Age 33, Male*, design consultant *32, Male* and costumer success manager *Age 26, Female* and one of the personas is shown in Figure 3.3. They have in different ways been in contact with the users and also seen them at work when visiting the building sites during the start of the app development. The customer success manager has a lot of communication with both the customer and the users. During the meeting four personas were created focusing on the target group that is drivers and fitters.



Figure 3.3: One of the personas created, it is blurred due to company secrecy

3.5 Heuristic evaluation

Well knowingly that the software is under development a heuristic evaluation was done in order to get an overview of the software and what possible problems that can occur when a user interacts with the system. The evaluation follows Jacob Nielsen 10 general principles. More about Heuristic evaluation can be found under theory 2.4.

The evaluation was done on the KLAR app that is the one used by the target audience. The users are the fitter and driver that only has access to the app. The evaluation was done on both android and iOS due to some existing differences.

The Heuristic evaluation was both performed to get to know the app better and understand its possible strength and weaknesses when it comes to its usability and to find a suitable place to locate gamification features.

Table 3.2

Principle	Comment	Percentage/coverage in the app

1. Visibility of system status	When it comes to phone taps the app has some visual change for the user when they tap a button or symbol but for most of the interaction a tap is first visible for the user when the app change screens. Therefore there are more possible work that can be done by introducing haptic feedback and more visual feedback to prevent users from pressing a button twice when the app is slow with changing screen. The app has two chat-rooms, one created for every prepass and one for the building site. Due to them being almost identical a new user may lose orientation when navigating between the chat rooms	70%
2. Match between system and real world	It is clear that symbols and words that are common to the trades are used. Users get different roles that is the name of their trade. The word "Byggeplads" is used and is the commonly used word for a danish building site. The app also uses recognized icons for different functions that are commonly used in other systems like a bell for the notification. The name for the different chat rooms also uses the word chat to indicate what type of functionality that can be used. A prepass in KLAR is called a KLAR. This means that there is a new word for this new type of function that is new for the user and the terminology is not self explaining.	90%
3. User control and freedom	For the different screen changes it is always possible to use a arrow for going back and even when using the phone for taking a photo it is possible to go back and not publish the photo. For prepass there are two options. The first option is to question the prepass and the second it to approve it. When the user has approved the prepass it is not possible to regret the action. Instead it is possible to write in the chat if there are any questions. If the prepass is questioned it is possible to change your action by approving it. It is therefore of interest to consider to make the user able to regret their action of approving a prepass.	80%

4. Consistency and standards	The app uses the same symbols for the same type of action during the interaction. The design is also mostly consistent. The internal consistency is good but there is one icon that is not consistently used. For the interaction between users called KLAR a hand with an hammer is used. The hammer is later used for a symbol that leads to a list with the different prepasses that a user has but the hammer is also visible for the symbol that leads to the photo gallery. For the gallery in a prepass the symbol leads to a gallery with the prepass photos but in the main chatroom it does not lead to prepass photos therefore the symbol may be misleading. For the external consistency many symbols are symbols commonly used by other software companies like the symbol for attachment, notification bell and avatar for profile. Though there could be made more work to make the design follow other well known designs. The app is available for iOS and Android though some of the functions differ in the different systems meaning that a user changing to the other system will experience inconsistency compared to the other design.	40%
5. Error prevention	In the app a user can send pictures, messages and prepasses. The user can also change some text in its own profile and add a profile picture. When sending a picture there is error prevention by letting the user see the picture before sending it. Before login out of the app it also asks the user if they are sure they want to log out. Overall there are some error prevention but the main error prevention is that the user has not many critical options they can make in the app.	95%
6. Recognition rather than recall	Through the UI the icons are used multiple times and are mapped to icons commonly used for the specific action meaning that recognition is used. The function that is new for a user is prepass and when using the function some explanation is needed. It is not clear if this is easy for a user to learn and how they would react after not using it for a while and then start using the app again if it is recognition or recall that would be used. Otherwise the app has some interaction that is commonly used in other systems but could implement more. If the user needs to go back to old projects they are all saved and it is possible for the user to look at what they have previously done.	75%

7. Flexibility and efficiency of use	Today the app does not let the users tailor their most frequent actions which would be preferable when the users are at different levels. For the function creating a prepass it is the same that a experienced and a non experienced user has to do. When the prepass is created a chat connected to the prepass is created between two users. This chat can be accessed in four different ways. The user can chose to tap on the prepass bot message in the building site chat, by tap on the prepass listing and tap on the wanted prepass, tap on the prepass chat on the top of the screen or through notification tap on a notification tap for that prepass. This gives the user multiple different ways to do the same action. It lets the user decide on their own way to do it but their are not a clear user journey for a experienced and non experienced user.	70%
8. Aesthetic and minimalist design	For the front page all the different building sites are shown and the primary goal is to work in the different sites. The users primary goal is easy to fulfill with the minimalists design. The bottom menu has the mapping to the building sites chats, the user profile and notifications which are the primary things a user can use. The UI is well organized and the symbols are in an simple design that is well known from other designs. Though the feature prepass is not able to be accessed in the main menu but is a function that is central for the product. This may create users to not use it. When adding functionality it is important that they continue with the minimalist design that it has now.	90%
9. Help users recognize, diagnose and recover from error	In KLAR their are a few messages in the app that explains different things for the user. If a user goes into a chat room and no messages have been send it says "no messages yet". When creating a prepass iOS and android works differently. For android the send button is not coloured before all the fields are filled out and no feedback is given when trying to press the button. With iOS an error message is visible that ask the user to fill out the fields before trying to send it. The error messages does not explain what a user can do to change except for the iOS create prepass button.	40%
10. Help and documentation	If a user has questions their are an existing support for KLAR users. But their are also help icons in the app that can help the user. When creating a prepass their is an visible guide that has text that explains the function. If the user want more information than what the guide gives the user it is possible to press the help icon and their is a more complex guide showing the user how to use prepass.	80%

For the KLAR app their are multiple different things that can be improved in future

development when it comes to user friendly design. Today the app uses some of the design principles and all of them are existing in the app but some are inconsistent and not finished. There are some differences between the Android and iOS application which can be problematic if a user changes application but must also be hard for the support to speak differently to the different applications. Therefore it should be a priority to make sure that the design in the future development is so alike as possible.

3.6 Design workshop

After gaining knowledge regarding both gamification, KLAR, defining KLAR business goal and collecting knowledge regarding the target users the next step was to generate ideas. The writer had many possible gamification feature ideas but to collect as many ideas as possible it was decided to do a design workshop.

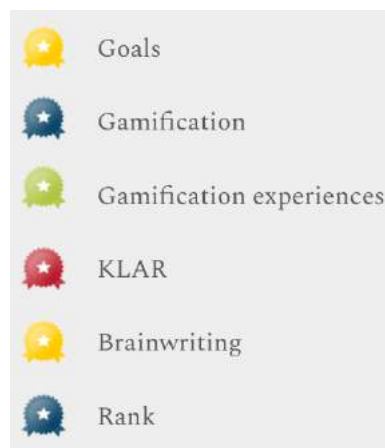


Figure 3.4: The different steps for the workshop

The Figure 3.4 shows the agenda for the design workshop.

3.6.1 Preparations

Before the design workshops were conducted there were multiple different preparations to be made. The first was to invite all the people at Engage to a decided date. The date chosen was adapted to a day where there were less meetings for the employees to increase the employees' ability to participate. Due to the workshop including the idea generating method brain writing that can be found under section 2.2.5 it was placed during the beginning of the day due to it being the preferred time for idea generated tasks.

The participants invited to the workshop were employees at Engage that have previous experience from implementing gamification in enterprise software that they have developed. This meant that the participants have all worked with gamification before in different ways. The participants' roles at Engage are head designer Age: 33, Male, COO Age: 53, Male, customer success manager Age: 26, Female, design consultant Age: 32, Male, product owner Age: 54, Male and operation general Age: 34, Male. Only the operation general has not a great understanding of the software solution KLAR but has done case studies within gamification. Due to

their background they all had ideas and have discussed possible gamification features before but not organised at a workshop. The workshop lasted for three hour with all of the participants participating at all time. In order to establish a common ground before starting the ideas generating tasks multiple different steps during the workshop was conducted. Figure 3.4 shows the steps that was followed and are further explained in the next sections.

3.6.2 Introduction

To make sure that all of the participants knew why they were gathered and what will happen with the result from the workshop the Figure 3.1 was showed before moving on to explaining the agenda for the workshop. Firstly the goal for the workshop was presented which was to gather the valuable knowledge that the different participants can contribute with and together pick out three ideas that can be further prototyped. After the goals were presented next was to introduce gamification in order to get the participants into the gamification mindset and give the participants time to adjust their thoughts and put aside other work tasks that they had in their mind. Firstly different definitions was introduced followed by introducing the framework Octalysis and its 8 different core drivers, more about the framework can be found under section 2.1.2. Further different examples of gamification was shown and explained. The examples presented was the application Habitica[8] that is a gamified to do list and Samsung nation[22] that is a common gamification enterprise solutions followed by the Swedish speed ticket lottery.

3.6.3 Gamification discussion

After showing the participants different examples of gamified solutions an organised discussion was held with the participants asked to mention software they recently have used that through gamification has changed their behaviour. This part was chosen in order to engage the participants in an early stage to observe the group dynamic. It also allowed the participants to early start to think by themselves and not only listen to the presenter. With the inspiration from the introduction examples the participants would be more involved in this part of the presentation and also asked to explore their own experiences. The goal for this part was to open the participants minds and start the thinking and creative process within the subject. The software that was the most discussed was LinkedIn [13] and Runkeeper [21] and how they in different ways use gamification to affect users.

3.6.4 KLAR solution and its users

After the discussions that was not connected to the specific solution KLAR the solution was presented. This was made both due to one participants being new to the software solution but also to show the defined scope. The problem with the solution today was also presented with the business goal. Though importantly addressed that in order to reach the business goal the users goals had to be in focus. After the business goal was introduced and the focus had to be moved to the user goal the personas were presented.

3.6.5 Brainwriting session

The participants got a short brake to gather their thought before it was time for the brainwriting session. More about brainwriting can be found under section 2.2.5. The brainwriting session was held to get a lot of ideas from the six participants where they can get inspired by each other but also be able to in peace and quiet write down their thought without judgment. For this session the time for writing down ideas was shortened to 4 minutes due to the workshop taking more time than participated and the iterations was done 4 times. From the brainwriting session 70 ideas were generated and they were all placed on a whiteboard where they were sorted into different categories. In the brainwriting session all of the participants at the design workshop participated. The total time of the brainwriting session was 70 minutes. The ideas collected can be seen in Figure 3.5 and 3.6.



Figure 3.5: All ideas from the brainwriting session. Ideas that were duplicated were only represented by one poster.



