

CHALMERS UNIVERSITY OF TECHNOLOGY



**CHALMERS**



**GÖTEBORGS UNIVERSITET**

BACHELOR THESIS AT THE DEPARTMENT OF COMPUTER  
SCIENCE AND ENGINEERING

DATX02 - GROUP 56

---

# Positive User Experience - Redesigning Chalmers' Studentportal

---

*Authors:*

Johan Davidsson,  
Oscar Forsberg,  
Mohammad Jamal Basal,  
Thomas Jinton,  
Alice Olsson,  
Johanna Wiberg

June 16, 2021

# Positive User Experience A Redesign of Chalmers' Studentportal

JOHAN DAVIDSSON  
OSCAR FORSBERG  
MOHAMMAD JAMAL BASAL  
THOMAS JINTON  
ALICE OLSSON  
JOHANNA WIBERG

Supervisor: Olof Torgersson, Associate professor, Interaction Design division,  
Department of Computer Science and Engineering.

Examiner: Morten Fjeld, Professor, Interaction Design division, Department of  
Computer Science and Engineering.

Bachelor's Thesis DATX02-21-56  
Department of Computer Science and Engineering  
Chalmers University of Technology  
University of Gothenburg  
SE-412 96 Gothenburg  
Sweden  
Telephone +46 31 772 1000

Typeset in LATEX  
Gothenburg, Sweden 2021

## Abstract

By doing a redesign of Chalmers' Studentportal the goal was to create a positive user experience while increasing the prototype's efficiency compared to the existing website. The new design was developed in the web-based prototyping tool Figma.

The first prototypes were designed after the collection of a wide range of data gathering methods; multiple structured interviews, a questionnaire, an expert analysis, multiple literature reviews and a meeting with employers working for Chalmers' Studentportal, the project's stakeholders.

The process evolved by carefully selecting design patterns to reduce navigation issues discovered by stakeholders and user tests. Rapid prototyping was used to progress the prototype, with user tests included in each iteration. An important aspect was the inclusion of emotional charts in every user test, which enabled one to track how users felt about various features and functions in the prototype.

The process resulted in a well established prototype, which was presented for the stakeholders together with the evoked emotions associated with the product. The results showed an increase of positive emotions when comparing the first user tests about the current Studentportal to the final prototype.

Something that had to be considered was whether the users liked the prototype more because they were dissatisfied with the current Studentportal. If this was the case, a minor improvement in the prototype could stand out tremendously, even if the improvement is objectively considered as tolerable. Nonetheless, in the final user test, only one participant experienced a negative emotion, a slight sense of being overwhelmed, associated with the product. However, it is something that could be expected. A brand new user interface will undoubtedly take some time to adapt to and learn, which is why it is not regarded as a problem.

## Sammandrag

Genom att konstruera en ny design av Chalmers Studentportal, var målet att skapa en positiv användarupplevelse och samtidigt få en högre effektivitet på den nya prototypen jämfört med den nuvarande Studentportalen. Prototypen tillverkades i det webbaserade verktyget Figma.

De första prototyperna påbörjades efter ett flertal olika metoder av datainsamling hade utförts; strukturerade intervjuer, ett frågeformulär, en expertanalys, flertalet litteraturstudier och möten med de som är ansvariga för Chalmers Studentportal, projektets intressenter.

Processen utvecklades genom att noggrant valda designmönster användes för att reducera bland annat navigationsproblem, upptäckta av både intressenterna och i användartester. Metoden Rapid prototyping användes för utvecklandet av prototypen där användartester genomfördes i varje iteration. En viktig aspekt var användandet av känslodiagram i alla användartester för att kunna spåra och förstå vad testpersonerna kände rörande bland annat prototypens funktioner och utseende.

Projektet resulterade i en väl etablerad prototyp som presenterades för intressenterna tillsammans med de känslor som användarna upplevt under testerna. Resultaten visade på en stor ökning av positiva känslor jämfört med det första användartestet kring den nuvarande Studentportalen med det sista användartestet på den slutgiltiga prototypen.

Slutligen så uppkom diskussion om användarna föredrog den skapade prototypen mer endast för att de var missnöjda med den befintliga Studentportalen. Om det är fallet skulle det kunna betyda att en liten förbättring av prototypen kan ge starka positiva känslor, även fast förbättringen objektivt kan anses vara av det minsta laget. Dock, i det sista användartestet upplevde endast en deltagare en negativ känsla, en känsla av överväldigande associerad med produkten. Men detta är något som man skulle kunna förväntas sig. Ett helt nytt användargränssnitt kommer utan tvekan att ta tid att anpassa sig till och lära sig, vilket är varför det inte betraktades som ett problem.

## Acknowledgments

We would like to begin by thanking our supervisor Olof Torgersson, for his support and advice throughout the process as well as our examiner, Morten Fjeld, for giving feedback throughout the project. We would also like to give a big thank you to our Stakeholders at Chalmers' Studentportal, Ingrid Claesson, Ulla-Karin Drakeskär, Helén Rosenfeldt, Pär Svensson and Johan Wetterberg, for cooperating with us and sharing statistics from the website and for reviewing the finished prototype. Your support has been very motivational for us.

Finally, we would like to thank our test participants for taking part in our user tests, your feedback was crucial for the prototyping process.

# Contents

<b>1</b>	<b>Introduction</b>	<b>8</b>
1.1	Purpose and goal . . . . .	8
1.2	Limitations . . . . .	8
<b>2</b>	<b>Related Work</b>	<b>9</b>
2.1	Re-design of a room-booking system . . . . .	9
2.2	Analysis of the implementation of the Studentportal . . . . .	9
<b>3</b>	<b>Theory</b>	<b>11</b>
3.1	Positive User Experience . . . . .	11
3.2	Design principles . . . . .	12
3.2.1	Visibility . . . . .	12
3.2.2	Feedback . . . . .	12
3.2.3	Constraints . . . . .	12
3.2.4	Consistency . . . . .	13
3.2.5	Affordance . . . . .	13
3.3	Design patterns . . . . .	13
3.3.1	Escape hatch . . . . .	14
3.3.2	Feature, search, and browse . . . . .	14
3.3.3	Fat menus . . . . .	14
3.3.4	Sitemap footer . . . . .	14
3.3.5	Breadcrumbs . . . . .	14
3.3.6	Visual framework . . . . .	15
3.3.7	Grid of equals . . . . .	15
3.3.8	Right-left alignment . . . . .	15
3.3.9	Input prompt . . . . .	15
3.3.10	Prominent done button . . . . .	15
3.3.11	Hover or Pop-Up tools . . . . .	16
3.3.12	Module Tabs . . . . .	16
3.3.13	Accordion . . . . .	16
3.3.14	Carousel . . . . .	16
3.3.15	Pagination . . . . .	16
3.4	Web Accessibility Directive . . . . .	17
<b>4</b>	<b>Method</b>	<b>18</b>
4.1	Data Gathering . . . . .	18
4.1.1	Interviews . . . . .	18
4.1.2	Questionnaire . . . . .	18
4.1.3	Stakeholder . . . . .	18
4.1.4	Expert Review of the Studentportal . . . . .	19
4.2	User Requirements . . . . .	19
4.2.1	Personas and Scenarios . . . . .	19
4.2.2	Constraints and Requirements . . . . .	19
4.2.3	User Stories . . . . .	19
4.3	Prototyping . . . . .	20

4.3.1	Paper prototyping . . . . .	20
4.3.2	Think-Aloud-Protocol . . . . .	20
4.3.3	Emotion Chart . . . . .	21
<b>5</b>	<b>Data Gathering</b>	<b>22</b>
5.1	Questionnaire . . . . .	22
5.2	Interviews . . . . .	23
5.3	Analysis of the Content of the Studentportal . . . . .	24
5.3.1	Approach . . . . .	24
5.3.2	Conclusions . . . . .	25
5.4	Stakeholder . . . . .	25
<b>6</b>	<b>User Requirements</b>	<b>26</b>
6.1	Constraints and Requirements . . . . .	26
6.2	Personas . . . . .	26
6.3	Scenarios . . . . .	28
6.3.1	First Scenario - Robert . . . . .	28
6.3.2	Second Scenario - Klara . . . . .	29
6.4	User stories . . . . .	29
<b>7</b>	<b>Prototyping</b>	<b>30</b>
7.1	Paper Prototypes . . . . .	30
7.1.1	Reviewing . . . . .	30
7.2	Iteration 1 . . . . .	31
7.2.1	Prototyping . . . . .	31
7.2.2	Reviewing - User test . . . . .	31
7.2.3	Refining . . . . .	32
7.3	Iteration 2 . . . . .	33
7.3.1	Prototyping . . . . .	33
7.3.2	Figma Memory Usage Problem . . . . .	35
7.3.3	Reviewing - User test . . . . .	35
7.3.4	Refining . . . . .	37
7.4	Final Touches . . . . .	37
7.5	Presenting the Prototype for Stakeholders . . . . .	37
<b>8</b>	<b>Result</b>	<b>38</b>
8.1	Users' Experience . . . . .	40
8.1.1	Final Prototype . . . . .	40
8.1.2	Evoked Emotions . . . . .	41
8.2	Guidelines for Maintenance of the Website . . . . .	42
<b>9</b>	<b>Discussion</b>	<b>43</b>
9.1	Motivation . . . . .	43
9.2	Users Experience . . . . .	43
9.3	Design Decisions to Ensure the Positive User Experience . . . . .	44
9.3.1	Aesthetics . . . . .	44
9.3.2	Usability . . . . .	44

9.3.3	Ease of Use . . . . .	45
9.4	Improvements . . . . .	45
9.4.1	Iteration Process . . . . .	45
9.4.2	Data Gathering . . . . .	45
9.5	Obstacles . . . . .	46
9.5.1	Covid-19 . . . . .	46
9.5.2	Figma Memory Alerts . . . . .	47
9.5.3	Human Factors in Testing . . . . .	47
9.6	Social-Ethical Aspects . . . . .	47
9.6.1	Web Accessibility Directive . . . . .	48
<b>10</b>	<b>Conclusion</b>	<b>49</b>
<b>A</b>	<b>Questionnaire</b>	<b>53</b>
<b>B</b>	<b>Interview</b>	<b>55</b>
<b>C</b>	<b>Paper Prototypes Frontpage</b>	<b>56</b>
<b>D</b>	<b>Figma Prototypes Frontpage</b>	<b>58</b>
<b>E</b>	<b>Emotion Chart</b>	<b>60</b>
<b>F</b>	<b>User stories</b>	<b>61</b>

# 1 Introduction

While using a product, one will seek a positive experience. As known, emotions are essential to humans beings. People seek positive experiences through contact with other humans, events, new experiences and the choices that one makes. Humans have created many of the things that one sees and uses everyday, making it impossible to ignore the fact that the product experience consciously or unconsciously tries to reach a positive experience [1].

The project's main focus has been to create a positive user experience by following design principles and to discover what users believe to be positive design choices. For instance, using emotional charts in every user test will make it possible to keep track of the feelings experienced when interacting with the prototype.

The project began with discussions regarding which application or website that could be redesigned for the purpose of achieving a more positive user experience. When Chalmers own Studentportal came to mind and the group discussed their own experiences with the website the choice was obvious. Redesigning a website that provides students with information regarding their studies was found to be both relatable and motivational.

## 1.1 Purpose and goal

The purpose and goal of this project is to redesign the current version of Chalmers' Studentportal [2] to raise its efficiency as well as to deliver a positive user experience. The project will result in a prototype which will work as a proposal for how Chalmers can refactor the current Studentportal. The prototype will strive to satisfy the users' needs, minimize negative responses and to increase the positive emotions occurring when using the prototype. To accomplish this carefully selected design patterns and user tests were utilized with emotional charts to cover the emotions of the participants.

## 1.2 Limitations

Since this project mainly focuses on positive design as well as design choices for redesigning Chalmers' Studentportal, it is difficult to also include the process of implementing the programming required to create a new completed website. This simply because there is not enough time. Therefore, the project only focused on the design process and the implementation of a prototype, in order to create a respectable design suggestion for the administrators at Chalmers Studentportal.

To make the prototype more accessible, a translation button was implemented in the header of the prototype. However, the choice was made to not present a throughout translation due to it not having an impact on the design of the prototype itself and therefore that function is not in the scope of the project.

Also, not all pages and views from the current Studentportal will be included in the new design, due to the lack of time and namely that many of the subpages on the Studentportal nearly have the exact same layout. Although subpages of importance will be included.

## 2 Related Work

The idea of improving programs by redesigning is something that has been discussed before, even as specific as the Chalmers Studentportal itself. However, when trying to improve a product it has been seen that users can find themselves confused due to losing their familiarity of the older product, even though the newer one objectively could be seen as superior. Nonetheless, it has been shown that Chalmers' Studentportal lacks functionality and that students find it difficult to navigate through the website, causing mostly negative association towards the Studentportal.

### 2.1 Re-design of a room-booking system

Redesign of a university associated website has been done before, as seen with Jonasson, Fjeld, Yamashita, 2007 [3]. Although the authors did a redesign of a room-booking system and not a Studentportal, similar methods were conducted in order to achieve respective goals. The authors wished to understand the factors that have part in a redesign and then evaluate the user interface for the newly constructed system. To gather data about the user group (students) open interviews were held which made it possible to set up future requirements. The authors came to the conclusion that they should stay as close to the previous design as possible but with one exception for a specific feature to satisfy the users' actual needs. A method called rapid prototyping was used in paper form, and later tested on the authors themselves. The information gathered was analyzed and utilized to refine the prototype which led to a final user test on five individuals.

In the end, Jonasson et al. came to the conclusion that small changes to an application with already experienced users could be crucial and something to keep in mind. The authors mention so-called power users, who are users that have learned to power through an application's difficulties. Because of that there was a shortage of enthusiasm towards the newer design despite the known issues with the original. "A main contribution to our understanding of re-design and paper prototyping of existing UIs was the finding that even a bad UI may have "committed" users. As such, a re-design may not be as simple or beneficial as initially hoped for". This issue led the authors into a conversation about what basic information in the design the users must have in order to successfully test the prototype. A "no teaching" approach was conducted and the authors could observe how 66% of the novice users, with no prior experience of the original application, performed superior in contrast to the two users with prior experience. To finish off, the authors mention that they would have liked to consider involving the aspect of emotional attachment if the project had been redone as well as an involvement of a more substantial group of individuals in order to achieve more established results.

### 2.2 Analysis of the implementation of the Studentportal

In 2012, the Bachelor thesis "Kundens vilja - programmerarens lag? - Om beställning och utveckling av Chalmers Studentportal" written by Linnea Fritz, Victor Karlsson, Johan Höglund, Håkan Andersson and Steven Teng [4], discussed the Studentportal from the perspective of students. With background from the project management and the economic terms regarding the project, the report covers the development process of the Studentportal to understand why the Studentportal is what it is today. The safety and the performance of the website was analysed in sync with user tests on students studying at the Chalmers University of Technology.