Figure 3.6: The result after sorting the ideas from what would be useful for the target group and how technically difficult they are

3.6.6 Rank

In order to not make the participants only look on their own ideas the ranking was parted into three different parts. The first part was to discuss which of the ideas that are most relevant to the project due to the brainwriting being open for all different ideas. The ideas that the group decided was relevant for the project was placed on another whiteboard. The rest of the ideas was put to the side before the next part. The first part took 20 minutes. The second part the participants were asked to separate the ideas depending on their technical difficulty. This was done in order to get a more technical overview and discussion going were

a lot of ideas that a few participants thought are easy to implement were not. Some ideas were harder to decide on without a developer but some of the ideas have previously been discussed with developers. The time for finishing the second ranking was approximate 30 minutes. The last section was to give every participant three dots that they could place on one post-it each in order to get three post-it that could be further prototyped. Due to the workshop taking more time than expected and discussions being depend into thought of how to develop a point system that will be a base for the KLAR software 3 ideas were not decided on. The planed time for the workshop was two hours but the workshop lasted for three hours before ending it with the ideas ranked in technical difficulty and relevance.

3.6.7 Results from workshop

The workshop ended with multiple discussions regarding motivation and different gamification elements possible to use. After generating the ideas and ranked both in how relevant the ideas were to this master thesis and further how hard they are to implement with the existing system 20 different ideas were left. 11 ideas were under the categories less technical challenging and 9 under the categories technically challenging.

After the design workshop multiple ideas were to choose from and not only three ideas that was the origin plan. From the workshop the next step was either to gather the group again and decide on the final ideas or let the product owner *Age: 54, Male* decide on the ideas that the company want to further test and evaluate. Due to the gathering of the personnel meant delaying their other work tasks and also included cost in salary from the time they spent on the meeting the decision taken was to further wait for the product owner to decide on the ideas to continue with. Instead of introducing the different ideas in the same way they were left at the workshop the ideas were mapped in the Octalysis framework to give the product owner another perspective and as much information as possible to make the decisions on what to further develop.

3.7 Octalysis framework

In this section the ideas from the workshop is shown in the Octalysis framework. As mentioned 20 different ideas were left at the end of the workshop and they were categorized under how technical difficult they would be to implement in the existing system. In Figure 3.7 the ideas can be seen mapped in the octalysis framework. The post it that are orange are the more technical difficult to implement and the yellow are the once that are less technical hard to implement. The mapping was done in order to make it easier for the product owner to decide on the final ideas to prototype. The framework shows which of the 8 core drivers the different ideas are connected to. Though what must be taken into account is that an idea can connect to more than one core drive and also different core drivers depending on the design. With the mapping the product owner got the idea of what is possible to do with the different ideas and also what type of ideas that were mostly generated during the workshop. The ideas were mapped manually in the octalysis framework tool [19] were it is possible to get feedback on the overall gamification of a product. The 20 ideas were mapped and the feedback from the framework was "Your experience is heavily focused on White Hat Core Drives, which means users feel great and empowered. The drawback is that users do not have

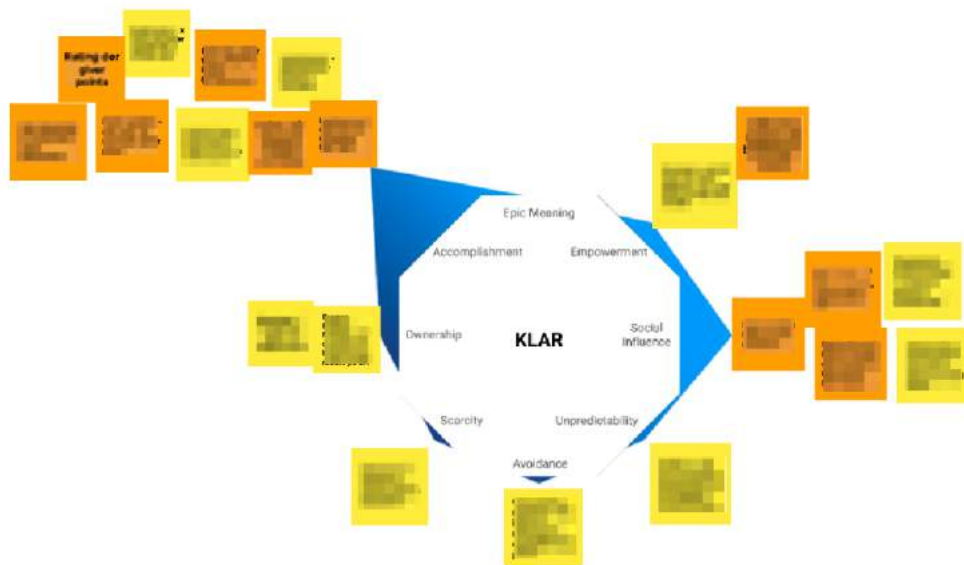


Figure 3.7: All the ideas from the workshop gathered in the octalysis framework, blurred due to secrecy

a sense of urgency to commit the desired actions. Think about implementing light Black Hat Techniques to add a bit more thrill to the experience" [19]. This means that if all of the ideas were to be implemented it would be wise to include more black hat features.

3.8 Ideas to prototype

There were many great ideas from the workshop that would be good to test for the future development before implementing gamification in the software but the primary discussion often ended up on discussing points and possible game rules regarding points. Therefore the product owner saw an interest in implementing a point system in the software. During the workshop it was also discussed from the personas that they have found the users to like earning things like badges.

The following ideas were decided by the product owner to implement in a prototype:
Point system

- Users get points from "godkend" KLAR
- User gets points from answering KLAR
- Users get less points when answering KLAR depending on the time from when it was created
- When a KLAR has not been answered for x time the user receiving it loses points.

KLAR Coin/badge

- When user have achieved x points they get a KLAR Coin

- KLAR Coin frees a badge

Progress bar

- User can see how far they are from their next KLAR Coin

Leaderboard

- User can see their colleagues and closest ranked depending on the points

Chapter 4

Lofi and Mid-fi phase

In this chapter the process of creating and iterating the Lofi prototype is described. The Lofi prototype will during this process evolve to a Mid-fi prototype that is more advanced than the Lofi but still has the focus on the high level interaction.

The chapter will include the processes of evaluating the decided ideas and how they can be presented in a prototype and tested. For the tests during the Lofi and Mid-fi iterations the prototypes will only be tested with employees at the company. This was decided due to the COVID-19 pandemic where the company decided on having restricted contact with people outside the company to prevent spreading of the virus.

This master thesis is focusing on user centered design more in section 2.2.3 and therefore the focus is on the iterative process. The following sections will therefore be sectioned into the different iterations.

4.1 First iteration

After the ideas had been approved by the product owner it was time to start with the first iteration. For the first iteration the first step is to analyze the ideas and how they can possibly be represented in the user part of the software system. Next is to create a design that is implemented in the first prototype and as a last step test the prototype with users. The result from this iteration is then later used for the second iteration.

4.1.1 Analyze

What is going to be included in the design is leaderboard, some type of badge/reward and points. But before deciding on the design it was of importance to decide on the functions of the different elements before designing them.

Leaderboard is connecting the users. Today they are only connected through the building suite. Meaning that a fitter does not have any communication with colleagues or people of

other professions unless they are connected through one building site. The leaderboard is included to connect people in the app outside of the building sites. It would be possible to do a leaderboard for everyone that uses the system but due to different professions using the app differently it was decided to control the leaderboard to only compare people within one company. This was also decided due to the personal connection between employees at a company. Therefore the leaderboard is only representing people within the same company with the same profession. Leaderboards are good for the social and accomplished core drive but to make sure that the user feel that they can get better and affect the ranking in the leaderboard, it will only show colleagues with points close to the user for the first design.

For the point system some game rules have to be established. The company specific ask for not only positive game rules but also creating a sense of urgency making the user answer quicker to a prepass. Using the scarcity core drive. The game rules can be seen in Figure 4.1. The points also have a higher value. They are both connected to the leaderboard were

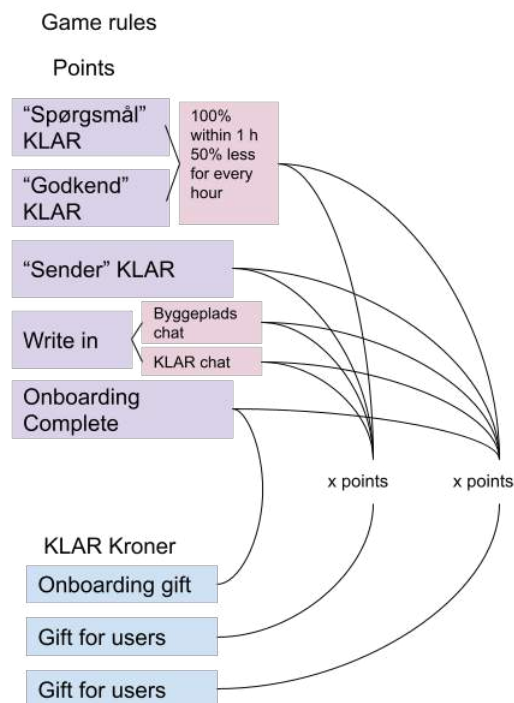


Figure 4.1: Game rules

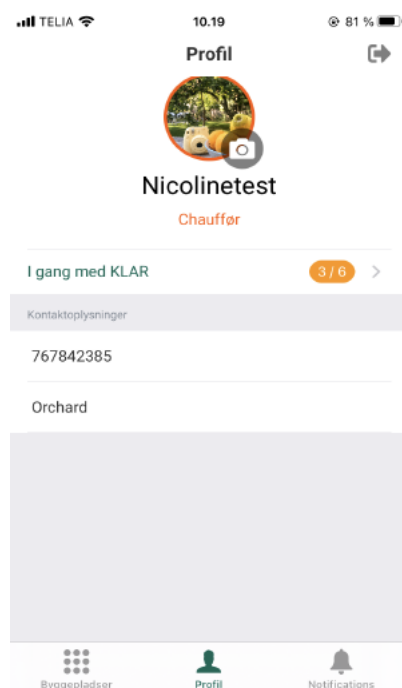
users are ranked depending on their points but the points also unlocks a badge. Firstly it was thought that a specific value of points would generate a KLAR coin that could be used to unlock badges. Instead it was decided that the points will unlock badges depending on the badges value.

The badge concept comes from the employees at Engages experiencing that the users of the app did not mind testing the app in the inner city of Copenhagen due to the chance to eat at a burger chain restaurant. The users of the app are definitely motivated by freebies and therefore the concept of rewarding with vouchers came alive. Though the economy behind

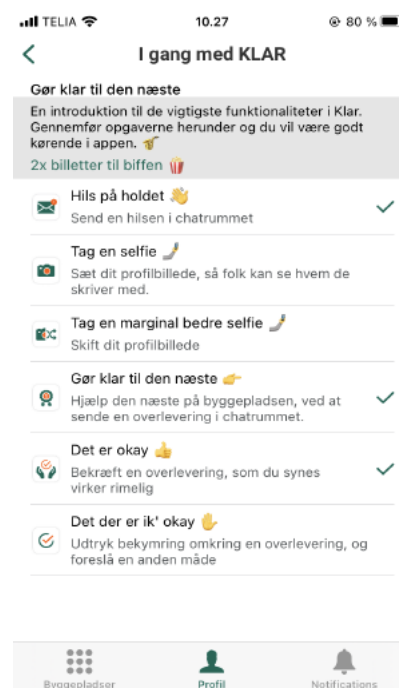
the vouchers is today unclear how that would possibly work. Therefore for the Lofi and Mid-fi a design was made were the user would get a virtual reward when reaching a specific point. The virtual reward would later be possible for a user to show their manager and retrieve a voucher or if the economy is not available it can be used as only a virtual reward. The design was chosen in a way that both the options could be used in the future so that Engage can chose. A virtual voucher may also be possible to implement but due to uncertainties for the future of the app and its complexity a virtual store or voucher has been put on hold and not taken into account in this design.

4.1.2 Design concept

When looking at the design that exist today that is seen in Figure 4.8a and 5.1.1 the profile for the KLAR application does not have many functionalities and the users today do not use the functionality as much as first intended.



(a) The current profile page



(b) The "kom igang med KLAR" pop up

Figure 4.2: Caption for this figure with two images

Due to the profile page having alot of potential for development that was found during the Heuristic evaluation that is shown in section 3.5. The profile page is also a central part of the existing home menu for the app it was therefore decided to continue develop the profile page by adding the different gamification elements. The profile page today has the functionality of changing profile picture and looking at a drop down screen showing the different features that the user needs to test in order to be complete with the onboarding. Both of the features are minimal used today but they were decided to follow into the next design. Though the contact information was decided to not bring along in the design due to them not being used today. When a user today opens the app, the first page is the page for the different building sites. This is preferred due to the app being an aide for different professions to collaborate at

the building sites. Though to make sure that the users also gets aware of the gaming elements it was decided to add a progress bar at the front page.

4.1.3 Prototype

Next step in the process was to start with the first prototype that can be seen in Figure 4.3 and 4.4. Due to delays in the project it was decided to create it with pen and paper in order to get feedback in time before the next iteration. The prototype was therefore designed on paper with post it notes that marked changes in the UI when a user pressed a button and something new happened.

What is visible in the picture of the prototype in Figure 4.3 is the changes made to the profile page that gets a new design with a leaderboard and reward page. For Figure 4.4 the changes made is the progressbar that in this design is located in the bottom right above the menu bar.

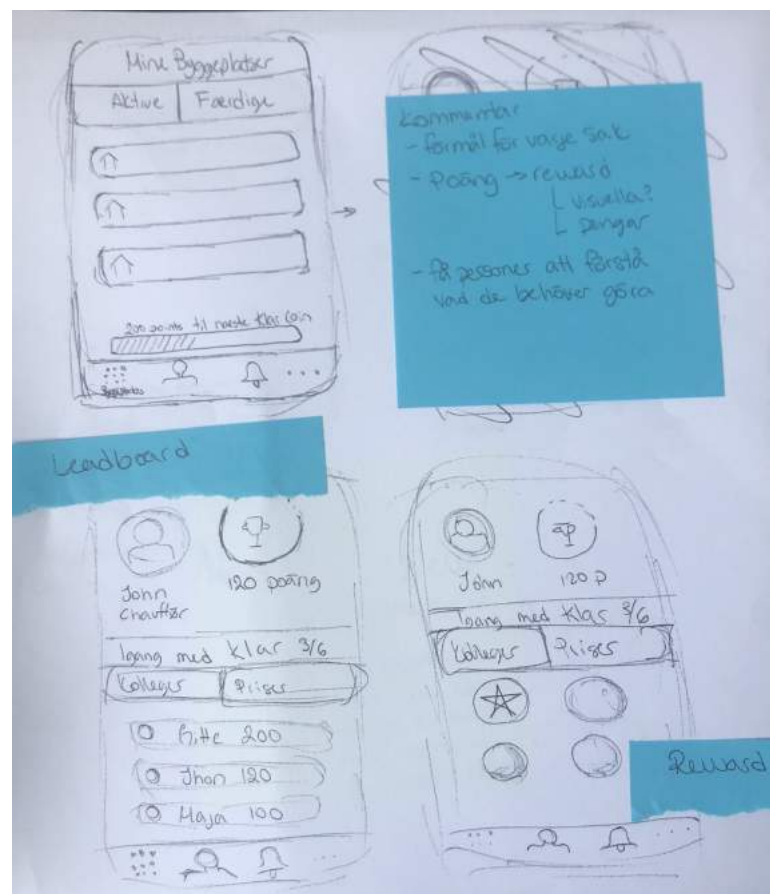


Figure 4.3: Lofi prototype profile page



Figure 4.4: Lofi prototype main page

4.1.4 Testing

The prototype was later tested and discussed with the designer Age: 33, Male at Engage that has previous experience with game elements and the solution KLAR. The test was conducted during an hour which the designer could first test the prototype and later discuss the ideas and what value it has to the user. The test was meant to be with one more member at the Engage team that would test the Lofi after the designer but due to workload from the company it was not possible to arrange for the first iteration.

The comment from the tester was the following.

- It is good that there is a progress bar at the front page so that you can see your progress. Though maybe there could be another way to see your points at all time even when the user is in the building site chat.
- The user has to understand how they get points.
- For the badges think more about their purpose in how the user will feel their purpose. In the design they are collected but maybe they do not need to be collected.
- It is very good that the profile page is changing and gets a new design with added elements

- The design may be needing some development when it comes to new and more experienced user in order to keep them interested and the beginners to learn all the steps.
- With a leaderboard it is important that the user knows how to get in the lead and know they can make it if they want to.
- Could be nice in the future if the companies could compete .. but that is out of scope for this project
- The user needs to know what reward they are getting. That could possible be made more clear

4.2 Second iteration

After the valuable notes from the test of the Lofi it was time to continue on to the next iteration. For the second iteration it is going to be a prototype in figma [5] that will not be too detailed. The focus is still on the high level concepts but due to it not being a paper prototype and more advanced it is of higher fidelity and is the first Mid-fi prototype for the project.

4.2.1 Analyze

From the interview in the first iteration there were a few keypoints that will be taken into account for the next prototype.

- There has to be a way for the user to constantly see their points
- User has to understand how they get their points
- The design needs to take into account both new and experienced users and how they need different levels
- The user needs to know what reward they are getting. That could possible be made more clear

For the first point regarding points a possible solution would be that there in the top bar is a space for the users points so that they are visible at all times and the user can see when the points are changing. Second point is some connected to the first point were the user gets visible feedback quickly. It would also be possible to add notifications that tells the user for what action they got points for right after the preferred action. This point also talks to an onboarding phase where a user needs to know what the game rules are this is also relevant for the third point. Where it is acknowledged that a users level leads to different needs.

4.2.2 Design

In order to comply with the analysis some design changes had to be made. The first and most important change is that there has to be a visible point display at all times when the user navigates in the system. In the first design there is a point display at the main page for the

app and the profile page but their also has to be an design that gives the user feedback while they are chatting.

Secondly the Lofi prototype did not give the user alot of feedback and it is of importance that the user understand what type of actions that gives them points. The progressbar is the part that will give feedback of progress when gaining points and making it more visible would possible give enough feedback for the users to understand what actions that are needed to gain points.

When it came to the rewards the designer pointed out that it was not fully clear what reward the user would get. Their may be of interest to only show the reward that the user are working towards right now. It was therefore decided to try to change the design to only show the reward that the user is working towards and see the feedback from the tester for the second iteration.

4.2.3 Prototype

Next prototype was created in Figma [5]. With the writer having no previous experience of using Figma some time was used to get to know the system and how it worked before creating the prototype. Firstly all of the existing using screens in KLAR was created before adding the game elements. When that was done the prototype was created were the tester would try it from both a driver and a fitter perspective.

Figure 4.5 shows the prototype for the profile page and Figure 4.6 shows the prepass chat request and a prepass chat were a timer and progressbar is added.