A questionnaire was created to gather quantitative data and the responders answered questions related to how often they visit the Studentportal, if they found it to live up to their standards and which three functions they use the most. The results showed to be highly negative. Interviews were performed and the feedback corroborated the results from the questionnaire in that the overall perception was negative. Navigation problems, functionality failure and confusing design were some of the comments. The user tests consisted of for example, navigating the Studentportal, finding information regarding master studies and booking a group room, where a majority of the participants had difficulties in succeeding the tasks.

The authors concluded that the project of implementing the Studentportal was an expensive and poorly executed pursuit and points to the failure of functionality and disappointment among the users. Lastly they present some design improvements and suggestions, for example constant and calculated menus, more graphics, additional icons and avoiding dead links.

## 3 Theory

The debate of emotions and their role in design have in the last 20 years grown exponentially [5]. The effort to promote positive emotions through design properties of both services and products have been discussed by Donald Norman, a member of the National Academy of Engineering [6]. He concluded that emotional design can be identified by two main approaches, both related to technology design. The first one being based on the modification of an object's appearance or interface, and the second one on inviting and encouraging interactions. One way of achieving this is by the appliance of design patterns.

### 3.1 Positive User Experience

In research, user experience (UX) refers to a systematic study of targeted audience preferences and their needs to apply to design processes, practical contexts and observations. UX researchers use different approaches to identify challenges and design possibilities. The most formal definition comes from the ISO FDIS 9241-210, which defines UX as “a person's expectations and reactions resulting from the anticipated use of a device, system or service” [7]. The standard definition of UX was introduced by Norman (1999): “all the facets of consumer engagement with the product: how it is interpreted, understood, and used defines user experience” [8]. This concept indicates that UX is above the user interface architecture and the usability of a product or service.

Designing a positive user experience is a process that incorporates services or tools in the process to provide users with meaningful and appropriate experiences. It includes designing and optimizing the entire product chain, including branding, architecture, usability and other functional aspects. The “perception and response of an individual arising from the use and intended use of the commodity, device or service is termed as user experience” [9]. It contains all the emotions, convictions, desires, attitudes, physical and psychological reactions, actions, and achievements of the user before, during, and after use. However, a positive user experience is affected by the dynamic software environment or interface, usability, and the contextual settings based on user demand [10].

Furthermore, a software's user activity also affects UX [11]. Since there is a machine-user interaction, a software activity must be carried out involving time-based input or output commands and experiences; for example, the higher the user activity with a certain software is, the higher the user understanding and user satisfaction is. Therefore, if the activity is underestimated the system will however not be successful in guaranteeing a positive user experience.

According to research, a positive user experience can be defined or estimated using two concepts; Subjective Well-Being - SWB [12] and Psychological Well-Being - PWB [13]. Psychological well-being applies to the inter- and intrinsic stages of healthy functioning, including individual relationships with others and self-referential behaviors that include a sense of self-control as well as personal development. Subjective well-being represents life satisfaction decisions based on positive and negative emotions. According to SWB concepts, a good or positive experience can be defined by three components: positive emotions, absence of negative emotions and satisfaction assessment [14]. Meanwhile, according to PWB concepts, a good or positive user experience can be defined by six components, including mastery (such as managing user interaction demands without surpassing system capacity), self-acceptance, growth, autonomy, purpose and involvement of positive emotions

during the web or software use [15].

In addition, a person's feelings and moods can change frequently and this is something that can affect the interaction with a product [16]. An emotion that stays with the user for a long time can change the overall experience with the product especially if it is an interaction that requires the user to be using the product for a long time. Furthermore, an emotion that stays with the user for a short time can also have a significant impact on the user experience. These two classes of emotions have been described by researchers to be either the short-lived automatic type or the long-lasting conscious type [16]. In addition, it is crucial to understand emotions when designing for the users.

## **3.2 Design principles**

Designers of a product are free to create anything they want, for example if there are a couple of icons that should be put on a website the designer has the freedom to position them at any place on the screen. However, there are unique guidelines that can help a creator to improve their designing solutions and they are known as design principles. They are not mandatory to follow but they can be seen as essential suggestions that are there to help and aid the designer's thinking [16]. If the principles are not followed then that will complicate the whole designing process which can be disadvantageous for a creative team. There are several design principles that can be used by interaction designers.

The five most common principles, written below, are all described in the book Beyond human-computer interaction [16].

### **3.2.1 Visibility**

The principle that focuses on how visible and distinguishable the elements as well as functions are is called visibility. The desired outcome for the designer is that the user completes their goal and can fulfill the desired usage of the product. An unfavorable result would be that the user becomes frustrated and aggravated which in turn leads to a bad experience with the product. Therefore it is relevant to keep all information and elements as visible as possible so that a user knows how to move to the next step of the interaction.

### **3.2.2 Feedback**

This principle is related to the visibility principle to some extent. When the user has performed an action or interacted with a specific element, there should be some sort of confirmation provided to the user, making sure that they have achieved their goal. There are multiple kinds of feedback for interaction design including audio, tactile, verbal, visuals etc. For instance, if the user presses a button one would want to confirm this action, either by making a sound or changing the layout of the page or the button.

### **3.2.3 Constraints**

Constraints is the concept of constraining the interaction when the user is using and experiencing a design. Some user interactions can be restricted and reduced while others can be completely eliminated and inaccessible. The principle is especially important in graphical user interfaces and

the constraints are of paramount importance in order for a user to accomplish their goals without making a mistake in the process. For example, if you are using a word processing program and your goal is to be as efficient as possible then constraints could prevent the user from selecting incorrect alternatives in the design.

### **3.2.4 Consistency**

The principle focuses on having similar operations and using similar elements across the entire interface. It is important that a consistent interface follows a certain order and that the structure is clear. A simple example would be action buttons on a webpage. Buttons with similar purpose should have the same name, same shape and by clicking them the user performs the same type of action. However, if some buttons have different colors that will make the user confused and question if the buttons with different colors act the same. In addition, when using your mouse to navigate the webpage it is crucial that the input actions of the mouse are consistent as well. There are many advantages with this principle and that is why it is regarded as one of the most important design principles. In addition, the navigation will get more effective when users realise that elements on previous pages act the same as elements on the current page.

### **3.2.5 Affordance**

This principle refers to an attribute of an object that allows the user to know how to use it. Especially in an interface it is essential that the elements and actions that are presented have a clear purpose and affordance. A simple definition for “to afford” would be “to give a clue”. For instance, on a website you have graphical elements that will allow the user to get to the next page or complete a task. Then it is essential that those elements have a visual style as well as an interactable appearance so that the user knows that the elements are there to be used. The design of the elements has to be clear and engaging in order for a person to understand the purpose of it. A simple text button without any visual design would be very ambiguous.

## **3.3 Design patterns**

Primarily, patterns capture common solutions to design forces and an implementation of one pattern can differ from the implementation of another one. Furthermore, the patterns will not establish design decisions and they are also not rules or simple heuristics [17]. In addition, patterns are structural and behavioral features that improve the “habitability” of something[17], for instance a user interface. They can also help capture the design experience and a pattern is often seen as a solution to a problem. One unique feature of a design pattern is that it can be implemented in several different ways [16]. They also make things easier to understand and they can also make things more beautiful. Furthermore, with the help of patterns tools become more useful as well as usable [17]. Patterns work with human senses and psychology and the design patterns come from the ways people perceive and use software. In addition, the design patterns form the building blocks for user interfaces [18].

The patterns described below are all from the second [17] or third [18] edition of Tidwell’s Designing Interfaces.

### 3.3.1 Escape hatch

The escape hatch is a pattern which enables the user a safe way out of the page that the user is currently on and navigates them back to a more familiar page, for instance the homepage on the website. As a result the users are less likely to feel trapped on the website which promotes safe exploring. The escape hatch could consist of a link, a button, or the most common approach, having a clickable logo in the header which navigates the user to the homepage.

### 3.3.2 Feature, search, and browse

The pattern consists of three elements; a feature item, a search box and multiple items that the user can browse through. The combination of these three elements works well for different kinds of users. The users who know what they are looking for can use the search box, while others can browse through the content that is presented on the page. The feature element can be a visual or something else that captures the users interest. Its purpose is to directly engage the users by presenting something interesting to make the page feel more inviting. The pattern is well suited for websites where one presents a lot of information as well as when one wants to engage the users.

### 3.3.3 Fat menus

Fat menus is a pattern where a website's subpages are placed in a fly-out or a drop-down menu. The menu can contain all subpages of the website or just a few sections. The content of the menu is sorted into categories and the pages hierarchy is often visualized. Fat menus suit well for websites with many pages and when the hierarchy of subpages are larger than two levels deep. By usage of a fat menu one can present many navigation options to the user which might have gone unnoticed otherwise. The pattern provides a simple way to explore a website further and gives a quick and easy overview of what the website contains without needing to navigate through it. As a result comes the decrease of unnecessary or additional steps and an efficient navigation.

### 3.3.4 Sitemap footer

The concept of the sitemap footer is categorization of links at the bottom of the page. The most common information located on the footer are the websites most visited pages, contact information and other resources connected to the site, for example social media. The sitemap footer provides users with further navigation options which in itself enables the site to become more explorable. Since every page on the website has the sitemap footer it creates continuity on the entirety of the website and gives the users an effective one-click option to navigate to different popular or important pages.

### 3.3.5 Breadcrumbs

Breadcrumbs are a way of showing previous navigation steps users have taken by writing out the name of the last pages the user has visited. The pattern suits sites or applications where the architecture has hierarchy and tries to counteract the feeling of getting lost. Not only does it provide clarification for where the user is located in the hierarchy, but it also provides the user a different way to navigate backwards to a familiar page. A common way of executing this pattern is by the use of the greater-than sign. For instance, "Start page > Summer Olympics > Rules". The

breadcrumbs indicate that the user is located on the page “Rules” and that it is deeper down in the hierarchy. The purpose of the pattern is to give the user context to the page.

### **3.3.6 Visual framework**

By having all pages or screens throughout a site or application follow the same layout, style and characteristics, one is said to follow the visual framework pattern. It provides familiarity to the user which leads to a faster learning process and a more effective and comfortable user experience. Furthermore, if one repeats the same layout throughout the website the visuals that are constant across pages blend into the background thereby making content of importance stand out better. This directs the user to what they find attractive.

### **3.3.7 Grid of equals**

When content is placed in a grid, or matrix, where all items should be of similar and visual weight the grid of equal pattern is applied. This clarifies to users that the items are comparable or of equal importance. The grid could contain items such as blog posts, news articles or products which are all selectable. Visually it gives a neat and calming experience.

### **3.3.8 Right-left alignment**

When making a two-column table of some sort one should make sure to have the text labels at the left right-aligned and the other item that is placed on the right left-aligned [17]. The pattern makes it easier for users to connect the label to the associated item without white space in between. If the labels are of a longer sort, one should consider not using right-alignment since it is harder for the human eye to perceive where the beginning of the line is.

### **3.3.9 Input prompt**

The pattern input prompt makes use of prompts in various items such as text fields or drop downs when wanting the users input. The purpose of the pattern is to give the users some sort of hints to what is expected of them, by the use of a prompt. For instance, when filling out one’s name in a registration form there will sometimes be two boxes next to each other. By using a prompt that says “First Name” in the first one and “Last Name” in the last one the user needs next to little time to complete the task. The use of input prompts may have such effectiveness that the correlated labels are not needed from time to time.

### **3.3.10 Prominent done button**

The prominent done button is a great way to offer some sort of closure to the user at the end of a process. It is a clearly visible button, often designed with a color that stands out and with defined borders. It should be placed at the end of the visual process that is portrayed on the screen and close to the last text field. This makes the user connect the association with the button and the text fields easier. Lastly the button should have a concise and short label, for example “Done”, “Send” or “Submit”. By the use of a prominent done button one diminishes the risk of having the user being confused by if their inputs were taken effect after all.

### **3.3.11 Hover or Pop-Up tools**

By the use of hover tools designers get a cleaner interface by hiding information, such as text labels or buttons, on items [18]. These stay hidden until the user hovers over said items, with a purpose of decluttering the screen and decreasing the risk of users being overwhelmed. The pattern is often used when the interface, often a list of items, handles a lot of smaller items, such as pictures, messages etc.

### **3.3.12 Module Tabs**

If you have a website with a lot of information and text that you want the user to interact with it is crucial that the content is visible as well as approachable. Especially, if the information is important you want the user to see it directly but it is difficult to put all information on one screen. By using module tabs this problem can be solved and assist the user to be more effective. Each tab represents a different new screen and when you press on one of the tabs you get to a new screen with new information and the tabs will always be in static positions and not disappear. Often the content of the modules are related or similar to each other.

### **3.3.13 Accordion**

This pattern can be very similar to the module tabs pattern and both of them are used when it comes to grouping a page's heterogeneous content. If you have a lot of text and additional information on your page and the amount of available room is limited then the modules are significant. By clicking on one of the panels the user can view the additional content that is connected to that panel. Compared with tabs the panels can be closed and opened independently of each other. The accordion modules can be arranged freely by the user depending on the situation. Perhaps all panels should be opened so that the user can see all the content or perhaps only some of the panels should be opened so that the user can be more efficient. Conclusively, all of the extensive information of a page can be enclosed within one element where parts of the information can be viewed separately.

### **3.3.14 Carousel**

This pattern is an engaging visual design and especially effective if one has many items or elements that the user could interact with. The items are placed horizontally and can be viewed from side to side via scroll or swipe. Compared with other solutions the list of items can not be moved vertically and instead the user has to browse through the elements back and forth. A user can easily navigate and explore the different items. The common structure of the elements is that they are represented as images or thumbnails. The content of the items should be of interest to the user and be relevant for the situation.

### **3.3.15 Pagination**

A common pattern that is often used to take a lot of information and split it up on several pages is called pagination. To assist the user's navigation and exploration of the content the pattern provides a control element where the user can choose which page to view. The pattern is made up of buttons with numbers that indicate the available pages and in addition two buttons you can click to see the previous or next results. Arrows or pointers are common tools to help the user navigate the different pages by clicking on them. The current page will be highlighted in the control area.

### 3.4 Web Accessibility Directive

On the 23 of September 2018 the Web Accessibility Directive became a law in Sweden and in the EU. The law was created to handle requirements regarding accessibility on the internet and applies to public sectors, state and municipal companies [19]. The background of the implementation of the law is that everyone no matter disability should be able to navigate the internet [20]. To follow the accessibility standards there are four principles to uphold, the first one being *Perceivable*, meaning that the content provided should be presentable to the users in ways that they can perceive [21]. The next being *Operable*, the webpage navigation and components must be operable. *Understandable* refers to the information on the website being understandable, and lastly the *Robust* principle meaning that the website should be able to perform across different platforms.

The law handles the entire process of implementing a website, from stakeholder demands, planning, designing, developing to maintaining the website [22]. From a design point of view, the law, for example, requires that information on a website should not rely on color schemes. Taken in consideration that multiple people experience color blindness and information can easily be missed if the colors of a text is too similar to the background.

## 4 Method

In order to achieve a positive user experience by the end of the project, a myriad of methods were used in the process. The process itself is divided into three main sections: Data Gathering, User Requirements and Prototyping. The information gathered from the users was used to create project requirements, which were then used as guidelines for prototyping and designing. All participants were informed beforehand that the data gathered would be anonymous and non traceable back to them.