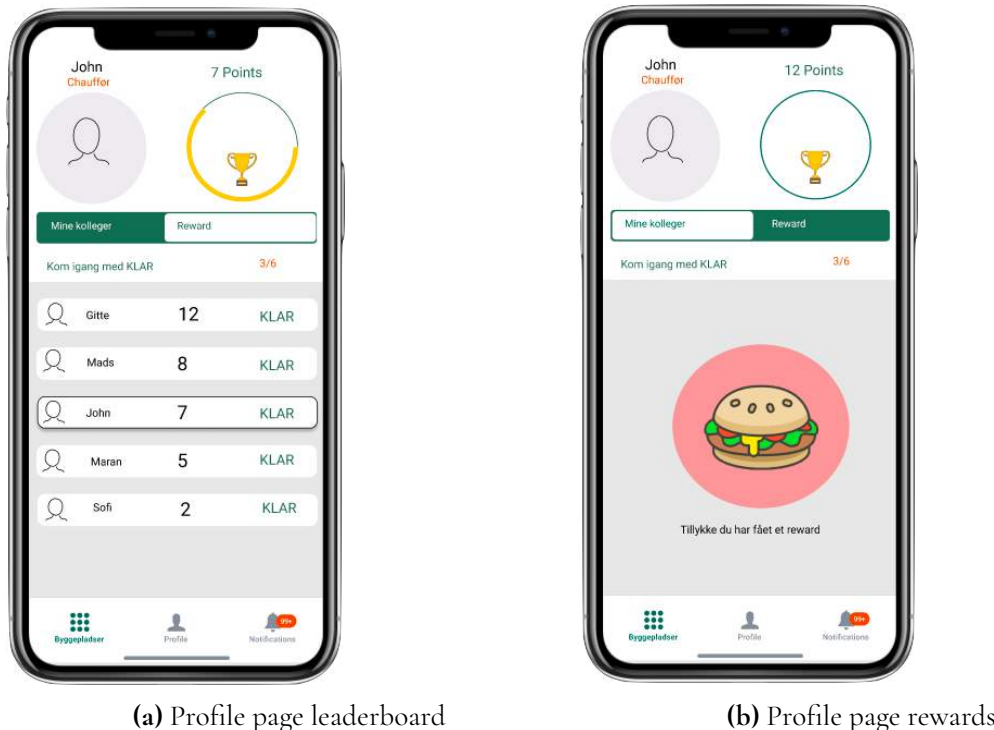


Figure 4.5: Pictures of the the tap design in the profile page

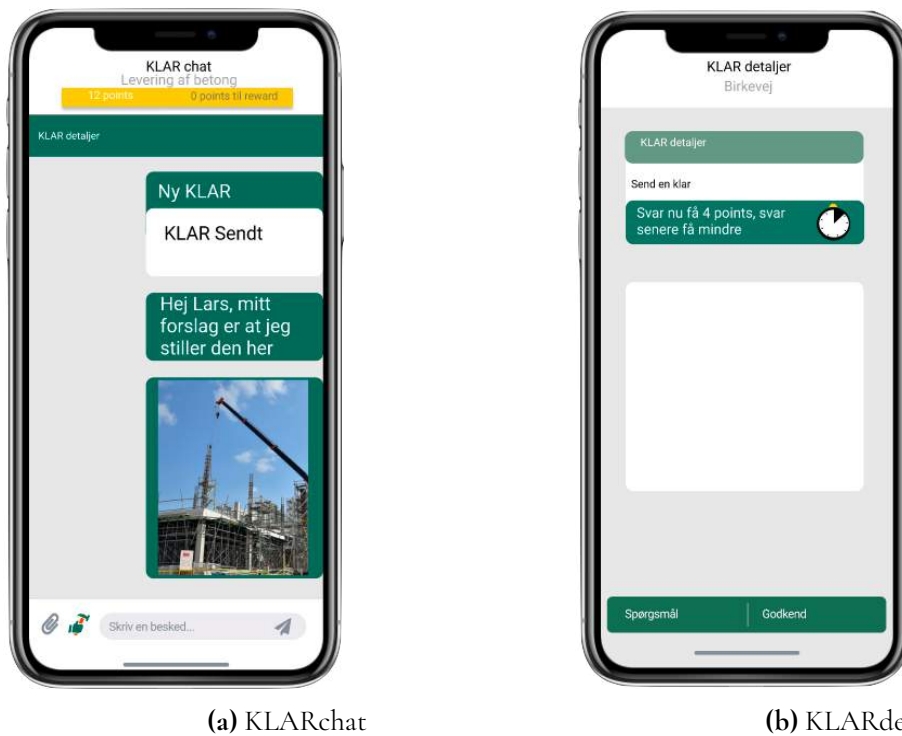


Figure 4.6: a) shows a prepass chat and b) shows when a user can accept or question the prepass request

4.2.4 Testing

For the second iteration the testing consisted of testing on four employees at Engage. Three of them has just started at the company and had not yet gotten a app introduction to the product. They all knew what the app is use for and its name but the operation general, finance manager and marketing manager had not seen the user interface or worked with it before. The customer success manager has previous experience with navigating in the app. All of the test persons firstly got a small introduction to the app and the core functionality of a prepass but without seeing the original app. In the next step the test persons had the opportunity to try the Mid-fi prototype. Different scenarios were described and the user tried to follow them. If they had questions they were answered. After they had run through the prototypes the different elements were discussed. The first test person was the customer success manager Age:26, Female that has previous experience with the app. The test lasted for 30 minutes with 7 minutes of testing to use the different functions in the app and the rest of the time was used for a discussion. The next test person was the finance manager Age: 54, Female that has no previous experience with the app. The test took 15 minutes due to the finance managers limited time. The time was used to test the app different functions and then a short 5 minutes discussion regarding the screens. The third test person was the operation general Age: 34, Male that was new to the system. The test took 20 minutes with 15 minutes to a discussion. The last test person was the Marketing manager Age: 28, Male. Like the other three test persons it started with a test that took 8 minutes and then finished with a discussion for approximate 14 minutes.

From all of the users their were alot of positive feedback regarding the design and that

the profile page now is giving an interactive opportunity that did not exist before. But from all of the users possible improvements were discussed and the main key points regarding improvement is presented below. Due to the test user customer success manager has previous experience with using the system the key points are separated into two categories. One with the key points from the three employees with no previous experience with the solutions and one for the customer success manager that has worked with the system before.

The main key points from the three employees that have no previous experience with the app.

- Was unclear what the user actually wins. Thought that the picture was a picture for reward not for a specific reward.
- Pointbar, was only discovered at the end
- Klartimer, understood it but would need more clarifying in the timeline and loss of points
- How do a user see more clearly how many points they need to achieve a reward
- Would be fun to see more rewards that you can achieve, maybe even collectable.
- Does not like the time pressure for a prepass, maybe would be better to reward them for quick answers

The main key points from the one employee that has previous experience with the app.

- Fear that people would start to send multiple messages to achieve rewards. Dialogue should be rewarded instead
- Leaderboard is it possible to see your ranking and see the top 3 or maybe top 1

4.3 Third iteration

For the third iteration the results from the second iteration is taken into account with the focus on the high level concepts. For the iteration the Mid-fi prototype is further developed without increasing fidelity but adding or changing concepts.

4.3.1 Analyze

For the previous iteration and test it is clear that there has to be made some changes to the reward page. Firstly it has to be more clear for the users how many points they need in order to get a specific reward. Secondly it has to be decided how many rewards the user would be able to see before reaching them and if they should be able to be collected in a reward library. To decide on the different design options regarding the rewards it may be a good idea to reflect at the original idea and why rewards are introduced.

For the voucher principle that is the reason for the design of rewards the user would need to show their manager the reward and it has a connection to the real world. But when the user has collected the voucher the specific reward is not more of interest. If the rewards are

not connected to a real world gift but is a virtual reward only their may be value for the user to be able to collect the rewards.

Points, their is a fear from one of the employees that users gets points from writing messages and will start writing more messages that does not add value to the conversation. The point of using points is to encourage the users to talk to each other. Encouraging to create prepass is the primary purpose but due to the users on the solutions today not using the prepass in the intended way it is of interest to encourage to all type of collaboration through communication. The communication is with users from different companies and therefore their may be an argument that they will keep it professional and not use the chat to send unwanted messages to get an reward. But at the same time that is never sure. The one employee at Engage pointing this out suggested that dialogue should be encouraged and therefore the points should reflect that.

Timer should be more clear of how it develops and affects the user over time but also focus on how it is presented in a way that it is still a black hat motivator that creates sense of urgency but with focus on rewarding. This will easily be changed in the existing design.

The last element that was pointed out was the leaderboard. Overall the feedback was positive but one employee felt that it would be good to add ranking on the leaderboard meaning that the user would be able to see who has most points in the company. The existing leaderboard only shows the four users that are the closest to you in points. Two that has more points than you and two that has less points. This technique was chosen due to get the user to feel that they can affect their scoring and their position in compared to other colleagues and not feeling that it will take to much effort to be scored as number one and therefore ignore the leaderboard.

4.3.2 Design

From the analyze different things has to be changed or included in the design. For the timer the describing text will be changed in a way that indicates to the user what points they get for answering. A possible design will also be made for the notification bar.

Two designs that are easy to change is the point system and the leaderboard. Though it is not clear if the design with the leaderboard will lose it purpose if ranking is visible and the point system may be complicated for the user to understand. Therefore the two designs will be implemented in the prototype together with the old prototype to test what users prefer.

Moreover animations will be added to increase the feedback. The animations will show changes in the progressbar and the rewards. For changes in the leaderboard a push notification has been added.

The reward page is the one that has the most complex design to change. The new design must make it possible for the user to see more than one reward and also what rewards that has been collected and the next available. During the designing two possible designs were thought of and was decided to be tested for see the testers preference and if their were any setbacks with the different designs.

4.3.3 Prototype

For the third iteration the difference in the prototype are the changes in the design from the second iteration. In the Figure 4.7 shows the new design for the profile page and main chat

room. In Figure 4.8 the two different designs that are tested for the reward page are shown.

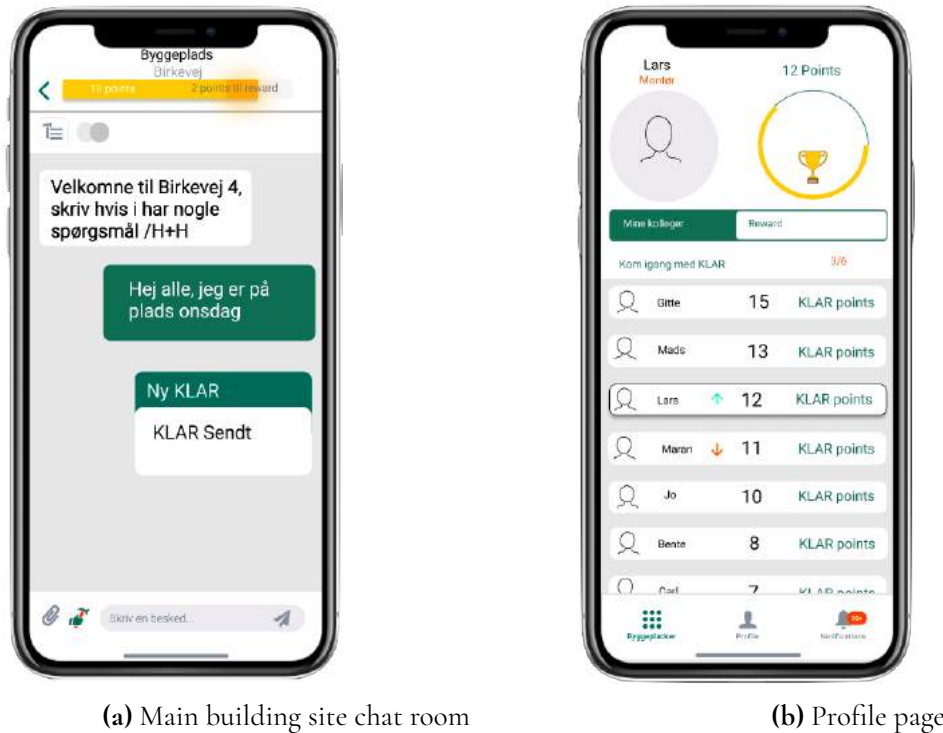


Figure 4.7: a) shows the added design to the main chat room and b) the new design for the profile page

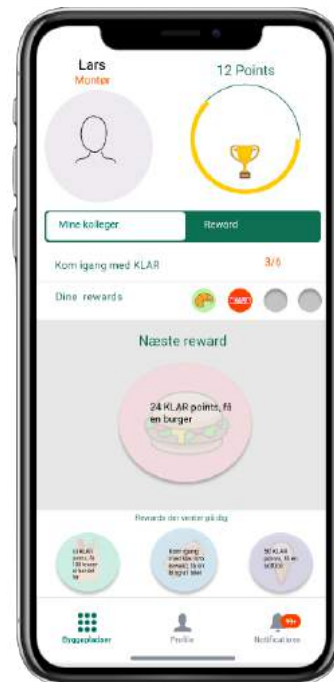
4.3.4 Testing

For the third iteration all of the employees at Engage that tested the prototype had no previous insight into how the previous Mid-fi looked. For the third iteration there were one employee left that had not tested the prototypes from the first and second iteration.

The prototype was tested first by the designer Age: 33, *Male* and design consultant Age: 32, *Male* that had not seen the prototype before. Like the first and second iteration the test was conducted during a session where the tester first tested the prototype before there was a discussion regarding the different elements and screens. The test was planned for a session of 30 minutes. For the designer 40 minutes was used where 10 minutes were used to test the prototype and the rest to discuss the possible changes. For the design consultant 20 minutes were used, 5 for testing and 15 for discussing the different screens.



(a) Design 1 for reward page



(b) Design 2 for the reward page

Figure 4.8: Shows the two different designs for the reward page in the profile page

Chapter 5

Hifi phase

In this chapter the focus is on the creation and testing of the Hifi prototype. Compared to the last chapter with the Lofi and Mid-fi prototype the Hifi will be of higher fidelity and therefore be more detailed and not only focus on the overall flow of the product.

One more difference is that the Hifi prototype will be tested with real users. This would be preferred to do with both the Lofi and Mid-fi but due to the COVID-19 virus and the users having a hard working schedule spread across Denmark it was decided to do at the end of the project to prevent workload and spreading of the virus. More about the user testing in chapter 6.

The Hifi will like the Lofi and Mid-fi prototype be created in Figma.

Due to limited time and workload the Hifi prototype is tested two times with two different people before the last usability evaluation tests. In the First iteration the prototype will be created and tested with a user that has no previous experience with KLAR. After the test user has tested the prototype the feedback is evaluated and reflected in the next iteration were the prototype is tested with the product owner. After the last test the prototype will be tested with multiple different people during a usability evaluation tests.

5.1 Hifi first iteration

Firstly with the Hifi prototype the feedback from the third iteration was taken into account. From the testing of the Mid-fi prototype different points were made. Here are some of points made during the tests:

- Their exist an impulse for writing a message to get more points. If the points instead would added for collaboration it could also be an option for the user to gain points when another user has answered their prepass.
- Design 2 is preferred. It adds more value to the user than design 1. Though for the reward page the vertical scroll is hard to understand. It may be seen as a menu were

the user can pick their next reward. Design 2 makes it more visible what the next reward is.

- Push is used for the application today and it was a good way to make the user aware. Their may be problems with keeping the important building site messages separate from the gamification and more social messages. The users still needs to be informed about an achievement. It could therefore be an option that a pop up was made visible for the user when they have made an improvement.

5.1.1 Design changes

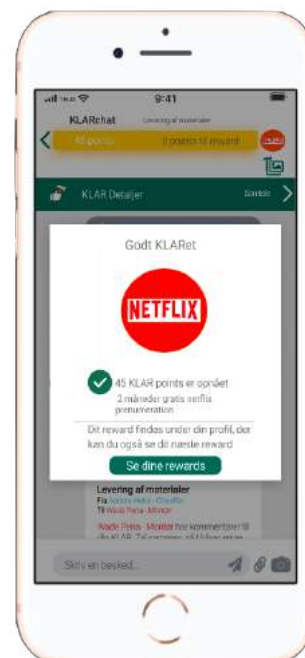
The design changes that was made for the first Hifi iteration are the following. A pop up was added to congratulate users when they have moved in leaderboard or when they have received reward. Their were minor design changes to the screen that was chosen as the reward screen. The point system is only rewarding conversation instead of rewarding for every single messages.

5.1.2 Prototype

For the Hifi prototype the frames in Figma were changed from the iPhone model X to a iPhone 8 due to the possibility to use a iPhone 8 for the tests instead of using a emulator in Figma. This was made to make the test feel more realistic for the user and make them feel like they were working with a live app instead of a screen on the computer.



(a) Building site chat



(b) Pop up when winning award

Figure 5.1: First Hifi prototype

5.1.3 Testing

For the first Hifi iteration there were only one test with a user that had not seen the app before the test. The user is of age 23 and male. During the test there was an open dialogue between the tester and the moderator to make sure to capture the different movements and why the user does the action it does at specific times. The first Hifi design can be seen in Figure 5.1.

5.2 Hifi second iteration

During the test of the first Hifi prototype there were one wrongdoing the user did that was later questioned in the interview and from the answer it felt critical to do a second change in the design before showing it to the product owner and start with the users tests. The problem discovered was that the user pushed the KLAR icon and thought that it was a like button similar to the like buttons used for other chat systems. The prepass icon is located close to the text field due to its action being connected to sending a message but the icon itself does not indicate what it does which was a known problem.

5.2.1 Design changes

It was decided to change the UI design that is in the app today to make it more clear in the chatroom about the different features. The first thing that has to be made it to move the prepass icon from the bottom bar so that it is not located at a regular place for a like button. It was also made clearer that it was a button and that it adds something. When moving the icon from the button bar the button bar was also changed.

5.2.2 Prototype

In this section the prototype for the second Hifi iteration is presented. The changes that was made is visible in the different chatrooms in Figure 5.2a. The big change is that the prepass icon is moved as shown in Figure 5.2b.

5.2.3 Testing

For the second Hifi iteration the product owner *Age: 54, Male* had a chance to test the product before the usability testing with external users were performed. The test was held short due to limited time, with the product owner trying the Hifi prototype for the first time. The test took 15 minutes with the product owner being able to try the different features and use the remaining 7 minutes for a short discussion. After the test it was concluded that there is a lot that has been done with the UI and that even more can be done in the future but that it is of big interest to test the users thought about the added gamification and changes from the existing UI.

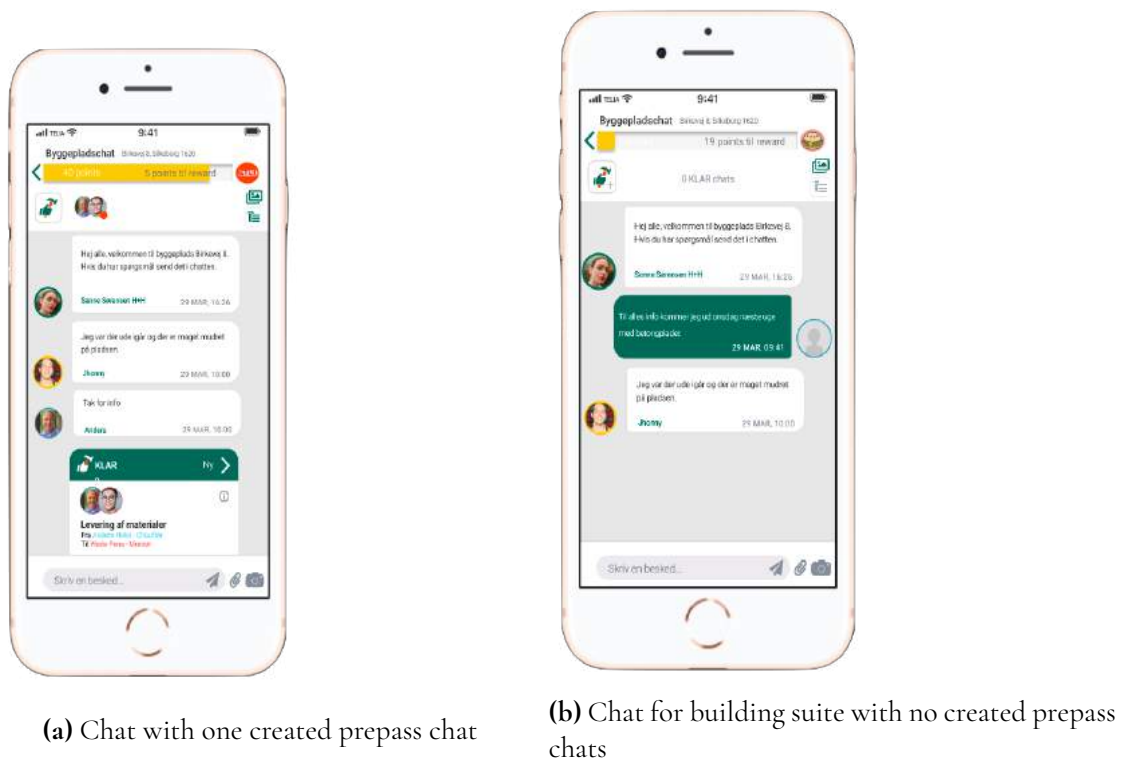


Figure 5.2: Second Hifi prototype

5.3 Final design

For this master thesis the goal was to create a Hifi design of the KLAR App with included gamification. The final Hifi will be evaluated with external users to evaluate its usability and the possible impact of the added gamification. The final gamification design and the UI changes that has been made along the different iterations are presented below.

5.3.1 Badges

For the Badges in the final Hifi they could be found in a separate page in the profile page. The badge page shows the user what badges they have earned, the next they will earn and the three badges that follows. The concept with the badges are that they can both be used as a visual rewards or as symbols that can be exchanged to a real world reward like a voucher. This all depends on the company that is using the system. For the user it is also possible to see a text on the different badges that described what they have to accomplish to get it and what they get in return. A user can win a badge if they complete the onboarding process for the first time and then afterwards when retrieving the amount of points needed for the different badges. Badges are visible at the profile page but the badge that the user is currently collecting points to win is also visible in the top progress at the profile page, chat pages and at the front page for the different building sites.

Furthermore when a user wins a badge the top progress bar will indicate with a animation that something has happened. Their will also be a pop up with some text explaining what has happened and a GIF on the screen were the user gets the option to quick access the profile

page as shown in Figure 5.2.

5.3.2 Points

The point system was decided to work as following. The user earns points from communicating with with other users in the system but with restrictions. A user gets points from:

- Answering other texts in the chat
- Message in chat
- When sending multiple messages the user only get points for the first message and then again after another user has send a message. This is to give points for dialogue to prevent spamming of not relevant messages.
- Opening a prepass
- Answering a prepass

The points are visible for the user both in at the profile page and at the top progress bar that is visible in the different chats and front page. The top progress bar has animation connected to when the user gets a point. One decision made regarding points that is not visible in the Hifi is that the users will continuously gather points which affected their placing in the leaderboard. It is of interest to reset the point system after some time of use to make sure that new users have a change to compete with the older users. For this reason it was decided that the points will be deleted every 6 months. Though due to the leaderboards connection to points the placing in the leaderboard will be kept with the users in the top getting the same point as the amount of users and the bottom user 0 points after the reset.

5.3.3 Leaderboard

Leaderboard is at the final design a leaderboard that shows all of you colleagues and is visible in the profile page. The leaderboard shows the profile picture of the user with their name and points.

When a user moves up in the leaderboard it is shown with a animation with arrows in the leaderboard. The user also receives a pop up with a short text explaining what has happened and a GIF. The user can by clicking on the pop up access the profile page.

5.3.4 UI changes

During the different tests different UI faults were discovered that was changes in the Hifi. Firstly the attachment symbol does not indicate that a user can take a picture when using it and therefore a separate camera symbol was added to the chats. Secondly the users had a hard time understanding the prepass icon and its meaning. It was therefore moved to the top of the screen to locate it close to the different chats that the button creates for better mapping. The design of the icon was changed with adding signifiers to make sure to indicate the right affordance. Lastly signifiers were also added to the different symbols to indicate when something had been filled in or added.

Chapter 6

Usability evaluation

After the Hifi was created and tested internally at Engage it was time to do a bigger usability test with user that has not seen or been in contact with the development of introducing gamification in the KLAR app. In the following chapter the testplan for the usability tests are introduced and the results from the usability tests are shown.

6.1 Purpose

The purpose of the usability evaluation is to gather qualitative data on how external users feel about the introduced elements to the KLAR app. The results will be available for Engage that can use them as a guideline for the future development of the app.