### 4.1 Data Gathering

At the beginning of the project a questionnaire was distributed among students to collect quantitative data, and some structured interviews were performed in conjunction with smaller user tests to collect qualitative data about the intended users. The decision to combine both approaches was made in order to provide a more detailed account of the observed behaviors and feelings [16]. In addition, an expert review of the Studentportal was written, and Chalmers employees responsible for the Studentportal were contacted to initiate a potential collaboration.

#### 4.1.1 Interviews

A structured interview is an interview with a predetermined set of questions as opposed to an unstructured interview where the questions are improvised during the interview [23]. It is most often done one-on-one with one interviewer and an interviewee and possibly an observer who documents the procedure. The data gathered from both structured and unstructured interviews is considered to be qualitative data because of the interviewers ability to ask follow-up questions and dig deeper in subjects where it seems as if there could be valuable information.

#### 4.1.2 Questionnaire

A questionnaire is a form filled with questions about the domain or product that is distributed amongst users as well as potential users to be answered and returned [16]. There are many ways of doing this but the most common is an online document due to its simplicity. Questionnaires are easy to distribute which means that there will most likely be a substantial amount of responses. In contrast to interviews the data gathered from questionnaires is considered quantitative data rather than qualitative because it is difficult to write questions that give good answers or follow-ups on something the users noted. When analysing the data from questionnaires you are looking at overall trends instead of individual answers.

#### 4.1.3 Stakeholder

In the beginning of the project the responsible staff of the Chalmers Studentportal were contacted and they became the stakeholders of the project. Stakeholders are groups or individuals that can either influence or be influenced by the outcome of a project [16]. The project's stakeholders contributed with statistics as well as information about the state of the current Studentportal and in return they received results from the project's process.

#### **4.1.4 Expert Review of the Studentportal**

An expert review is an evaluation method where people who have good knowledge of user experience and user populations reviews a product to look for possible problems or errors [16]. To comprehend the problems of the current Studentportal an expert review, created by the developers of this project, was directed at the content as well as the visual elements of the entire webpage. The purpose was to find areas on the current webpage that are confusing and unclear. This method is helpful because when a problem is found in the early stages of the project, the sooner a solution can be designed to solve the problem.

## **4.2 User Requirements**

The reason behind the user requirements was to be able to see the project through the intended users' eyes and to know which direction to take the design. With personas and scenarios the needs of the users could be captured, and the structure of the work process was built upon requirements and user stories.

### **4.2.1 Personas and Scenarios**

A character based on a target demographic is called a persona and is created to help developers and designers to be able to identify a group of users [24]. The persona is given a name, age, occupation, interests and usually includes a chart representing different levels of characteristics, for example optimism, patience or technical knowledge. By using personas the needs of the users can be shown graphically along with their preferences. The usage of personas is a good way to make objective design decisions that will benefit the later users.

A scenario is a made up story regarding a user's tasks or activities. It is common that a scenario shows an existing situation, but it is more commonly used to picture an imaginative scenario to be of support in the design process [16].

### **4.2.2 Constraints and Requirements**

Limitations on a design is called constraints, it can be both constraints made by the designer to make a way to improve the design or constraints that the designer has no control over [25].

Requirements are written based on results from data gathered to be able to turn concepts into design features [26]. Requirements specify what should be required of the final product in order to ensure that it meets the needs of the intended users. For example, by dividing requirements among developers the process can be made smoother and timelines can be more easily organized. A requirement may look like this:

"The frontpage of the prototype should have categorized information and content to ease the navigation".

### **4.2.3 User Stories**

The growing prevalence of user stories legitimizes the notion that software experts view them as valuable tools to identify and reflect accurate user-based requirements [27]. User stories are com-

mon approaches to classify requirements, often using a basic template like:

“As a ... (describing role), I want ... (describing goal), so that ... (highlighting benefit).”

According to Lucassen et al., the inclusion of user stories is increasing and it is significant in research, particularly in the sense of agile development of software applications [28]. The user stories served as guidelines throughout the entire process to make sure that any design decisions are based on the future users and that the purpose of the project is not lost along the way. A small selection of the user stories used in the project can be found in Appendix F.

### **4.3 Prototyping**

The entire prototyping process was based on the method of Rapid Prototyping [29], a cycle that consists of three phases: Prototyping, Reviewing and Refining. Prototyping revolves around the creative process of making some sort of a design, reviewing handles the process of testing on users and gathering data, and refining identifies the problems that need to be fixed or clarified in the next cycle. This project consists of two cycles, called iterations 1 and 2. Before iteration 1 could begin, a series of paper prototypes of a frontpage were created and reviewed to establish some sort of foundation of the design for iteration 1. As with data gathering, the feedback from users after testing were anonymous and the participants were all made aware of this.

#### **4.3.1 Paper prototyping**

As previously mentioned, the foundation was built on a series of paper prototypes, which is a technique for sketching designs on paper with a pen. The method is fast, accessible to everyone, and does not require any special equipment, [29] which was the primary reason for its use. This process was also an iterative one. Each person sketched individual ideas to later be shown and discussed in the group. The feedback from others laid ground for the next individual sketching session where other people’s ideas were further explored.

#### **4.3.2 Think-Aloud-Protocol**

The Think-aloud-protocol refers to the practice of participants freely speaking to whatever is on their mind [23]. The method was utilized in all user tests to gain a complete picture of the user’s actions of the product. Throughout all the user tests, a series of scenario-based questions asked users to complete specific activities, for instance to navigate to different pages or describe thoughts and feelings about different features and elements. It is an effective tool because it accurately represents participants’ thinking processes, offers useful insight into which challenges that occur, and demonstrates how people handle website activities [30]. However, there is an underlying possibility that the subject will become mute and lose the energy or motivation to continue speaking [23]. To diminish the risk of this happening the group decided to complement certain cases with a series of follow-up questions if necessary. Everything expressed by the participants was written down in a document and compiled to later compare all answers and make a conclusion of what features need to be arranged, removed or implemented.

### 4.3.3 Emotion Chart

To conclude the user tests in iteration 1 and 2, an emotional chart with system descriptive adjectives were shown to the participants. This technique is based of another method that uses emotions written on cards [31], but it was implemented differently to fit the project's user test format. The chart used in the user tests consisted of three different tables. Each table was either filled with positive emotions, see Figure 1, negative emotions or system descriptive adjectives (additional figures can be viewed in Appendix E). Participants were asked to circle or underline the emotions and adjectives they experienced throughout the entire user test. The purpose of the chart was to provide insight to if the prototype enhanced the user experience, hopefully making it a positive one. To establish if there had been improvements in the overall user experience the emotions perceived during iteration 1 were compared to iteration 2.

Positiva Känslor

Sympatisk	Respekt	Snällhet	Lust
Kärlek	Beundrande	Dyrkan	Önskan
Lättnad	Drömmig	Avslappnad	Förhoppningsfull
Eufori	Glädje	Nöjd	Själsäker
Förtrollad	Stolt	Inspirerad	Fascinerad
Modig	Tillfredsställd	Energifylld	Överraskad
Munter	Ivrig	Lycka	Hänförd
Triumf	Hopp	Extas	Upprymd
Förtjusning	Skojig	Optimism	Entusiasm

Figure 1: Chart showing 25 positive emotions a person can potentially experience. If the participant felt any of the 25 options, it was to be filled out in the chart.

## 5 Data Gathering

Two methods of operation were conducted to gather information about the users' feelings and issues regarding the user experience of the Chalmers Studentportal. The two methods consisted of a questionnaire and some interviews combined with smaller user tests. Based on the results, requirements, scenarios and personas could be developed to set up some sort of guidelines for future work, and as a reminder that it is the users' needs and issues that must be the project's main focus.

### 5.1 Questionnaire

To get a better understanding of what the overall opinion of the Studentportal is among students at Chalmers, a Google Forms questionnaire was created. The questionnaire mainly focused on what students think of the Studentportal in its current state, what they believe the website lacks, what they find positive about the website, the navigation and appearance of the Studentportal and lastly what they value in a good website. Since this questionnaire's purpose was to collect quantitative data the questions were limited to yes, no and rating questions, to make it easy to view the results and get a clear overview of the opinions regarding the Studentportal. Additional questions and answers from the questionnaire can be seen in Appendix A.

In total, 107 students answered the questionnaire ranging from first year to fifth year students. Regarding the program range, Software engineering was at a big majority with 70,1% of the responses.

The answers showed that 61.7% of the students state that they visit the website less than once a week and based on the questionnaire the overall opinion is negative. One question proving this theory was regarding the overall rate of the Studentportal, from functionality to user experience, the results can be viewed in Figure 2.

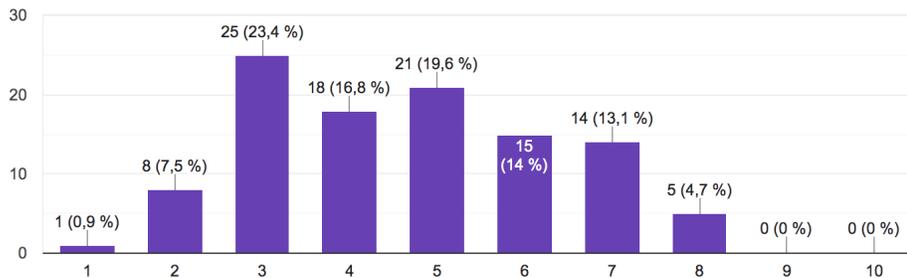


Figure 2: Shows the responses of the question from the questionnaire: "How would you rate Chalmers Studentportal as a whole? This includes anything from functionality to the user experience"

When asked if the participants knew where to find information regarding Scholarships, 61% did not know where to look, 27.1% stated that they were not sure and 15.9% knew where to find the information.

For the question “What do you value most in a website? Choose multiple if desired.”, the results show that navigation, readability and content were of importance to the participants, as seen in Figure 3. This was taken further into consideration in the design process and the results were valuable when designing the firsts prototypes.

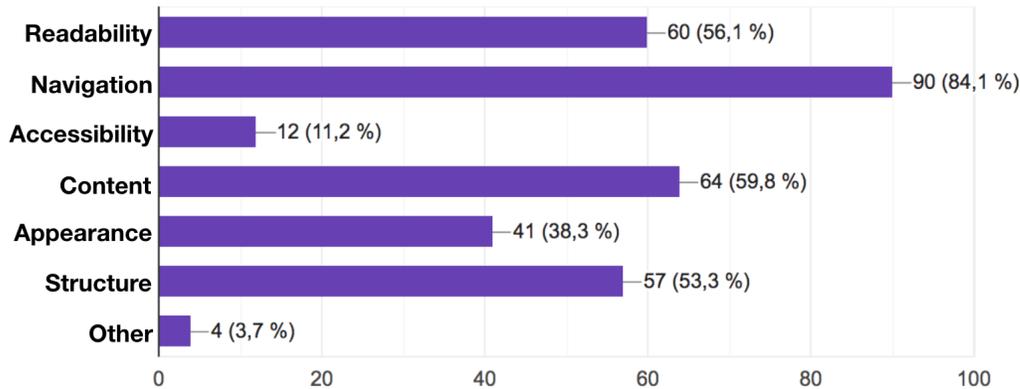


Figure 3: Shows the answers on the question “What do you value most in a website? Choose multiple if desired.”. The table’s choices was modified to show the categories clearer.

## 5.2 Interviews

To advance the data gathering process, interviews followed by a small user test on Chalmers Studentportal were conducted with a total of 11 participants. The sole purpose of the interviews were to identify problems with the current Chalmers Studentportal and to get a better understanding of the users’ needs, which will later help to produce such things as requirements and scenarios. The user group consisted of students from different programs at Chalmers, but most of them from the Software engineering department. All questions can be found in Appendix B.

To begin the participants were shown the already existing website and were asked open-ended questions to explain their use and feelings towards it. This with the intent to not steer the participants in a specific direction and to receive a deeper understanding of underlying issues and needs. Questions like “What do you feel is important to achieve a positive user-experience?” and “What do you use Chalmers Studentportal for?” were asked in order to reach the aforementioned goal.

Afterwards the participants were subjected to three small navigation tests of the Studentportal and were asked to locate crucial information that every student at some point in time needs to be able to find, such as the contact information of their programs’ student counselor, or all mandatory courses in the second semester. Think-aloud, a method of data gathering, was used to let the speakers communicate freely to whatever is on their mind. One downside of this method is the possible unnatural situation that might occur [32]. Most people do not talk to themselves everyday,

which could make it harder for participants to constantly speak their minds without a second party to discuss with. To diminish the risk of this happening, the previously mentioned interviews were held in the beginning to loosen up involved participants, as well as the use of situational follow-up questions if necessary. Participants performed as mentioned three navigation tests on the website and were lastly asked some conclusive questions about the entire process.

After the results were compiled and compared, it was possible to see two main areas that were brought up by the majority of the participants. First, the mostly negatively experienced emotions but also some key general thoughts they had about design overall. The results can be seen in the list below.

### **Emotional experiences**

- Irritation
- Frustration
- Confusion
- Stress
- Feeling of fulfilment when completing tasks

### **Key parts of the design**

- Effective navigation
- No abundance of information
- Consistent design
- Clear structure

## **5.3 Analysis of the Content of the Studentportal**

When the results from the questionnaire and interviews were compiled, a complete expert analysis of the content on the Studentportal was conducted [2]. This was done to get an understanding of the information currently on the Studentportal and to know what information to use in the coming prototypes

### **5.3.1 Approach**

The analysis was done in the swedish version of the Studentportal because there is more information in that version, an example being that there are five main titles in the Swedish version, and only four in the English one. The English version is missing the subject “Studies abroad” which is logical since exchange students are already studying abroad from another school.

The Studentportal was divided into seven parts, “Studier” (Studies), “Utlandsstudier” (Studies abroad), “Studentliv” (Student life), “Karriärkollen” (Career check), “Kontakt” (Contact), the search function and lastly the frontpage. Each page and subpage got investigated throughout and every detail was being noted and commented on in a document along with short comments regarding the information on the page.

### 5.3.2 Conclusions

There are many flaws in the current Studentportal, both regarding information and structure. Some examples are sections having different titles than what is shown on the side menu which could cause confusion. There are multiple occasions where shortcuts on a subpage leads back to the same subpage.

On top of this there is an overwhelming amount of information that is duplicated across multiple pages which sparked conversation regarding whether this is a positive or negative thing. However, the conclusion came to be that together with the confusing navigation the duplication of information would be unnecessary if the navigation was easier.

Questions regarding the structure emerged. It is clear that there are too many administrators for different pages. Every page at the bottom has the contact information for respective administrators. If too many people have access to updating the website which is using different techniques to present information, it is plausible that the core structure across subpages becomes non-existent. This is possibly one of the reasons why many students find it messy and unstructured.

## 5.4 Stakeholder

To get more insight in the work and state of the current Studentportal a meeting with five people from Chalmers External Communications department and Student and Alumni relations department was held online. Their roles were, Unit manager for the External Communication department; Ingrid Claesson, Unit manager for the Student and Alumni relations department; Ulla-Karin Drakeskär, Communicator for the Student and Alumni relations department; Helén Rosenfeldt, Brand strategist for the External Communication department; Pär Svensson and lastly webmaster at the External Communication department; Johan Wetterberg. To make this process easier to comprehend this group of people will in the future be referred to as the stakeholders.

After the project was introduced, conversations regarding the current Studentportal's state was held. The stakeholders confirmed the problems regarding the maintenance of the Studentportal, and stated that there are multiple people updating the information on the website, which can cause confusion among users.

The feedback was positive and the stakeholders were excited to hear about the project and wanted to receive later user tests made on the current Studentportal. A reason for their excitement was due to the fact that the Studentportal in the near future needs to be reconstructed due to its current framework being outdated.

The stakeholders provided statistics on what pages the users use the most together with recommendations on websites covering inclusion and web guidelines. Additionally the stakeholders provided the project with images and gave permission for the use of images that can be seen on the website.

The contact with the stakeholders was held during the whole project and the finished version was later presented to them.

## 6 User Requirements

When the first round of data gathering, surveys and interviews was finished the work on guidelines that could be followed throughout the project to ensure a positive user experience began. This by making sure that the users are in focus by the use of Requirements, Constraints, Personas, Scenarios and User-stories. Specifically, requirements and user stories have been updated along the way to make sure that the project is adapting to newly discovered data or information.

### 6.1 Constraints and Requirements

The constraint "The last iteration of the prototype should be finished before summer 2021" was the only one made for this project. The reason for having only one constraint was due to the project only consisting of designing a prototype. Therefore many of the common constraints that you may encounter when actually implementing a website were not relevant.

To have a moderate and precise direction for the future of the project, requirements were established to be looked back upon. They were written based on the understanding of the newly discovered problems with the Studentportal, for example, navigation and unpleasing or cluttered design. Listed below are a few of the requirements that are needed to be fulfilled in order to see the outcome as a success.

- The finished prototype should give the users a positive user experience.
- The finished prototype should allow the user a quick overview of the homepage.
- The finished prototype should allow the user to navigate to important student websites such as Ladok, Canvas and TimeEdit.
- The finished prototype should view relevant program information for a logged in student.
- The finished prototype should categorize information and content to ease the navigation.
- The finished prototype should have a calendar that is precise and universal.
- The finished prototype should have eye-pleasing colors for the content and elements of the pages.

### 6.2 Personas

In order to discover the requirements it is important to understand the users' motivations, behaviors and needs. Creating personas is a suitable method to exemplify and define these factors to help designers keep focus throughout the process [16]. Two personas were created, one primary persona, Robert 24 (Figure 4), and one secondary persona, Klara 19 (Figure 5).

The personas were created based on the data from questionnaires and the first interviews. The "Goals" section, as seen in Figures 4 and 5, is a representation of what the participants said that they used the Chalmers Studentportal for during the interviews. The section of "Frustration" is a representation of a mix between what the users said irritated them during the first interview and

what the users answered on question six "What do you value most in a website?" in the questionnaire. To confirm the quality of the personas it was argued that it is appropriate to have two different sets of characteristics to be able to cover a larger group of students at Chalmers.

The concept of personas was utilized to create a concrete and realistic picture of a user. This was helpful throughout the process by motivating all stages of design decisions, functionality and prioritization of elements in the prototype.

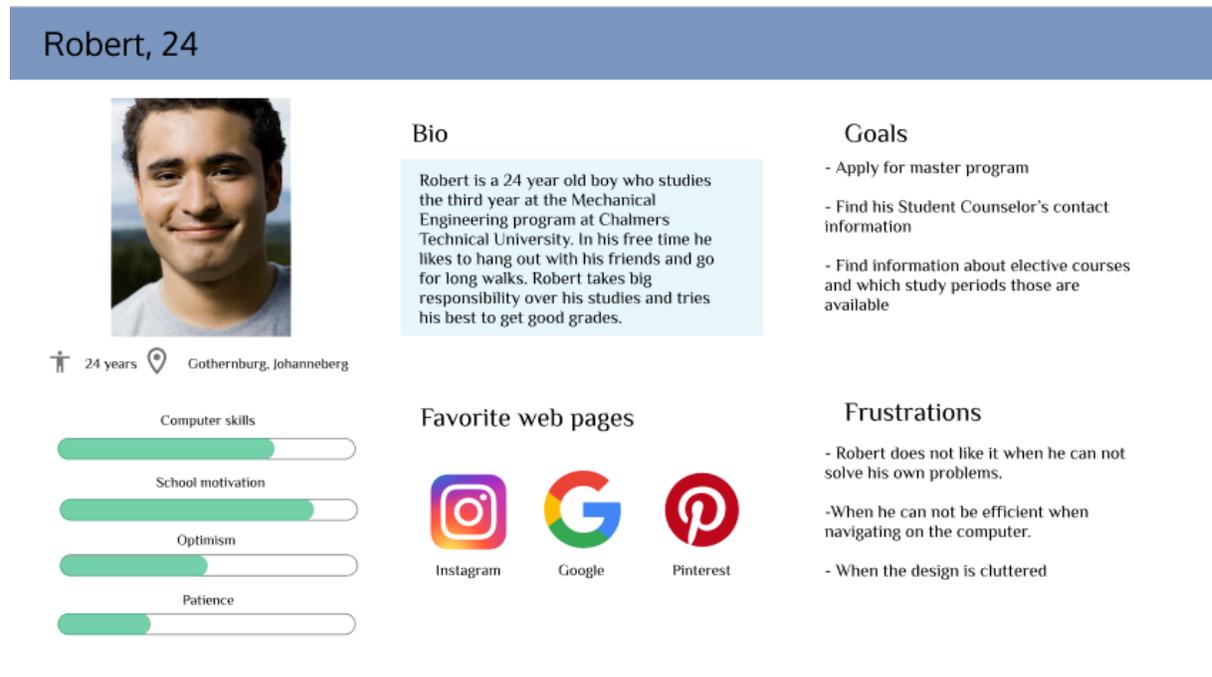


Figure 4: The persona of Robert 24, including a biography, his skills and goals.

## Klara , 19

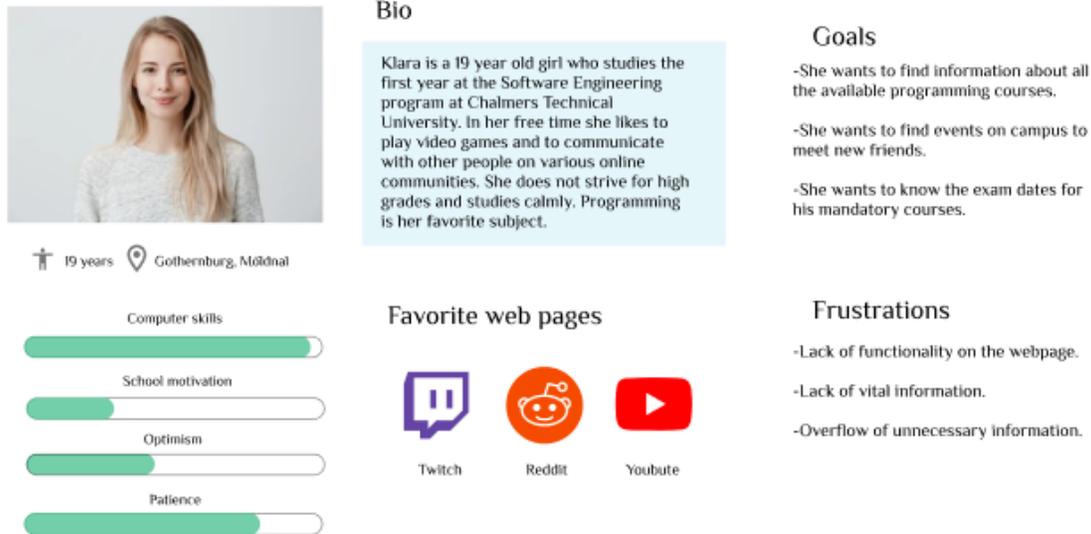


Figure 5: *The persona of Klara 19, including a biography, her skills and goals.*

### 6.3 Scenarios

Scenarios were written after the initial data gathering which yielded much information regarding how the students use the Studentportal and what for. Scenarios were done in order to clarify what the users might experience and to visualise problems and solutions. Ten scenarios were created in order to cover as many instances as possible, two of which can be seen below. The scenarios are based on the previously mentioned personas. The information in the scenarios below regarding navigation are from [2].

#### 6.3.1 First Scenario - Robert

Robert, one of the personas, does not know which master program he wants to apply for. He has never contacted his section's student counselor before but decides that now is a good time to do so. He does not remember the counselor's name and decides to log into the Studentportal to find out. The first view he sees is the "Mina sidor" (my pages) and a lot of menu choices are seen, he quickly finds the "Kontakt" (contact) button. There he finds the ones being responsible for different errands and their emails. He scrolls through the page and finds a link to student counselors and clicks it, getting a bit annoyed due to the time it takes. A question pops up asking if he studies at Bachelor studies or master studies, after choosing Bachelor studies he is taken to a page where all of the programs at Chalmers are listed without the contact information to the student counselor. By this time Robert has almost lost his patience, finding it hard to believe that it would take this long to find the information. He finds his program in the list and clicks it and the page jumps down

to the student counselor of Mechanical engineering where the email address can be seen. Overall he did not find the information difficult to find but the time it took was frustrating.

### 6.3.2 Second Scenario - Klara

Klara, the second persona, is studying her third year at the institution of Software engineering at Chalmers and wants to find information about the available programming courses. She sits down on her couch at home, opens her computer and logs into Chalmers Studentportal. When logged in, Klara is navigated to a page with multiple menu options. She gets somewhat frustrated that there are too many choices, many of which she sees as unnecessary. After a minute of hesitation, Klara presses the menu "Sök Kurser" (search courses) which brings her to a page which asks her to manually fill out information about the course she is looking for. She gets a bit confused since she does not know exactly what she is looking for. Instead she navigates to the link "Sök program och utbildningsplaner" (search programs) at the top of the page. She ends up at a similar page as the one before, but this time she finds her institution faster and clicks on it. She feels unmotivated to keep going since her motivation for her studies overall is quite low, but she tries to be optimistic. The page Klara is located on shows her all courses that are both mandatory and elective. She would have liked to get rid of all courses not related to programming but as she is quite good at computers, she figures out that it either would have taken too much time to do, or the functionality does not exist. Instead she writes down all courses she could find on a paper.

## 6.4 User stories

The user stories used ranged from being able to quickly access shortcuts, being reminded of important dates, to the implementation of hover tools. A few of the user stories used in the project can be found in Appendix F.

Hence, from the user stories, almost every student needs a modified website or menu on the Studentportal to navigate their courses, finding new resources, getting timely details or information regarding their progress, upcoming courses and so forth. Five of the user stories used were:

- As a student I want specific information about my program and my year to be shown as a default so I don't get shown unnecessarily information that I don't care about.
- As a student I want an accordion in the menu so I don't get overwhelmed with too much information and can find the right page easier.
- As a student, I want to be able to reach Ladok from the Studentportal so that I can check my finished courses and my grades.
- As a student, I would like to be able to see what future courses I have so that I know what I will be studying.
- As a student, I want to be able to find information about mandatory or elective courses so that I can plan my curriculum to the best of my ability.

## 7 Prototyping

The prototyping process began with paper and pen and continued in the prototyping tool Figma. The project progressed iteratively by brainstorming and creating design alternatives, user testing and lastly analyzing the answers from user tests in order to change and update the prototype. The user tests were performed in Swedish due to it being the native language of the participants which hopefully diminishes any risk of confusion in translation.

### 7.1 Paper Prototypes

Instead of determining which specific direction the design would take early on, a brainstorming session was held, meaning each person quickly sketched their own idea individually for a frontpage to later be compared and discussed. An example can be seen in Figure 6 and more examples can be found in Appendix C.

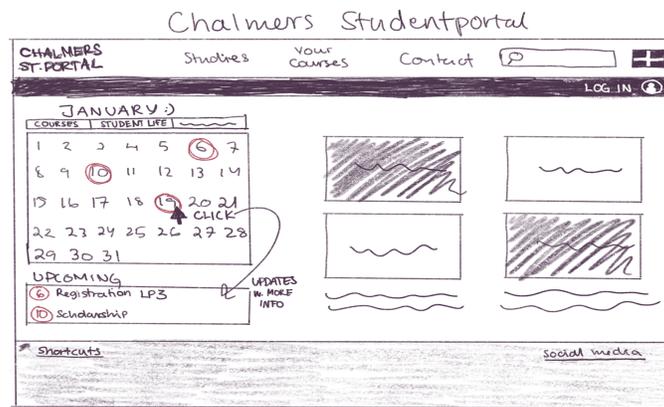


Figure 6: Initial idea for a front page for the new Chalmers Studentportal with prominent features such as shortcuts to Canvas and Ladok, a calendar and a smaller news feed.

These prototypes were then remade in the prototyping tool Figma to be more appealing, see Appendix D. For one of the prototypes a few subpages were created to show a little bit of framework and also to have more material to present to the participants.

#### 7.1.1 Reviewing

A presentation of all the prototypes were created and shown to a group of 10 people to receive feedback regarding the frontpage and framework for the Studentportal. The most popular frontpage can be seen below:

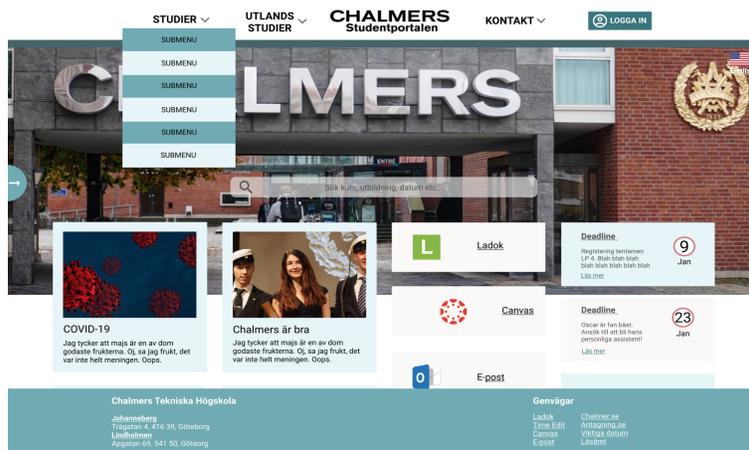


Figure 7: The participants' favorite front screen.

## 7.2 Iteration 1

After receiving the results from the first user test, regarding the frontpage and the information gathered from the first interview, see Chapter 5.2, the first iteration began by using the most liked prototype frontpage as a foundation.

### 7.2.1 Prototyping

The process began by looking into what the users liked about the leading prototype, as seen in Figure 7 and it was the shortcuts, the clear view and the symmetric elements. When the prototype expanded the things the users liked were continually kept in mind. A lot of focus was put on the header and footer of the page since these would appear on every page. The main color was changed from a clear blue to a more soft blue version. Since there is a lot of information to cover it was decided to start with information regarding "Studier" (studies). This was due to the statistics provided from the stakeholders showing that studies are the most viewed pages on the Studentportal. To achieve a more efficient navigation than in the current Studentportal an accordion was created where the links for the subpages were categorized into three sections, see Figure 9b. By analyzing the previous expert review, see Chapter 5.3, a new arrangement of the subpages could be established.