Form the data collections from the tests these questions are going to be answered

- Do the user feel more engaged with the product due to the gamification elements?
- Do users see the progressbar
- Do the user see were they are placed in the leaderboard
- Do the user see were their next badge is
- Do the user see what badges they have earned
- Do the user see the onboarding activities
- Do the user understand for what actions they earn points
- What does the user think about the leaderboard?
- What does the user think about the badges page
- What does the user think about the bonus points depending on time

- What does the user think about how they earn points
- Is there any of the gamification features the user does not understand.

6.2 Methods

For usability testing multiple different methods are combined to gather both quantitative and qualitative data. For the usability test with the KLAR prototyp different methods were used and the ones that was used are presented below.

6.2.1 Session

The tests were conducted during 45 minute long test sessions. For the first 5 minutes of the test session the test user got a short introduction to the test and what the app is used for today. When the test users felt ready the user test started. During the user test the user went through the different scenarios on a iPhone. The test sessions was estimated to last for 25 minutes. After the test users had finished the last scenario a semi structured interview was held. The interview was planed to last for 10 minutes but depending on the test users time and feedback the interview could last longer. Lastly the test users had to answer a SUS survey.

6.2.2 Test subjects

When recruiting test subjects it was of high interest to test the prototype on user that worked within the building industry in Denmark. The app is in Danish and therefore it was also important to find test subjects that knew the language in order to understand the different words and text. Furthermore users with different age span and technical skills were of interest.

Six of the ten test subjects work within the danish building industry and three test subjects work within logistics. One test subject work as a concept designer for technical solutions. The average age is 37 with the age range from 23 to 55. Six of the test subjects identifies them selves as male and four as female.

6.2.3 Scenarios

Table 6.1: User tasks

Nbr	Tasks	Sub tasks
1.	Your are now Driver Anders Holst that is a new user of KLAR, your manager has created a profile for you in the system. You are now for the first time going to login to the system.	1. Write the username/password, 2.Click on the accept terms of use button 3.Click on login button

- | | |
|---|---|
| <ol style="list-style-type: none"> 2. You have now successfully logged in to KLAR for the first time. You are on the front page and are added to a new building site named Birkevej. You want to let everyone at Birkevej know that you are delivering walls next Wednesday. | <ol style="list-style-type: none"> 1. Click on the building site 2. Click on the text field 3. Sends the message. |
| <ol style="list-style-type: none"> 3. You have gotten a message from Johnny that it is muddy at the site. You write a thank you to Johnny. The leaderboard has change. You are curious and want to check out the leaderboard. | <ol style="list-style-type: none"> 1. Click on the textfield 2. Click on the send button 3. Gets points 4. Click on the button for leaderboard 5. scroll on the leaderboard to see your position. |
| <ol style="list-style-type: none"> 4. You are now for the first time in your profile page and therefore wants to check out the different things that are possible to do at the page. You can also see that you colleagues have profile pictures and therefore you also want to add a profile picture to your profile. | <ol style="list-style-type: none"> 1. Click on the reward page 2. click on camera and take a picture 3. Click on "kom igang med KLAR" |
| <ol style="list-style-type: none"> 5. You have received next Wednesdays route and wants to tell the Fitter your arrival time and were you are going to place the goods. You therefore decide to do a chat with only him. | <ol style="list-style-type: none"> 1. Navigate to the building site Birkevej 2. Click on the create prepass button 3. Add fitter Wade Pena 4. Add text to the field "emne" and "besked" 5. Send the message |
| <ol style="list-style-type: none"> 6. Your are now the fitter Wade Pena that is a user that has used KLAR for some time. You have just installed KLAR on a new phone so you have to login | <ol style="list-style-type: none"> 1. Click on the textfield 2. Accept terms and use 3. Click on login. |
| <ol style="list-style-type: none"> 7. You can see that something has happened on Birkevej and want to answer the prepass request. You can either accept or question the request. Afterwards you answer the driver thank you if your accept or "placere de i køkkenet" if questioning. You have won a reward and wants to know what your next possible reward is. | <ol style="list-style-type: none"> 1. Click on the building site 2. Click to navigate to prepass 3. Accept or question the request 4. Click on the text field 5. Send the text 6. Click on the reward button |

6.2.4 Metric

For the usability testing different methods were chosen to collect different types of data. More about metrics can be found under section . For the usability test the following methods were used and collect the following type of data: Objective data collected by the moderator

- Quantitative: time to complete task, amount of errors, completion of task
- Qualitative: Guidance the moderator had to give

Subjective data from the test user

- Quantitative: Score from System usability scale
- Qualitative: Answers during interview after completion of test

6.2.5 Roles

During user testing there are often a moderator that communicates with the test user and an observer that observes and collects data. Though there are only one person to fulfill the roles the same person are both acting as moderator and observer. To make it easier a camera was set up to both collect sound and actions of the test users and therefore act as the eyes of an observer.

6.2.6 Test environment

The tests are conducted in person with the different users. The tests are done in an undisturbed environment at Engage office or at the test users office. The test user tests the scenarios on an iPhone 6 with a iPhone 8 on a tripod recording their actions.

6.3 Results

In the following section the results from the usability tests will be presented. 10 users were tested. The age between the different participants stretched from 24 - 55. The target group was people working within the building industry and all except for one test person that work as a designer have work or works as craftsmen at different building sites or within logistics and planning of deliveries and orders.

6.3.1 Observations/Tasks

In the following section the quantitative and qualitative results from the observations of the test persons are presented.

Quantitative results

The amount of errors for the different tasks can be seen in Figure 6.1. The task which was most prone to error was task one. Second comes task four. For task one the users did the error of not accepting terms and conditions before trying to login. The error was quickly discovered by the users and not done more than once before they were able to login. Task four it was clear that the users did not find the "kom igang med KLAR" button and did not use it before guidance. Task two had zero errors meaning that there were no users that did not follow the subtasks for sending a message in the building site chat room. Task 3 had one user that misunderstood the task and thought that they had to create a chatroom and not answer in the chat. Further observations are described in section 6.3.1.

Furthermore all test users succeeded with all of the tests. The Figure 6.2 shows the time faults for the different tasks. Most of the users managed without a time fault but 4 users had a time fault at task five. The task was longer and more complicated task.

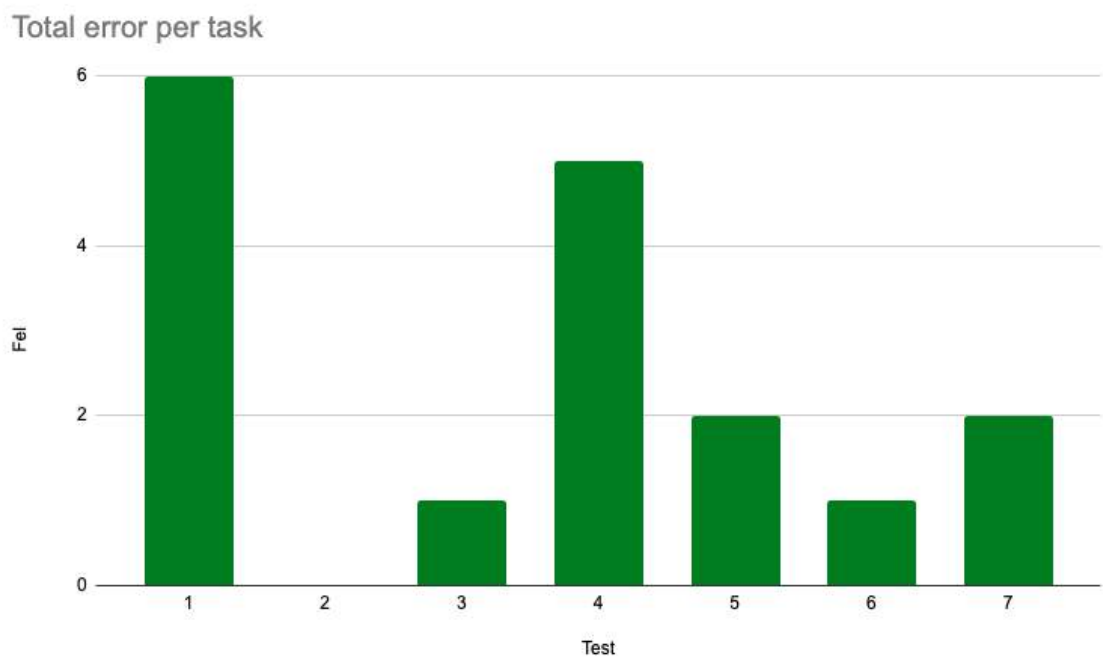


Figure 6.1: Total error made for every task

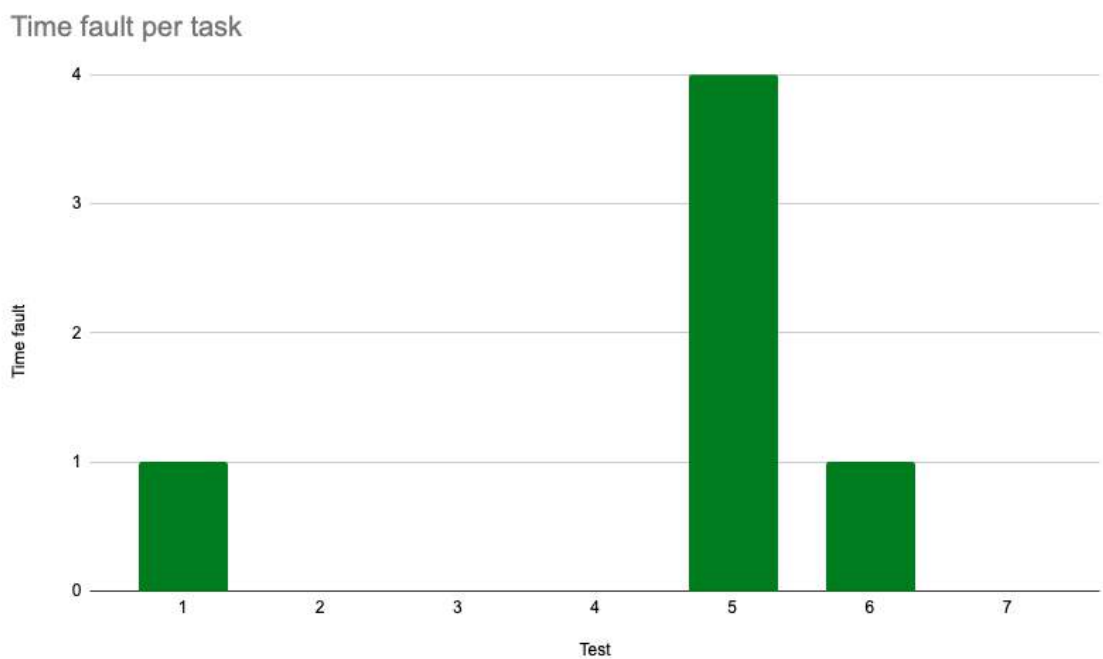


Figure 6.2: Total time fault for the tasks

Qualitative results

During the tests observation was made of the users different actions. For task one it was clear that users did not notice terms and conditions before after trying to login for the first time.