To have more material for the users to test, a few of the user stories were implemented, see Appendix F, such as a contact page for the Software engineering department together with a page for important dates and finally a page for the program specific courses. By the use of patterns like right-left alignment, grid of equals and visual framework the subpages became structural as well as intuitive.

### 7.2.2 Reviewing - User test

An important part to test was the navigation and therefore the accordion was of importance. In total, 10 people from different programs took part in the user test. The questions covered mainly

navigation and the organization of the information on the pages, since aesthetics and visuals had not been in focus thus far. The test involved the same questions as the first interviews regarding the current Studentportal, in order to compare new difficulties that might have occurred due to the newly established design. The feedback was positive and a majority completed the tasks without problems and the visual contact page was appreciated, see Figure 8. One thing noted by the participants was that the alignment as well as the symmetry of elements in a few pages was a bit off.

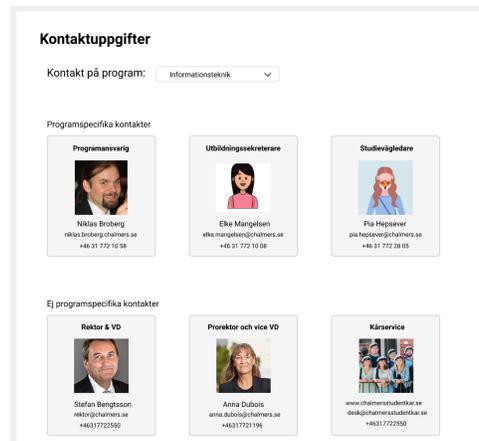


Figure 8: *Newly designed contact page, showing contact information for the Software Technology Institution and Chalmers in general.*

To finish off the user test, the participants filled out an emotion chart. The chart is filled with positive, negative and system descriptive adjectives to further help the understanding of the user experience involved with the prior navigation tests. If an emotion was experienced during the navigation tests it is supposed to be filled out in the emotion chart.

The most perceived positive emotions were "relaxed", "satisfied", "pleased" and "enjoyment". Only one negative emotion was experienced among the participants, this one being "uninteresting", stated by one participant. Some of the system descriptive adjectives mentioned were "useful", "fast", "structured" and "understandable".

### 7.2.3 Refining

With the feedback provided, discussions regarding the navigation, alignment and the accordion occurred. To further enable easy navigation, breadcrumbs and an escape hatch were implemented. The structure of the information under the menu "Studies" was to be further discussed with different approaches to make it more clear and easy to navigate through. Since not all of the pages were implemented in the prototype at this stage, discussions regarding further subpages were held to establish scenarios. The previously written requirements were investigated once more together with the personas, this in order to receive inspiration and to focus on the user experience. The bugs found in the prototype were corrected.

The emotions experienced by the participants were at a majority positive responses. Since navigation was of importance at this stage, feelings such as "fast", "understandable" and "structured" were appreciated. The feeling "uninterested" was concluded to not have anything to do with the navigation of the prototype. However, to avoid later prototypes from being uninteresting implementations such as a carousel on the frontpage was considered together with the feature search browse pattern.

New requirements were written covering how information was to be presented and the structure of new subpages as a result of newly gathered information. The personas and their scenarios were observed once again to remember elements that were of importance when prototyping.

## **7.3 Iteration 2**

With background from the previous user tests and the written requirements the second iteration proceeded, mainly focused on the implementation of subpages and the visual framework of the prototype. A drop-down menu was implemented, functioning as a module tab, to be able to navigate between different subpages.

### **7.3.1 Prototyping**

To be as efficient as possible, a template for the subpages was created so that every subpage had the same framework and distance from other elements. The prototype was divided into three parts for the purpose of separating the content and to follow the pagination design pattern. These three were; Studier (studies), Utlandsstudier (studies abroad) and Studentliv (student life), where studies can be viewed in Figure 9b. With the template, the subpages were divided among the group and could be worked on individually. User stories were distributed and patterns used for the subpages were for example prominent done buttons, breadcrumbs, hover tools, grid of equals and accordion.

There were three goals with the design of the subpages; making the groupings and titles more clear to aid in navigation, making it more clear where the user is in relation to the rest of the website and reducing the time and clicks required to find certain pages.

Finally the frontpage was updated with the implementation of a new and more discrete header, as seen in Figure 9. Further new implementations included a carousel, a calendar page and a news page, which followed the grid of equals-, pagination pattern among others. To follow the feature search browse pattern, a search page was made which was reachable from the header on every page. The input prompt pattern was used to create a user profile page, see Figure 10, with functions for changing the student's program and which program to be set as default across the different pages.

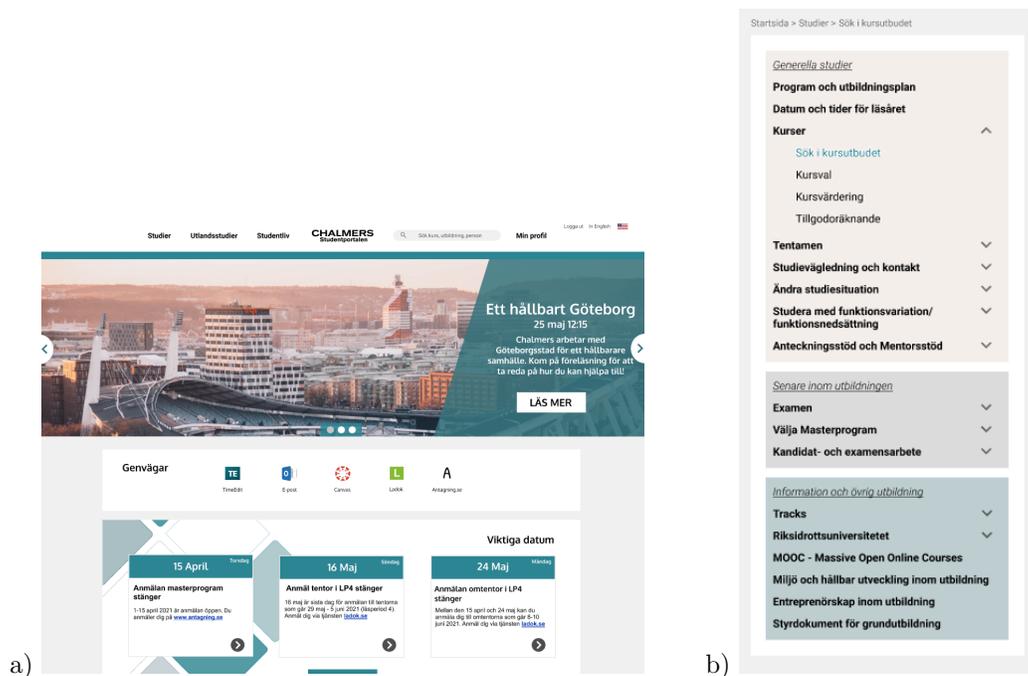


Figure 9: The second iteration of the frontpage with features such as a carousel and links (a) and example of the accordion used in subpages (b).

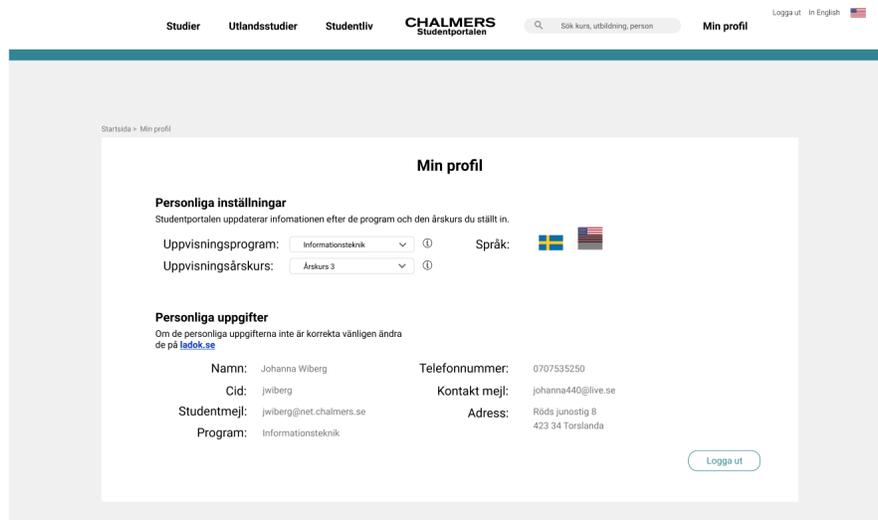


Figure 10: The prototypes profile page covering personal settings.

### 7.3.2 Figma Memory Usage Problem

When prototyping large files in Figma a project can reach the active memory limit at 2 GB. The higher the percentage is, the higher the chance of losing data becomes. When the active memory limit reaches 100% Figma will lock the file, if this happens one must close all the Figma tabs and reload the page. Figma may let the user open the file to restore it to a previous version, however it is very unstable [33].

When the final implementations of the last subcategories were created, a Figma alert started to appear, implying that the file was almost out of memory. The first alert came when memory was at 60%, the warning alert was:

*“This file is almost out of browser memory. Remove content to lower memory use to 50% or less. This will ensure you can continue to work in this file safely.”*

After removing a few frames in Figma the work continued, however, later a new alert appeared, when the memory was at 75%,

*“Adding content is no longer safe as data may be lost. Remove content to reduce this file’s memory use or restore a previous version.”*

As a result, it was unsafe to continue adding views as well as connections, and the work needed to be paused. After further discussion it was decided that only one person should work in the Figma file since it was discovered that when several individuals simultaneously worked in Figma the memory usage increased. As a result, pages and views that were found to be unimportant were moved or deleted, to be able to have more memory access for the improvements of the prototype after later user tests. After feedback from the supervisor, elements such as the sitemap footer were remade into components with the intention of saving memory, however the memory usage stayed almost the same as before.

### 7.3.3 Reviewing - User test

The user test followed a similar structure to the first iteration by utilizing the same emotional charts and many of the same tasks were reused in order to compare. In addition, the test also contained more assignments to investigate features that had been added since the first iteration as well as questions about stylistic choices. New test participants were scouted to reach a larger group and seven people participated in total.

The user tests started with questions about stylistic choices by showing the participants images of different options and asking them to pick the most appealing one. They were asked to focus on aesthetics and the first choice was between three different fonts. The second test was between four different color palettes, see Figures 11a and 11b. The final test was between two different menus, one called a fat menu, see Figure 12a, and a smaller drop-down menu, see Figure 12b.

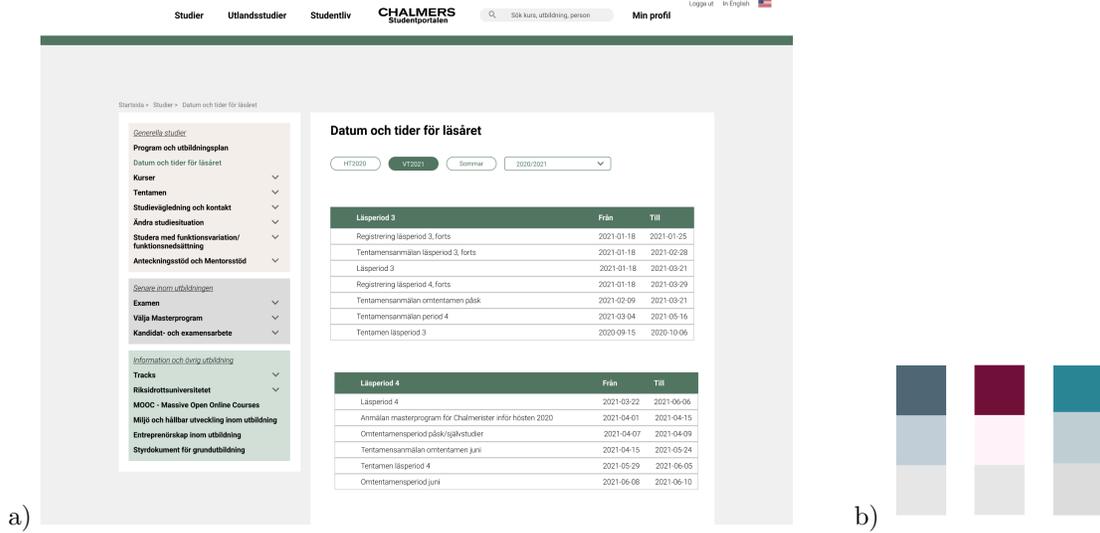


Figure 11: The green color palette visualized on the prototype (a) and the three other options (b).

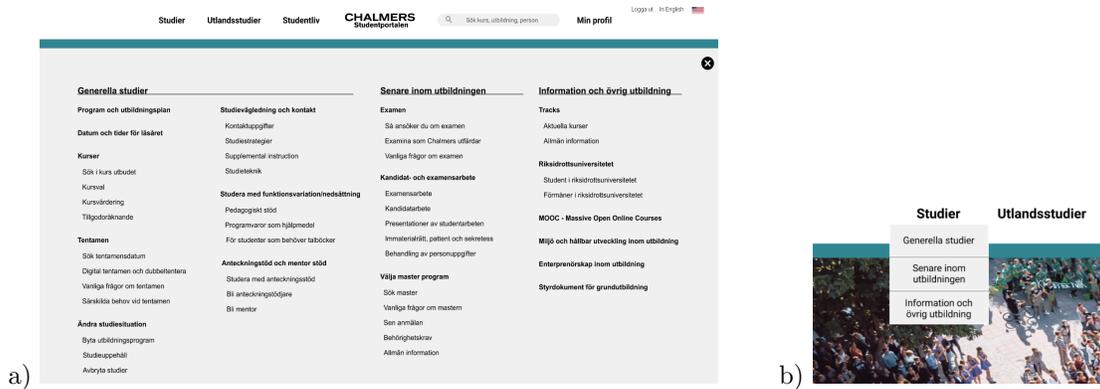


Figure 12: Two examples of a menu tested on participants, a fat menu (a) and a drop-down menu (b).

The second part of the user test the participants were given tasks to complete identical to the previous tests. Some examples of recurring tests are finding a student counselor or finding what date the exam week starts. Some new ones were for example finding contact information to the people responsible for studies abroad in America or finding information about how to arrange an event at campus. Once completed the test persons had to answer a few questions regarding if the prototype followed design principles, ranking the principles with either a low or high mark (1-5).

Lastly, the participants were once again asked to fill out the emotional- and the system descriptive charts. The results showed very positive emotions such as "satisfied", "happy", "interested" and "relaxed". A negative emotion that came from one of the participants was "overwhelmed".

### 7.3.4 Refining

Once the results were summarized a few conclusions could be drawn. The second font style, Arial, was voted the best. Regarding the color palettes, the opinions varied and it was decided to keep the current palette since it had a high rank among the users. The most popular menu became the fat menu, since the participants found it to be the most practical.

From the tests and rankings it could be concluded that the prototype functioned as intended and the users had no trouble navigating it. Most of the friction that occurred during the tests was due to bugs and not design flaws and the participants gave a rating of around 4.5 out of 5 on almost all of the alternatives.

For the emotions perceived, this time focus was not only on the navigation but the overall sense of the prototype. Previously, in the user test of the first iteration, the negative emotion "uninterested" was mentioned, however, it was not mentioned during this user test which was seen as very beneficial. Regarding the negative emotion "overwhelmed" it was considered it could depend on the participant seeing the prototype for the first time and recognizing elements but not the new framework, something that also the specific participant could confirm. However, the critique was examined and reviewed.

## 7.4 Final Touches

In the final stage, the main focus was put on last changes and small updates to get a well rounded prototype. The font of the text was changed to Arial but the color scheme was preserved. The previously mentioned fat menu was implemented and the drop-down menu was deleted. For the frontpage, new pictures were used in the carousel, because previous ones had copyrights attached to them. Minor bugs like connections not working properly were fixed and some final touches like extra hover or pop-up tools were implemented. By this time, all of the user stories chosen to be created had been implemented and the requirements fulfilled.

## 7.5 Presenting the Prototype for Stakeholders

The final prototype was presented to the stakeholders whilst walking through and comparing all user tests and results. The Figma prototype was shared with the stakeholders so that they could walk through it themselves later. The font, color scheme, and the use of a fat menu instead of a drop-down menu were discussed, and the response was positive. As they soon will be remaking the current Studentportal, the stakeholders were both excited and interested in the results. Furthermore, the accordion, which categorizes menu subcategories into colorized blocks, was well-received. Some questions arose from the stakeholders' side, for instance why users felt overwhelmed by the use of pictures on the current Studentportal and not in the prototype. It was discussed that this might be because of the utilization of grid of equals in the prototype. Lastly, the stakeholders expressed high gratitude for the cooperation during the project and that the results from the user tests could possibly be used later on to help develop the newer version of the Studentportal. In addition, there is a likelihood of them reaching out to the authors of the thesis to participate in their user tests.

## 8 Result

With information gathered from the questionnaire, multiple interviews, and user tests serving as the project's backbone, combined with established design principles and patterns, the project resulted in the final version of the prototype, see Figures 13 - 17. In summary, the final prototype could be viewed as a suggestion for a new design for Chalmers' Studentportal with the goal of providing a positive user experience.

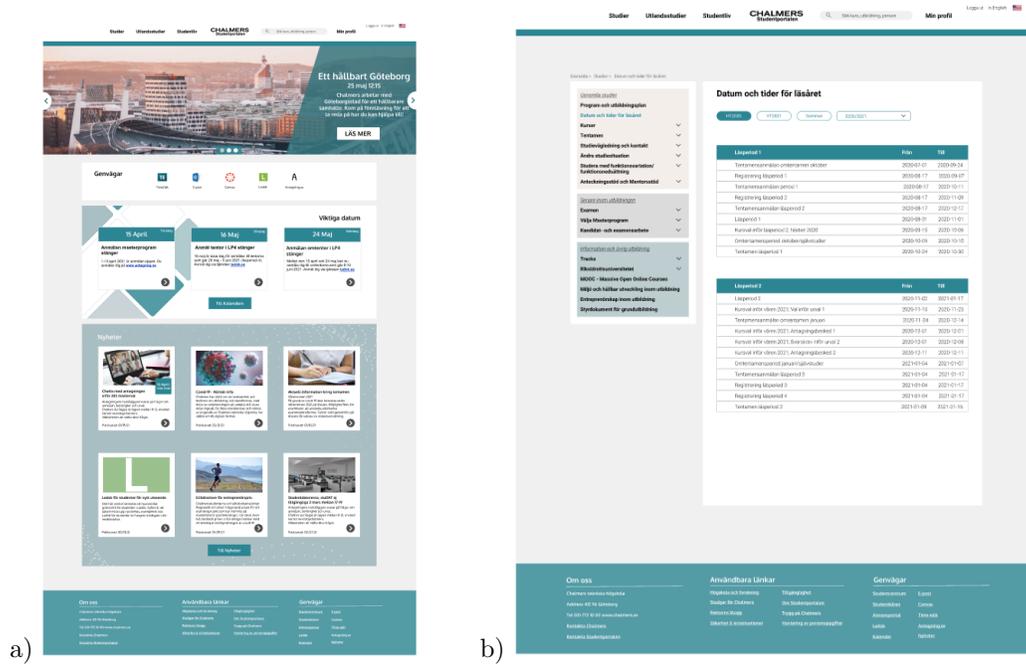


Figure 13: Two pictures from the prototype developed with Figma. Figure a) shows the homepage of the prototype. Figure b) shows one of the subpages.

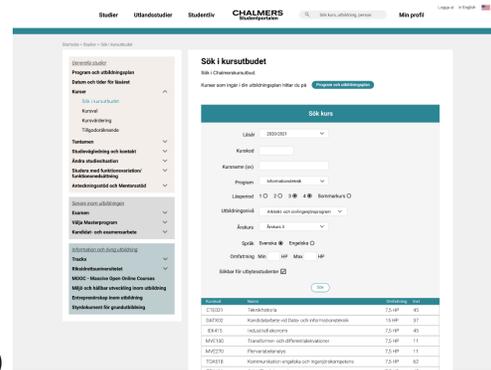
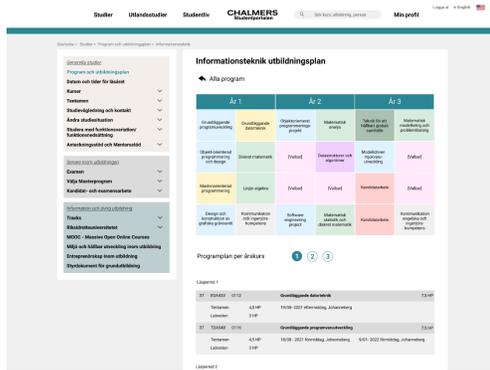


Figure 14: Two pictures from the prototype developed with Figma. Figure a) presents the syllabus for the first three years at the Software Engineering program. Figure b) shows the page where one searches for specific courses available.

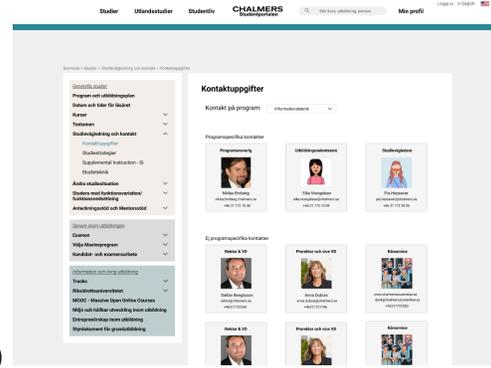
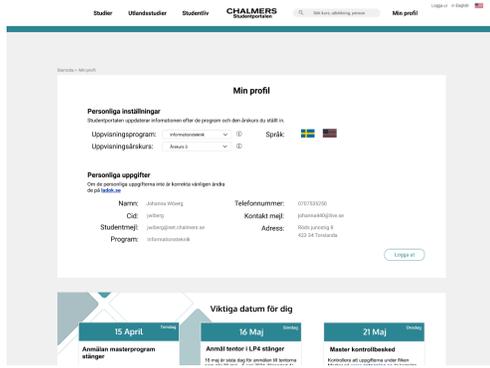


Figure 15: Figure a) shows the profile page for an student that is logged into the Studentportal. Here one can view his or her personal data and change what program he or she studies. This will enable the website to adapt to the input and only show relevant information for respective program. Here students can also view your personal deadlines. Figure b) presents the contact page for the Software engineering program.

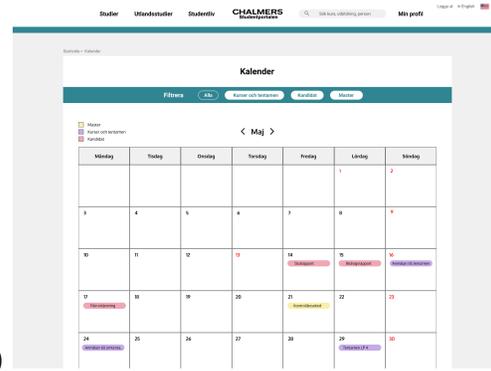
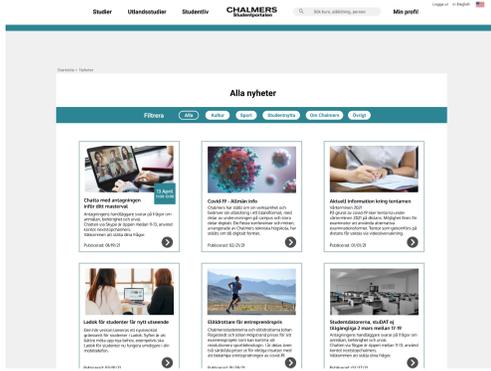


Figure 16: Figure a) Newly designed news page with the functionality of categorizing the news for personal liking. Figure b) shows the calendar page with deadlines concerning courses, bachelor and master studies.

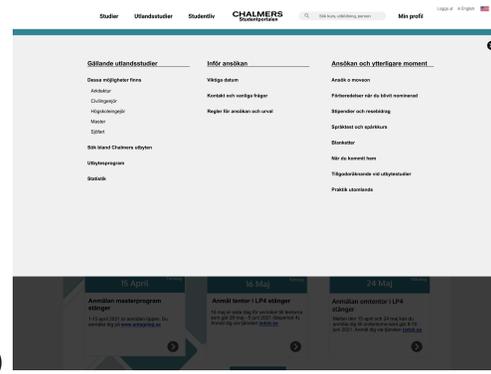
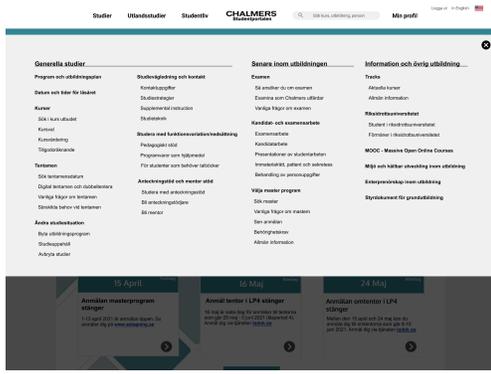


Figure 17: Both figures presents the use of a fat menu to navigate through the prototypes subpages. Figure a) shows the navigation options when pressing the menu "Studier" (Studies) on the home page whilst Figure b) shows the options when pressing "Utlandsstudier" (Study Abroad).

## 8.1 Users' Experience

Overall the users' experiences towards the prototype in regards to the specific design principles and system descriptive adjectives were overwhelmingly positive. In addition, only one out of 12 emotions evoked from the emotional chart in the last user test was negative, meaning that the finished prototype could be seen to live up to the expectations to fulfill a positive user experience.

### 8.1.1 Final Prototype

Participants rated the prototype in regards to the five previously mentioned design principles by giving each principle a score of 1 to 5. The final result for each category was calculated by the mean. On top of this the participants filled out a system descriptive adjective chart. The adjectives

written below were mentioned at least once by a participant.

### **Design Principles**

- Visibility - 4.5 out of 5
- Feedback - 4.5 out of 5
- Constraints - 3.8 out of 5
- Consistency - 4.8 out of 5
- Affordance - 4.6 out of 5

### **System Descriptive Adjectives**

- Useful
- Effective
- Structured
- Interesting
- Clear
- Understandable
- Quick
- Easy-to-use

#### **8.1.2 Evoked Emotions**

The results showed a large range of positive emotions associated with the product, specifically 12 positive ones versus one negative. Listed below are the specific emotions participants said to have perceived during the final user test. Each emotion has been experienced by at least one individual or more.

#### **Positive Emotions**

- Cheerful
- Eager
- Energetic
- Fascinated
- Happy
- Hopeful
- Interested

- Optimistic
- Proud
- Relaxed
- Relieved
- Satisfied

### **Negative Emotions**

- Overwhelmed

## **8.2 Guidelines for Maintenance of the Website**

To create a respectable and functional website is one challenge, but to maintain it to be of quality over time is another. After this project we can provide a few guidelines for maintaining the Chalmers Studentportal and to make sure it holds up to standard even after updating its content.

After the first meeting with the stakeholders it was clear that the website had multiple administrators that updates the Studentportal's content without any instructions of how to do it. This seemed to be a concern since the structure of the content varied across the pages and some information was duplicated, resulting in the creation of unnecessary subpages. Since Chalmers Studentportal is a large website with a lot of content and information, multiple administrators are required. However, by establishing guidelines for updates, it is possible to avoid duplication and ensure that the content layout is consistent across all pages.

Firstly, our recommendation is to have guidelines for how each subpage should look in terms of font, font size, buttons, links and presentation of visuals. To prevent duplication of information, it is recommended that there should be some sort of documentation on what content exists and on what page it is located. Additionally, having an administrator who is responsible for the entire website's content can be beneficial in ensuring that each page has unique information and follows the guidelines.

As Chalmers students, the group is aware that the Chalmers Studentportal has a bad reputation; even the stakeholders agree that the website is outdated and does not meet good standards. It is absolutely necessary to update a website from time to time if you want to keep it interesting. Our obvious advice is to make changes, but those changes must be thoroughly tested on users to make sure that the changes are appropriate or not.

## 9 Discussion

This section will go over various aspects of the project's entire process and results. First and foremost, the motivation for redesigning the Chalmers Studentportal, followed by the users' experiences with the new design, some concrete design decisions to ensure a positive user experience, improvements and obstacles, and finally the social-ethical measures that had to be taken into consideration.

### 9.1 Motivation

The changes brought about by the Covid-19 pandemic have caused a lot of stress and frustration in many people's lives, including the authors of this Bachelor's thesis. This sparked the idea of creating a positive user experience with the goal of improving the user's mental state and reducing stress.

However, as seen with previously mentioned Jonasson, Fjeld and Yamashita, 2007 [3], the authors came to the conclusion that an improved redesign might not be as beneficial as one might have thought because some lesser user interfaces have so called "committed users". Even if this is true, any means of improving a product should always be welcomed, especially when it is a product that all Chalmers students must use. The Studentportal was chosen because the group unanimously felt that they had a negative view of its design, and every group member had been frustrated when using it on multiple occasions. Choosing to redesign the Studentportal also meant that the target demographic became students at Chalmers University of Technology, making it easier to contact and set up user tests with people in that demographic.

### 9.2 Users Experience

The overwhelming majority of emotions experienced from the final user test were positive, with 12 versus one. A reasonable conclusion would be that the goal of providing a positive user experience has been satisfied. However, there is a slight possibility that the prototype will not meet these standards; it all depends on what one is comparing it to. Since the majority of the project's participants expressed negative feelings toward the existing website, positive emotions may have been exaggerated and developed in spite of the existing Studentportal. However, the results speak for themselves; they simply need to be correctly interpreted. The feeling of being overwhelmed was the only negative emotion experienced, and this by only one of the participants. A reasonable explanation for this is that any user requires time to become acquainted with the product, and thus this outlier may be viewed as carrying no weight.