When they did not succeed to login from their first try they quickly saw the agree terms and condition and filled it in before trying again.

For task two there were no difficulties in finding the building site and write in the chat to the other project members. The test users also pointed out that they were that they had gained a point.

For the profile page task four the test users used the scroll for the leaderboard and easily navigated between the two different tabs. What the users did not discover was the button for the on boarding process that is alike the one existing today.

Task five it was clear that the time for completion varied from 35 seconds to 3 minutes. Some users found the button for creating a prepass quickly and the other test users that used more time to complete the task all navigated to the front page and thought that they their could find the fitter and send a message. At the front page they found no suitable icon to click on and when guided with a phrase stating that they have to create a conversation with the fitter for that specific building site they navigated back to the main chat and found the right button. Creating a private chat in the main chat room seemed confusing to some test users. When they had pressed the right button they quickly completed the task.

For task seven there were also a few mistakes made with the users told to answer the prepass sent to them starting to write in the main chat room instead of entering the one to one chat room. When there was no response they tried to click on the chat bot message for the created prepass and found their way.

6.3.2 Semi structured interview

The interview was semi structured more can be found under section 2.3.2. This means that there were questions that were asked to all of the ten participants but there were also asked followup questions if needed to get a better understanding and feedback. In this section the results from the standard questions are presented including the results to the follow up questions for the specific standard question the answer belongs to.

What did you like with the prototype

The overall comment was that the design is simple. It is easy to navigate in the app and it feels manageable. There were specific liking for the front page with the building sites in focus and the chat room. Moreover it was also commented that the bottom menu was simple and easy to understand and made the navigation easy. The option to approve a prepass was also seen by one user to be a very smart solution that made it possible to answer quick without thinking about writing a message to the other builder.

Was there something that you did not like?

For the second question the test user replied very differently. Only five of the users had something that they did not like in the prototype. One user thought that the page for creating a prepass had too many fields and therefore it was not fast enough to create if you are in a hurry at work. One user was unsure if the use of points was necessary or if it only made the app feel too much like a game. The same test user was asked if he would use the app with the points the test user answered "Yes but I only want to do my job and use it for that only".

Furthermore one user did not like the top progressbar and would instead like to be nudged with notifications or other functions and only have the progressbar visible in the profile page. One commented that the prepass icons is hard to understand and lastly one user commented that they thought it was hard to navigate in the system but with more time in the system it would probably be no problem.

Was there a specific function or task that you felt was too complicated?

Three test users commented on the prepass functionality. It was all regarding different parts of the use of the prepass. One commented that it was hard at first to find the prepass button. Another test user commented that it was hard to add another user to the prepass. The last comment regarding the prepass was that it was hard to find where to click to answer a prepass. There was also a comment regarding the "kom igang med klar" that it was hard to click on and hard to notice.

If you tomorrow was told to use the app at work by your boss what function do you think you would get the most use of?

The results from the answers for the question above shows that seven out of the ten users thought that if they had to use the app in their work that they would use the prepass the most due to it being a one to one chatroom that could help them get answers from the right person before arriving at the building site. Other functions that was mentioned was one user that liked that it was at all time possible to see the blueprints for the specific site. Two other test users also liked notification functionality where a red dot is shown on the specific building site where something has happened and also for the specific chat where there is a new status update or message. One of the test users commented "It would be nice to have a feature for calling people at the building site when you are in a hurry".

What do you think about having a leaderboard with your colleagues and their scores being ranked?

All of the test users answered that they liked the leaderboard. They commented that they liked that it was a company focused leaderboard where they can see their colleagues that they know and that it can create a stronger feeling of belonging. It was also commented that it was a fun thing to add to your everyday work and being something that you could play with and see progress. It was commented that it could be fun to be able to press on the different users and see more information regarding their winnings.

Progressbar

There was no question regarding the progress bar but a natural functionality discussed when asking further questions regarding the profile page and its different functionalities. Most of the test users liked the top progressbar or had no opinion regarding its existence. It was also answered that the design with the round progressbar at the profile page is good looking and

easy to understand. One user thought that the top progressbar may be redundant and users would only need to see their points when they go to the profile page.

What do you think about earning rewards?

No one of the test user commented that they did not like the rewards. The following comments were made "It is clear what you can win but it would be nice to have your rewards bigger" "Like that you can earn rewards but maybe the icon and text needs to be bigger for people with bad sight. "Like it and like that it is connected to the company you work for, maybe possible to give merch." Furthermore it was commented that it could be fun to be able to press on the different icons and that would trigger some type of movement. One test user answered that earning rewards may make them feel that they have to perform. One test user also replied that they would maybe use it in the beginning but was unsure how much they would use it after gaining a few rewards.

Do you think that leaderboard and rewards will motivate you to use the app?

Nine of the ten test users answered that the leaderboard and rewards motivate them to use the app. They commented that it is something fun to talk to your colleagues about and that earning something when using the app will make me open it more often. The tenth user commented "No I will use the app to solve problems, but the rewards are a bonus, know many people that would use it more than me."

What did you get points for doing?

Eight out of the ten test users mentioned that they earned points from answering in the chat. Two of the test user mentioned that they earn points from creating and answering a prepass.

When retrieving a prepass their is a time-pressure that regulates the points you get. What is your thought about that?

All of the test users replied that they did not mind the time pressure and that they thought that their were enough time to answer to not feel pressured but that the time pressure and possibility to win more points would make them even more prone to answer quickly. It is a good reminder without making me stressed. The fact that you do not loose points is nice.

6.3.3 System usability scale

For the SUS survey the results shows that the test users experienced general high usability after testing the prototype. In figure 6.3 the results from the individual test users can be seen with a line marking the point 68 which is seen as a bench mark for good and bad usability. In the result it is possible to see that only one out of the 10 test users scored the system under 68. The rest of the scores reached from 70 to 95 with the average 78.25. This means that their one test user that thought the usability of the system was not good.

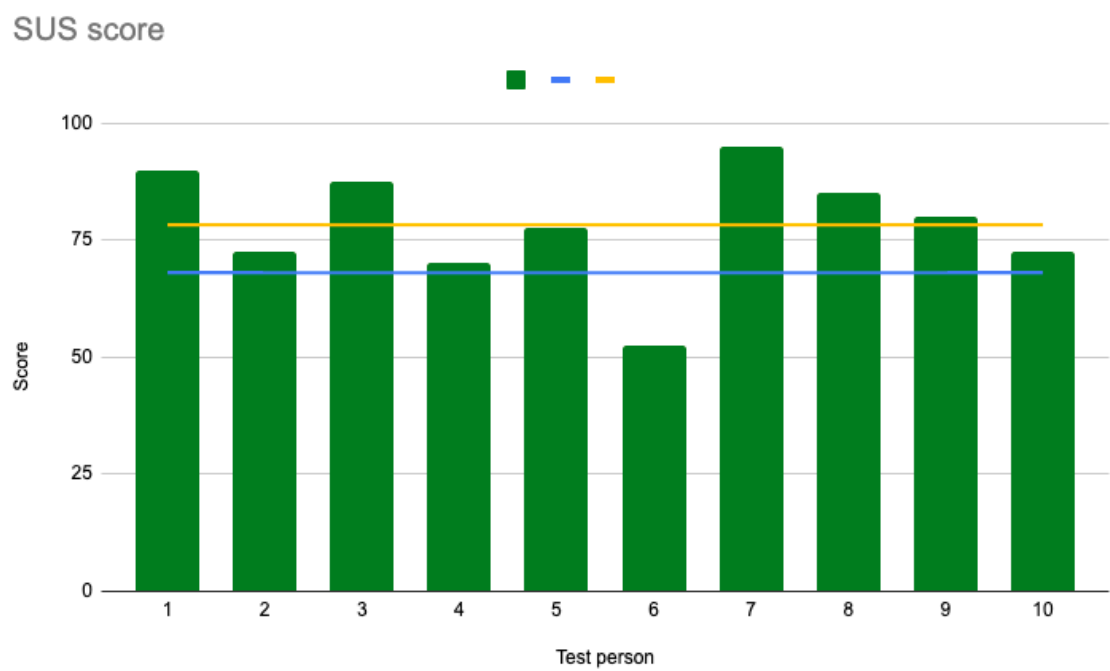


Figure 6.3: SUS score for the 10 test users with the blue line indicating the benchmark 68 and the yellow the average from the tests 78.25

Chapter 7

Discussion

7.1 First phase

7.1.1 Target audience

When reading up regarding gamification and the most common pitfall it was clear that with no understanding of the target user there would be a possible risk of not designing towards the right core drive and what motivates them [2]. For the research done in the beginning of the project the knowledge from previous encounter with the users were used together with the company's information. Due to the target user being hard to reach and book time with both due to cost and time there was no further research. Though with more time and resources it would be beneficial to extend the first phase and target group research to conclude their different motivations and what is most common within the different professions. It could itself be a whole master thesis researching their motivational drivers and create Lofi prototypes. Due to this master thesis ending with a functional and tested Hifi prototype and the time limit it was decided to focus more on the design iterations and the final testing.

7.1.2 Brainstorming

During the brainstorming and design workshop there was limited time given due to it being a blockade of resources for other projects running within the company. For this only two hours were given. There was much planned during the two hours and the workshop ended one hour after time without the expected outcome. It was first thought that it was possible to decide on the final features to start prototype during the session but the end result from the workshop was multiple ideas ranked between hard to implement and less hard to implement. With not ending the design workshop with the expected result the project was delayed for a few days to get a final result from the product owner. To prevent this it would be beneficial to do the design workshop with all of the employees and collect ideas and then book a follow up

meeting with some of the most important stakeholders and decide on the ideas to continue with.

7.2 Hifi phase

7.2.1 Learning Figma

The Hifi design was made in figma[5] and is the same software used when creating the Mid-fi prototype. The writer had not used the software before but it was commonly used at the company as a requirement specification for the developers. Even when creating the Hifi prototype and having used the software for a while there were multiple different things that had to be changed along the way that took longer than expected. This at times created some delays in the project. If the writer would have had more previous experience with figma a lot of time would have been saved and more iterations could have been made.

7.2.2 UI changes

During the Hifi phase the writer took the decision to do some changes in the Hifi prototype that was not connected to gamification but connected to UI problems that were seen that both employees and later user tests had shown to be a problem. During the iterations the focus had been on adding gamification and changing the profile page that has very few features in the existing version of the app present. Due to the changes being made in the Hifi it was complicated and could have been tested earlier in the process. It could therefore have been a higher focus on changing existing UI problems when adding the gamification in the different iterations. Though it would also be possible to do a bigger report and thesis about the existing UI and possible changes to improve it.

7.3 Usability evaluation

The usability evaluation took more time than expected due to multiple different complications. There were tests booked with different subcontractors to a cooperating company to the solution but due to bureaucracy the test dates were cancelled a few days before the tests were to take place. This made the time limited to book new tests with users within the target group.