Even if specific design principles are not directly related to emotions, there is a correlation between the two. In the final user test, when participants were asked to rate the prototype in terms of the five design principles, the total score was 22,2 out of 25. The score is high enough that one could conclude that it provides a positive user experience. Design principles and patterns are standardized to some extent for a reason; otherwise, they would not appear in most literature and online, implying that testing whether participants enjoy them may not be as necessary as one might think. It is a fine line in user experience whether world-wide known design principles should be determined by individuals with lesser knowledge or not. This is because user experience revolves around what the user thinks and expresses which is why it is an interesting topic to be discussed further in future projects.

According to the chart of system descriptive adjectives, all adjectives chosen by participants were positive. Words like "effective", "structured" and "understandable" indicate that the prototype was well-received by the participants, indicating that the project's goal was satisfied.

When the results of the first interviews, as described in Chapter 5.2, were compared to the results of the most recent user tests, there is a clear indication that the user experience has improved. However, as previously stated, even though there has been an improvement on paper, this could simply be due to a bias toward the already existing website. Some participants may prefer anything presented to them if it does not look anything like the current version. Nonetheless, progress is always welcome and the results may be viewed as a direction for future developments of the website.

### **9.3 Design Decisions to Ensure the Positive User Experience**

The majority of design decisions were made to support the goal of a positive user experience, with the exception of those made to account for external constraints such as time or the Figma memory limit. When discussing how to accomplish this, it became clear that there were three categories, aesthetics, usability and ease of use, that could be improved in order to increase user satisfaction. Aesthetics refers to how likeable or pleasing the overall design appears to the user when the contents are ignored. Usability refers to how useful something is to the user in terms of whether it helps them in any meaningful way. Ease of use refers to how effectively and effortlessly a user can interact with and accomplish tasks within the prototype.

#### **9.3.1 Aesthetics**

Aesthetics is difficult to implement because it is subjective, which means that there is no definitive way of making an aesthetically pleasing layout, it will always be more satisfying to some users and less to others. Since the goal of the project was to create a design that elicits a positive response from the users it was decided that eliminating a negative response was more important than creating a positive or neutral. This led to the decision of implementing the design choices that gave the most neutral response and opting away from designs that gave both positive and neutral reactions. An example of this is the decision of a color scheme where the two palettes, see Figure 11, had both very positive responses from some users and very negative responses from others. In this case it was decided that the bright blue color scheme that had less positive responses and more neutral, but no negative should be implemented.

#### **9.3.2 Usability**

Usability can also be challenging to implement, the reason being that the users of the Studentportal are varied in their needs and tendencies. For instance, a student in the first year of a Bachelor's program will likely not have a great interest in applying to a master program and the deadlines for said application. On the other hand, for a student in the third year of the same program, this information might be critical as well as very useful. This led to the design being implemented in a way that takes account for the needs of different students by assigning each student a login and a profile with a selected year and program so that the presented content will be tailored to fit the needs of each individual. This in turn helped with the implementation and improvement of the calendar function which was a table displaying upcoming events and deadlines for students. When discussing the current version of the Studentportal, interviewees reported feeling as if the

information presented there was irrelevant or uninteresting. In the new design it was decided that less information should be displayed to make it easier to absorb what is presented and also that it should only contain information that is deemed important, such as deadlines for exam registration or application for courses. Users in iteration two reported that this feature felt nicer and the information now felt relevant.

### **9.3.3 Ease of Use**

In the data gathering phase it was discovered that navigating and finding what the user is searching for was the biggest point of frustration in the current iteration of the Studentportal due to the fact that the website is required to contain all information that is needed or relevant for any student, without any filters it can become a daunting task to find specific content. Interviewees reported that this coupled with a disorganised structure on the website caused a feeling of being flooded with information and an inability to find anything relevant due to the extensive volume of content presented. The new design solves this through the use of the aforementioned profile and a revision and re-categorisation of all relevant content on the Studentportal. With the information about the most frequently used and visited parts of the current Studentportal and inquiries about the importance of different content during interviews, the group implemented most of these subsections with a new structure. In iteration two of the user tests the participants gave feedback about the new structure and reported feeling as if it was easier to navigate and find information compared to the old version.

## **9.4 Improvements**

There is no doubt that there will always be areas in every type of project that could be improved. There were two major areas of improvement that emerged in this project: first, the process of data collection and participant distribution, and second, what information should and should not be tested on said participants. Looking at the distribution of all data gathering, it is heavily dominated by software engineering students, which begs the question of whether focusing on individuals with greater knowledge of advanced topics will somehow disadvantage the general student with lesser knowledge.

### **9.4.1 Iteration Process**

The number of iterations created and the amount of work done in between each iteration could have been increased. Because there were only two iterations, the amount of feedback that could be accounted for and used to improve the product was limited, especially given that the final iteration was made near the end of the project. In future work, the group would recommend a third iteration to have more room for changes and reviewing. Fortunately, the feedback from the last round of user tests was positive and no major changes were required. However, if this had not been the case, it could have been difficult to implement improvements and adjust flaws in the final iteration due to time constraints.

### **9.4.2 Data Gathering**

The collection of data from individuals mainly consisted of a quantitative questionnaire and a more in depth interview. The common factor that stood out in both data gathering methods is that the

majority of the participants are Software engineering students. However, individuals studying some sort of Software engineering program or course, probably possesses deeper knowledge and experience of what lies beneath creating a well functioning website. When comparing results between Software engineering students and others there were no big outliers except for a specific question; The participants were asked if they knew where they could find information on the website regarding scholarships.

On the one hand, students with more experience with software technology may be able to express well-grounded opinions on various topics, such as why a design pattern works or does not work for different outcomes. On the other hand, there is concern that by doing so, the average everyday student may be unintentionally left out of the process. Every decision should take into account all students, not just those with a deeper understanding of the subject. It was not initially regarded as the most significant obstacle but it was taken into account in subsequent user tests to ensure greater overall inclusivity.

## 9.5 Obstacles

Like any project there has been a few obstacles along the way interfering with the workflow. To start off, there is an ongoing pandemic causing most physical meetings and testing to be online over video conferencing applications. A positive user experience becomes harder to get a grip on when performing user tests online, for instance observing simple gestures or voice changes. In contrast to the environmental obstacle that is Covid-19 there have been some technical issues as well. It has to do with the chosen web based prototyping tool concerning memory storage, causing information loss and hindrance in further prototyping development. Also the risk of abnormalities in testing begs the question what one should do when there are multiple outliers amongst the participants.

### 9.5.1 Covid-19

Due to the spread of Covid-19 it has been troublesome to physically test the prototype to its fullest potential. User testing and regular meetings have mostly been held over online desktop applications to decrease the risk of contracting the virus for everyone involved. One big advantage experienced with said method is the great accessibility to people wherever they might be, whether it is early in the morning or late at night. Individuals testing from home are subjected to a familiar environment, hopefully making them more comfortable with the situation. Some physical meetings can feel somewhat uptight or too formal if there is no personal bond and an effect of this on the participants could be a decrease of urge to express themselves.

Despite the ease of access and comfort for the individuals testing, there have been instances where the online environment has negatively impacted the participants, causing them to not speak their minds as much as expected. Online meetings do not involve any direct face-to-face interactions or physical contact. This may not be a problem in a regular meeting, but it is very different when it comes to interactive user testing. It is understandable that people may not be as enthusiastic when speaking to a computer screen rather than a human being.

From the inside, it has been more difficult to distinguish human emotions and body language on the screen, for example, if a person expresses high enthusiasm or interest through their way of speaking or with something more subtle, such as nodding their head. As a result, positive user

experiences are much more difficult to comprehend or perceive. This is why the majority of the user tests were designed in such a way that multiple sections dealt with concrete questions about the prototype as a whole, ensuring that no valuable information was lost.

In retrospect, there was not much that could have been done about the Covid-19 situation, but the way the interviews and user tests were conducted can be investigated. Overall, online user testing is an excellent short-term solution when physical meetings are not possible. However, in the future, physical user tests or a combination of both would be recommended to ensure insightful information in the field of user experience.

### 9.5.2 Figma Memory Alerts

After adapting to the new boundary, the effectiveness in the prototyping was no longer as high as intentionally planned. This led to the prototype not including all of the subpages as first intended. Only the most relevant and most viewed pages were kept, according to the statistics of the Studentportal provided from the stakeholders.

### 9.5.3 Human Factors in Testing

Because user experience is such a specific and advanced concept, one issue that occasionally emerges is when a user test participant has little to no knowledge of the principles they were asked to rate from 1 to 5 in the final user test. There was an underlying sense that some participants rambled just to get something written down on paper, which undermined the sole purpose of the test. It is thus difficult to determine where to draw the line between what is useful to users and what should be tested upon. There are steps that could have been taken, such as disregarding specific participant responses or having a large enough sample size to ensure that the outliers have a smaller impact on the results.

Furthermore, there is a slight risk that the people interviewed and tested upon, all have somewhat skewed opinions compared to the majority of the student population at Chalmers. Even though the risk is quite small, there is still a chance that this might be a possibility. Factors taken into consideration because of this was the number of people being interviewed. By having a higher number than usual when testing hopefully diminishes these risks to none. On top of this, the group had to make some decisions for the users based on their answers if the results felt off, compared to literature readings and prior interaction design experience. In future work the group would have liked to state at the beginning of the tests that if the participants feel like they do not have an opinion, it is perfectly fine to be silent or say that they want to be quiet.

## 9.6 Social-Ethical Aspects

Whether it is ethically right or wrong to change a website one has not been involved in creating is a question the group has asked themselves throughout the entire project. In the master thesis "*The author's right to respect - A study in its field of application*" [34] written by Annette Österlund, 2013, for the Department of Law at Stockholm University, the right to creative respect is discussed. The right to respect means that an originator has the right to his literary or artistic reputation and therefore one must not change his work in any way that may violate the originator's reputation or character. As the Studentportal is a website for students and the intention of this project is only to

improve it, it is not intended to be disrespectful to the creators of the Chalmers Studentportal. To avoid any kind of violation or possible problems mentioned above, the stakeholders were contacted early in the process.

As mentioned in Chapter 5.4, the project was a cooperative process involving the creative team responsible for the current Studentportal. To resolve any issues revolving copyright regarding pictures on the website, the Studentportal team kindly provided pictures which were rightly theirs, making it a non-issue.

### **9.6.1 Web Accessibility Directive**

Regarding the Web Accessibility Directive, it is worth mentioning that Chalmers University of Technology is an institute and that the law therefore does not apply to the university [35]. However, since the law was founded with the intent of inclusiveness, the group wanted to keep the directives in mind when creating the prototype.

By the usage of well known design patterns three of the four accessibility principles have been kept in mind, Perceivable, Operable and Understandable. The Robust principle has not, because of the prototype only existing in Figma and not on various platforms. Some examples of following the principles in the finished prototype is the color scheme, where the text does not rely on the colored background, focus has been on making navigation easy for users and to be able to go back if wished. Lastly the prototype works and it is considered to be operable.

## 10 Conclusion

Throughout the project the main goal has been centered around creating a user friendly prototype to provide a positive user experience. By involving the intended user group early and constantly the hope was to create a prototype that was well adjusted and evoked only positive emotions.

By looking at the results, specifically comparing the first interview on the current Studentportal to the last user test on the prototype, one can conclude that the design does give the users a positive experience. The usage of emotional charts when performing user tests have been of great use in order to provide a measurement of whether the participants' perception of the prototype was positive or not. This is especially true when constructing multiple iterations which makes comparison of results possible. Therefore the purpose of the project could be seen as fulfilled.

As mentioned in the discussion, some of the positive results might have been biased due to students comparing the new design to the old one which might lead to a perceived greater user experience. If the design was to be introduced to someone with no prior experience with the Studentportal their impression might differ. The use of a third iteration could have been promising in order to receive more feedback from user tests.

Finally, the stakeholders mentioned that work on a new Studentportal will be starting soon since the framework that the current version is built upon will no longer be supported. By giving the stakeholders access to the final prototype, and report, there is chance that it would help in the creation of the new Studentportal. In this case, the authors of this project future work may simply be to assist of some sort in the realisation of the new Studentportal.

## References

- [1] Pieter M.A. Desmet. “Positive Design”. In: *TU Delft Faculty of Industrial Design Engineering* (2013), p. 17. DOI: <https://repository.tudelft.nl/islandora/object/uuid:06ec60ac-0363-43ea-9ccd-8426ef0d6b64/datastream/OBJ/download>.
- [2] Chalmers University of Technology. *Studentportalen - Chalmers tekniska högskola*. URL: <https://student.portal.chalmers.se/sv/Sidor/default.aspx>. (accessed: 02.09.2021).
- [3] Per A. Jonasson, Morten Fjeld, and Aiko Yamashita. “Expert Habits vs. UI Improvements: Re-Design of a Room Booking System”. In: *Proceedings of the 21st British HCI Group Annual Conference on HCI* (2007). URL: <https://dl.acm.org/doi/10.5555/1531407.1531421>.
- [4] Linnea Fritz, Victor Karlsson, and Johan Høglund et al. “Kundens vilja - programmerarens lag? Om beställning och utveckling av Chalmers studentportal”. In: *Examensarbeten för kandidatexamen // Bachelor Theses* (2012), p. 75. URL: <https://odr.chalmers.se/handle/20.500.12380/159922?mode=full>.
- [5] Stefano Triberti, Alice Chirico, and Gemma La Rocca et al. “Developing Emotional Design: Emotions as Cognitive Processes and their Role in the Design of Interactive Technologies”. In: *Frontiers in Psychology* (2017), pp. -. URL: <https://www.frontiersin.org/articles/10.3389/fpsyg.2017.01773/full>.
- [6] *Wireframes — Konigi*. -. URL: [https://www.interaction-design.org/don\\_norman](https://www.interaction-design.org/don_norman).
- [7] Ergonomics of human-system interaction — Part 210: ISO 9241-210:2019. *Human-centred design for interactive systems, ISO, 7 2019*. URL: <https://www.iso.org/standard/77520.html>.
- [8] Norman D. A. *The invisible computer: Why good products can fail, the personal computer is so complex, and information appliances are the solution*. -. MIT Press, 1998. ISBN: 0262640414.
- [9] Ergonomics of human-system interaction — Part 210: ISO 9241-210:2010. *Human-centred design for interactive systems, ISO, 03 2010*. URL: <https://www.iso.org/standard/52075.html>.
- [10] Katharina Zeiner, Michael Burmester, Kristin Haasler, Julian Henschel et al. “Designing for Positive User Experience in Work Contexts: Experience Categories and their Applications”. In: *Human Technology* 14.2 (2018), pp. 140–175. URL: <https://doi.org/10.17011/ht/urn.201808103815>.
- [11] Provost G. “The Dimensions of Positive and Negative User Experiences with Interactive Products.” In: *Design, User Experience, and Usability. Design Philosophy, Methods, and Tools*, 13.1 (2013), pp. 399–408. URL: [https://doi.org/10.1007/978-3-642-39229-0\\_43](https://doi.org/10.1007/978-3-642-39229-0_43).
- [12] Kai Ludwigs and Stephan Erdtmann. “The Happiness Analyzer – Developing a New Technique for Measuring Subjective Well-Being.” In: *International Journal of Community Well-Being*, 1.2 (2018), pp. 101–114. URL: <https://doi.org/10.1007/s42413-018-0011-3>.
- [13] Burns R. “Psychosocial Well-being. Encyclopedia of Geropsychology, 1-8”. In: *Pachana N. (eds) Encyclopedia of Geropsychology. Springer, Singapore*. (2016). URL: [https://doi.org/10.1007/978-981-287-080-3\\_251-1](https://doi.org/10.1007/978-981-287-080-3_251-1).
- [14] Miller L. “*The Fundamental Concepts of Good UX*. 2016. URL: <https://usabilla.com/blog/fundamental-concepts-ux/>.