The target group are people working at different building sites. This means that they during a day will not be located at an office or have time to drive to an office and do the test. This led to the tests being conducted at different places and not in one controlled environment. The test locations also challenged the writer with different internet stability which the figma as a cloud service needs when trying a prototype.

For one of the tests 6 hours was used in total for transportation to access the test user. This led to only ten tests being performed during the period of three weeks. There was a lot of time used to make sure that the test was made in person and could be observed by the writer. Conducting a similar test in the future it may be beneficial to do some with an observer but it could also be a possibility to use an online user test application that can integrate the figma

prototype created. This would make it possible to skip the time on transportation and at the same time reach more possible user participants and get more test users.

7.4 Research questions

How can gamification engage and motivate users to communicate in KLAR?

By finding the motivational goals of the target audience and using our different core drivers that can be found in section 2.1, 2.1. It is possible to motivate users to use the software solution KLAR and encourage them to communicate more through added gamification. By adding points to communication and connect rewards to the points the users get a real life reward when using the app.

What type of gamification features would best engage and motivate users to communicate? With the goal of the company and the personas created it was clear that accomplishment was a core drive that motivates the target audience and therefore the point, badges and leaderboard was chosen to try Lofi and later also Mid-fi and Hifi due to the different testers positive response. For the last usability testing with the target audience their were only positive feedback given to the leaderboard and only one user pointing out that the rewards probably would not be so important as to be effective during work hours.

How can the gamification features be implemented? To make sure that the app had good usability and make sure that the use is simple for different people the heuristic evaluation was used as a guideline for the design. It was discovered that the profile page was not in use and therefore most of the added functionality was added at the profile page. This was liked by the target audience and the use of the old navigation bottom bar through observations was also a simple design that was easy to use. Their have also been done changes at the front page and in the different chat rooms. For the front page it is a progress bar. The progress bar is a way for the users to see their goal and also discoverer when and how they retrieve points. Only one designer commented that they thought it was to much. The rest commented that they liked it or did not mind the progressbar. For the chat pages the same was added and some UI changes was made with only positive changes in ease of use. For the creation of a prepass a time limit was added. The intention was to make users feel the benefit of answering quick without feeling to much pressure. From the test it was clear that the test user from the target audience did not mind the feature. Though from observations the users did not seem to feel the pressure to answer quickly. It could be a positive thing and a possible work for the future to experiment how much of a black hat that can be added.

7.5 Future work

7.5.1 Changing the existing Hifi

The final Hifi still have many opportunities for improvement. From the results from the usability evaluation their were different suggestions for future feature but also comments connected to the UI and gamification.

Gamification

One pitfall with gamification is that companies implement it in their software and then leaves it hoping that it will continue grow the motivation and user engagement [2]. Gamification needs to be updated and constantly be compared to the target audience motivational drivers and the business goal. This means that the company will have further work to do after the implementation of the solution to keep the software up to date. It could also be interesting to continue the gamification research and find a balance in the solution for black and white hat drivers.

UI

From the usability tests there are multiple different comments regarding the icons used for a prepass and other UI problems that can be improved. Possible improvements of the UI:

- Change the prepass icon (the symbol does not explain the button)
- Use the prepass hand icon as a like button
- Change attachment symbol to gallery symbol
- Creating a prepass page should have less clicks and be quicker to fill in. Maybe have it look closer to a regular email.
- The design of the badges should be more like the rest of the app
- "kom igang med KLAR" should be redesign so that users understand that you can click on it.
- "kom igang med KLAR" Text and icons should comply with the rest of the app design
- Agree to terms of use button should be made more visible

7.5.2 Other features

There are many possible features that can be added to the solution in the future. Some were suggested by the test participants.

To add more gamification and to create more of a community feeling likes could be added to the solution so that the people connected to one building site can like and react to each other messages. To add on it further GIF and voice messages can also be added. There could also be added missions for the different people and a to do list so that they every time they leave a building site have done what they have promised.

One feature suggested by a user is adding the possibility of calling someone that is connected to the specific building site and use video to show and ask for different things if that is needed.

Chapter 8

Conclusion

The goal for this master thesis was to investigate if adding gamification to the KLAR solution would increase the user engagement. This with a process of learning about gamification and its possible effect and implementation. Done through performing a literature study, host a design workshop, work iterative with different levels of fidelity prototypes and finish with a usability evaluation. All of the different parts of the main goals have been successfully fulfilled during the project.

From the literature study it was concluded that the Octalysis framework can be used to keep track of which human motivational core drive, gamification features connect to. This is valuable for the proposed implementation of features but also for further implementation of gamification features for KLAR. From the literature study it was also made clear that early focus on the target audience is a key success factor and if implemented in the right way, the added functionality would increase user engagement.

Furthermore the iterative design process was both time efficient and gave valuable feedback both to the general usability of the KLAR app and the added gamification elements. It was evident from the first tests of the Lofi to the last iteration with the Hifi that users liked the gamification features and only had comments to the design and what could be future added functionality. This was also reflected in the usability evaluation where the target audience rated the design with a high usability score and generally commented that the added gamification features motivated them to open and use the app.

Bibliography

- [1] John Brooke. “Sus: a “quick and dirty’usability”. In: *Usability evaluation in industry* 189 (1996).
- [2] B. Burke. *Gamify*. Bibliomotion, Inc, 2014. ISBN: 978-1-937134-85-3.
- [3] Yu kai Chou. “Actionable gamification”. In: *Beyond points, badges, and leaderboards* (2015).
- [4] Sebastian Deterding et al. “From game design elements to gamefulness: defining" gamification"". In: *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments*. 2011, pp. 9–15.
- [5] Figma. <https://www.figma.com/>. Accessed: 2021-05-22.
- [6] Anne Galletta. *Mastering the semi-structured interview and beyond: From research design to analysis and publication*. Vol. 18. NYU press, 2013.
- [7] Google Scholar. <https://scholar.google.com.tw/>. Accessed: 2021-05-22.
- [8] Habitica. <https://habitica.com/static/home>. Accessed: 2021-05-22.
- [9] “HÅLLBAR INDUSTRI, INNOVATIONER OCH INFRASTRUKTUR”. In: (). Accessed: 2021-06-28. URL: <https://www.globalamalen.se/om-globala-malen/mal-9-hallbar-industri-innovationer-och-infrastruktur/>.
- [10] H. Sharp J. Preece Y. Rogers. *Interaktionsdesign*. Studentlitteratur, 2015.
- [11] KLAR appstore. <https://apps.apple.com/us/app/h-h-klar/id1499314974>. Accessed: 2021-05-27.
- [12] Janaki Kumar. “Gamification at work: Designing engaging business software”. In: *International conference of design, user experience, and usability*. Springer. 2013, pp. 528–537.
- [13] linkedin. <https://se.linkedin.com/>. Accessed: 2021-07-02.
- [14] Craig Miller. “The gamification of education”. In: *Developments in Business Simulation and Experiential Learning: Proceedings of the Annual ABSEL conference*. Vol. 40. 2013.
- [15] Bill Moggridge and Bill Atkinson. *Designing interactions*. Vol. 17. MIT press Cambridge, MA, 2007.

- [16] Jakob Nielsen. "Finding usability problems through heuristic evaluation". In: *Proceedings of the SIGCHI conference on Human factors in computing systems*. 1992, pp. 373–380.
- [17] Jakob Nielsen and Rolf Molich. "Heuristic evaluation of user interfaces". In: *Proceedings of the SIGCHI conference on Human factors in computing systems*. 1990, pp. 249–256.
- [18] D. A. Norman. *The design of everyday things*. Basic books, 2013.
- [19] Octalysis tool. <https://yukaichou.com/octalysis-tool/>. Accessed: 2021-05-22.
- [20] Jeff Rubin and Dana Chisnell. "How to plan, design, and conduct effective tests". In: *Handbook of usability testing* 17.2 (2008), p. 348.
- [21] Runkeeper. <https://runkeeper.com/cms/>. Accessed: 2021-07-02.
- [22] Samsung Nation. https://www.samsung.com/us/news/newsPreviewRead.do?news_seq=19953. Accessed: 2021-05-22.
- [23] Je Sauro. "Measuring usability with the system usability scale (sus)". In: (). Accessed: 2021-06-15. URL: <https://%20measuringu.com/sus/>.
- [24] Iris Soute, Susanne Lagerström, and Panos Markopoulos. "Rapid prototyping of outdoor games for children in an iterative design process". In: *proceedings of the 12th international conference on interaction design and children*. 2013, pp. 74–83.
- [25] Stefan Stieglitz et al. *Gamification*. Springer, 2017.
- [26] "System Usability scale (SUS)". In: (). Accessed: 2021-06-15. URL: <https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html>.
- [27] Arthur B VanGundy. "Brain writing for new product ideas: an alternative to brainstorming". In: *Journal of Consumer Marketing* (1984).
- [28] Miriam Walker, Leila Takayama, and James A Landay. "High-fidelity or low-fidelity, paper or computer? Choosing attributes when testing web prototypes". In: *Proceedings of the human factors and ergonomics society annual meeting*. Vol. 46. 5. SAGE Publications Sage CA: Los Angeles, CA. 2002, pp. 661–665.
- [29] Anna M Wichansky. "Usability testing in 2000 and beyond". In: *Ergonomics* 43.7 (2000), pp. 998–1006.

Appendices

Appendix A

Appendice

A.1 Semi structured interview questions

Testperson	1. Hvad kunde du lige med prototypen?	
	2. Var der noget du mindre kunde lige?	
	3. Var der en specific funktion du synes var besværlig?	
	4. Hvis du fick bruge denne imorgen hvad for function tror du vile få mest brug for?	
	5. Hvad synes du om at der er et leaderboard med dine kolleger?	
	6. Hvad synes du om rewards siden?	
	7. Tror du reward og leaderboard vile motivere dig til at bruge appen mere?	
	8. Var det tydeligt for dig for hvad du fick point for at lave?	
	9. Vad tyker du om tidpressen (KLAR)	
	10. Er der noget du synes var svært at forstå?	

Figure A.1

A.2 Sus form

KLAR

For hver af de følgende udsagn skal du vælge et felt, du bedst synes beskriver KLAR

* Required

Jeg tror at jeg gerne vil bruge KLAR ofte hvis de var tilgængeligt på min arbejdsplads *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Jeg fandt KLAR unødvendigt komplekst *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Jeg synes at KLAR var let at bruge *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Figure A.2

Jeg tror, at jeg har brug for support fra en teknisk person for at kunne bruge dette KLAR *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt Enig

Jeg synes at de forskellige funktioner i KLAR var godt integreret *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Jeg synes at der var for meget inkonsekvens i KLAR *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Figure A.3

Jeg tror, at de fleste mennesker ville lære at bruge KLAR meget hurtigt *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Jeg fandt KLAR meget besværligt at bruge *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Jeg følte mig meget sikker når jeg brugte KLAR *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Figure A.4

Jeg havde brug for at lære mange ting, før jeg kunne komme i gang med system *

	1	2	3	4	5	
Helt uenig	☐	☐	☐	☐	☐	Helt enig

Figure A.5