- [15] Kalvāns Ē. “Factors of Psychological Well-being and Models of ideal and real Psychological Well-being, the SOCIETY, INTEGRATION, EDUCATION. *Proceedings of the International Scientific Conference, 2, 120*. 2015. URL: <https://doi.org/10.17770/sie2012vol12.90>.
- [16] Helen Sharp, Yvonne Rogers, and Jennifer Preece. *Interaction Design - Beyond human-computer interaction*. 5th Edition. John Wiley Sons, Inc, 2019. ISBN: 9781119547259.
- [17] Jenifer Tidwell. *Designing Interfaces*. 2nd Edition. O’Reilly Media, Inc, 2011. ISBN: 9781449379704.
- [18] Jenifer Tidwell, Charles Brewer, and Aynne Valecia. *Designing Interfaces*. 3rd Edition. O’Reilly Media, Inc, 2020. ISBN: 9781492051961.
- [19] I. Lesay and M. Schulz. “Genomförande av webbtillgänglighetsdirektivet”. In: *Regeringskansliet Finansdepartementet* (2017), p. 188. URL: <https://www.regeringen.se/4adfa/contentassets/0de1964e621246d69b426d0b7befcd54/genomforande-av-webbtillganglighetsdirektivet-ds-201760-.pdf>.
- [20] European Commission. *Web Accessibility*. 2021. URL: <https://digital-strategy.ec.europa.eu/en/policies/web-accessibility>. (accessed: 20.04.2021).
- [21] European Commission. *Accessibility of the Europarl website*. unknown. URL: <https://www.europarl.europa.eu/portal/en/accessibility>. (accessed: 21.04.2021).
- [22] Hampus Sethfors. “Web Accessibility Directive – What it is and how to comply”. In: *Axess Lab* (2017), online. URL: <https://axesslab.com/web-accessibility-directive/>.
- [23] Jenny Preece, Yvonne Rogers, and Helen Sharp. “Interaktionsdesign: bortom människa-dator-interaktion.” In: (*Uppl. 1:1*). Lund: Studentlitteratur. (2016). URL: <https://biblioteket.stockholm.se/titel/1036449>.
- [24] Safa Khudeira. *How to Use Personas in Customer-Centric Web Design*. URL: <https://www.intechnic.com/blog/how-to-use-personas-in-customer-centric-web-design/>.
- [25] John Spacey. *9 types of Design Constraints*. 2017. URL: <https://simplicable.com/new/design-constraints>.
- [26] Jennifer Leigh Brown. *Build Better Requirements Documentation: Why, Who, and How*. 2018. URL: <https://www.uxbooth.com/articles/build-better-requirements-documentation-why-who-and-how/>.
- [27] Kassab M. *The changing landscape of requirements engineering practices over the past decade. EmpiRE15 in conjunction with the 23rd IEEE International Requirements Engineering Conference At: Ottawa, Canada*. 2015. URL: <https://doi.org/10.1109/empire.2015.7431299>. (accessed: 20.04.2021).
- [28] Garm Lucassen et al. “The Use and Effectiveness of User Stories in Practice.” In: *Requirements Engineering: Foundation for Software Quality* (2016), pp. 205–222. URL: [https://doi.org/10.1007/978-3-319-30282-9\\_14](https://doi.org/10.1007/978-3-319-30282-9_14).
- [29] Nick Babich. *What is Rapid Prototyping?* 2019. URL: <https://xd.adobe.com/ideas/process/prototyping/rapid-prototyping-efficient-way-communicate-ideas/#:~:text=Rapid%5C%20prototyping%5C%20is%5C%20an%5C%20iterative,%5C%2C%5C%20reviewing%5C%2C%5C%20and%5C%20refinement%5C%20stages>.
- [30] Amy M.Gill and Blair Nonnecke. “Think aloud: effects and validity.” In: *Proceedings of the 30th ACM international conference on Design of communication*. (2012), pp. 31–36. URL: <https://doi.org/10.1145/2379057.2379065>.

- [31] JungKyoon Yoon, Anna E. Pohlmeier, and Chajoong Kim et al. “Designing for Positive Emotions: Issues and Emerging Research Directions”. In: *The Design Journal - An International Journal for All Aspects of Design* 21.1 (2020), p. 21. DOI: 10.1080/14606925.2020.1845434.
- [32] Jakob Nielsen. *Thinking Aloud: The 1 Usability Tool*. URL: <https://www.nngroup.com/articles/thinking-aloud-the-1-usability-tool/>. (accessed: 03.10.2021).
- [33] Figma support. *Reduce memory usage in files*. URL: <https://help.figma.com/hc/en-us/articles/360040528173-Reduce-memory-usage-in-files#alerts>. (accessed: 20.04.2021).
- [34] Annette Österlund. “Upphovsmannens respekträtt – En studie i dess tillämpningsområde”. In: *Examensarbete för Juridiska institutionen för Stockholms Universitet*. 32.1 (2013), p. 32. DOI: <https://www.diva-portal.org/smash/get/diva2:662655/FULLTEXT01.pdf>.
- [35] Chalmers - author not stated. *Om Chalmersstiftelsen*. 2019. URL: <https://www.chalmers.se/sv/stiftelse/om-stiftelsen/Sidor/default.aspx>. (accessed: 21.04.2021).

## A Questionnaire

An extract of questions and answers from the questionnaire is shown together with some of the answers to the optional question "Do you have any more thoughts about Chalmers Student Portal?". As with the user tests and interviews, the questionnaire was made anonymous.

How often do you use Chalmers Student Portal?

107 svar

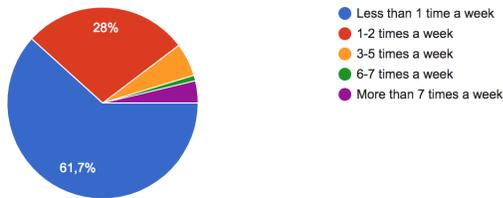


Figure 18: Shows the responses of a question from the questionnaire

Where do you get most of your information about your studies?

107 svar

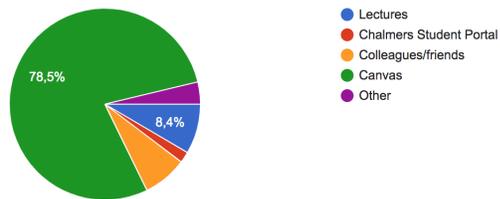


Figure 19: The responses of a question from the questionnaire

... navigation. How easily can you find what you are looking for?

107 svar

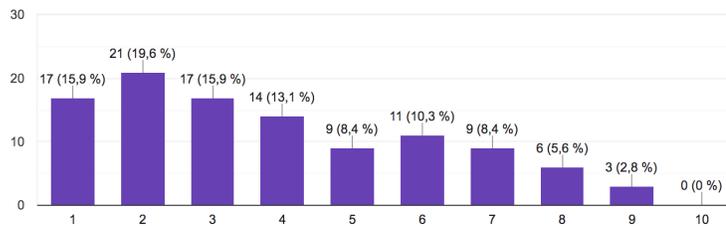


Figure 20: The responses of a question from the questionnaire

How would you rate this page in terms of...

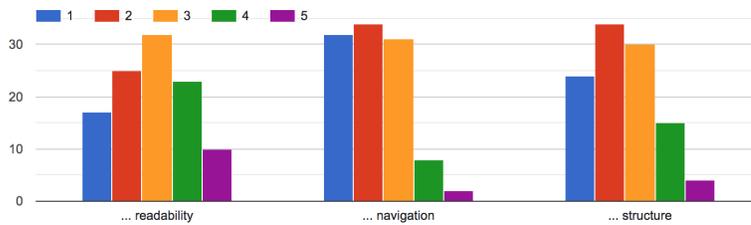


Figure 21: *The responses of a question from the questionnaire*

Someone asked you to find information about "Scholarships". Would you know where to start looking?

107 svar

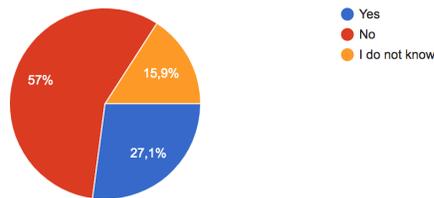


Figure 22: *The responses of a question from the questionnaire*

### Thoughts about Chalmers' Studentportal

- "The website is frustrating to use. I feel like I don't find what I'm looking for. It makes me feel exhausted...."
- "Okay website, hard to navigate"
- "I honestly do not know who it is for, since it is obviously not made for students."
- "Text can be good for clarity's sake, when icons don't suffice. But with the current design the overwhelming walls of text only seem to obscure the original intention of the website..."
- "Without the search function it would be impossible to use."
- "Usually you find what you want, but it takes time"
- "I use the Student Portal the same way I do any website. If I want to look for e.g. "Scholarships", I will not try to navigate the web page. Instead, I will simply search "Chalmers Scholarships" on Google and then instantly find what I am looking for. Domain navigation requires visual interpretation of an interface = excise. Google = pure flow."

## B Interview

The questions asked in the first interview regarding the existing Studentportal. All participants gave permission for the data gathered to be used in the project and they were informed that it would be anonymous. In total, 11 people were interviewed.

### INLEDANDE FRÅGOR

- Vad tycker du är viktigt för att få en bra användarupplevelse?
- Hur påverkar en bra respektive dålig användarupplevelse dig?
- Vad använder du Studentportalen till?
- Tycker du att hemsidan uppfyller sitt syfte? Förklara varför/varför inte?
- Kan du nämna saker du använt studentportalen till det senaste året?
- Vad tror du att den allmänna uppfattningen om hemsidan är? Håller du med om den?
- Hur väl uppfyller hemsidan ditt behov? Vad har du för behov?
- Hur väl tror du att den uppfyller användarnas behov?
- Vad är ditt allmänna intryck nuvarande studentportal? (hemsidan visas för testpersonen)
- Vad känner du nu när du ser framsidan?

### TESTER

- TEST 1 - Kan du hitta vilka datum tentamen perioden är för läsperiod 4 vårterminen 2021? Prata högt allt du tänker och förklara hur du går tillväga? Vilka känslor känner du? Vad tycker du generellt?
- TEST 2 - Hitta kontaktuppgifter till din sektionens studievägledare. Prata högt allt du tänker och förklara hur du går tillväga? Vilka känslor känner du? Vad tycker du generellt?
- TEST 3 - Kan du hitta vilka kurser du har som obligatoriska detta året? Prata högt allt du tänker och förklara hur du går tillväga? Vilka känslor känner du? Vad tycker du generellt?

### AVLSUTANDE FRÅGOR

- Vad är ditt allmänna intryck av hemsidan efter testerna?
- Har ditt allmänna intryck ändrats, isåfall på vilket sätt?
- Beskriv positiva och negativa känslor som du upplevde under testerna.
- Mer konkret, vad tycker du va bra respektive dåligt med hemsidan? Kan du ge exempel?

## C Paper Prototypes Frontpage

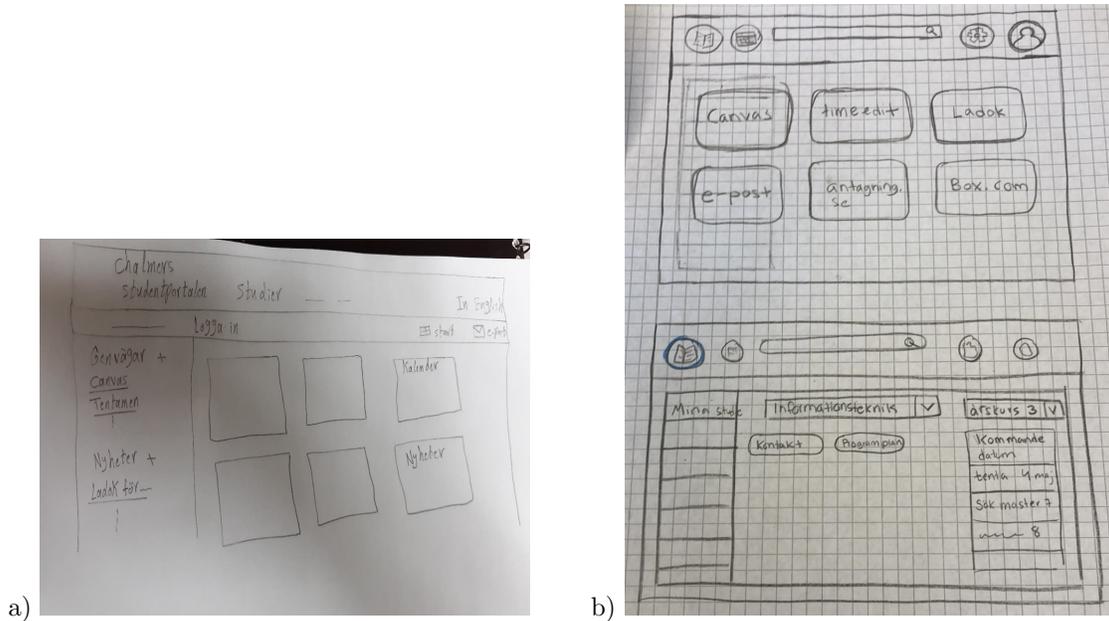


Figure 23: Homepage ideas for a new Studentportal in both Figure a) and Figure b).

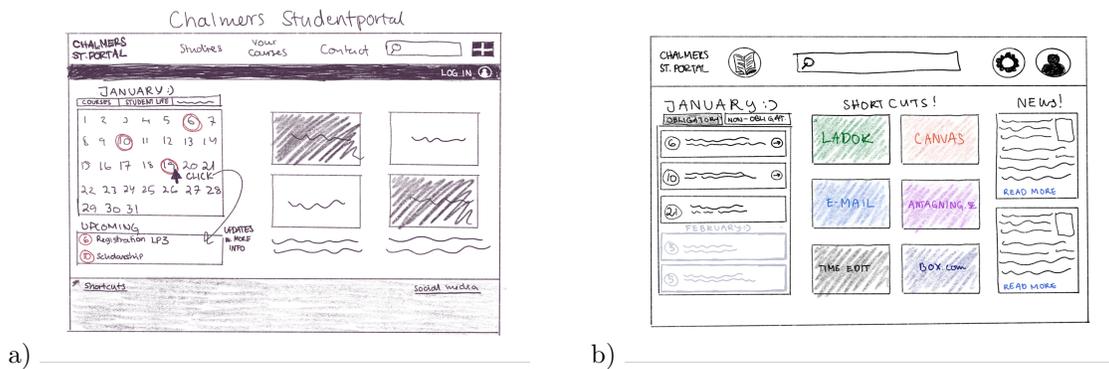


Figure 24: Homepage ideas for a new Studentportal with clear visuals in both Figure a) and Figure b).

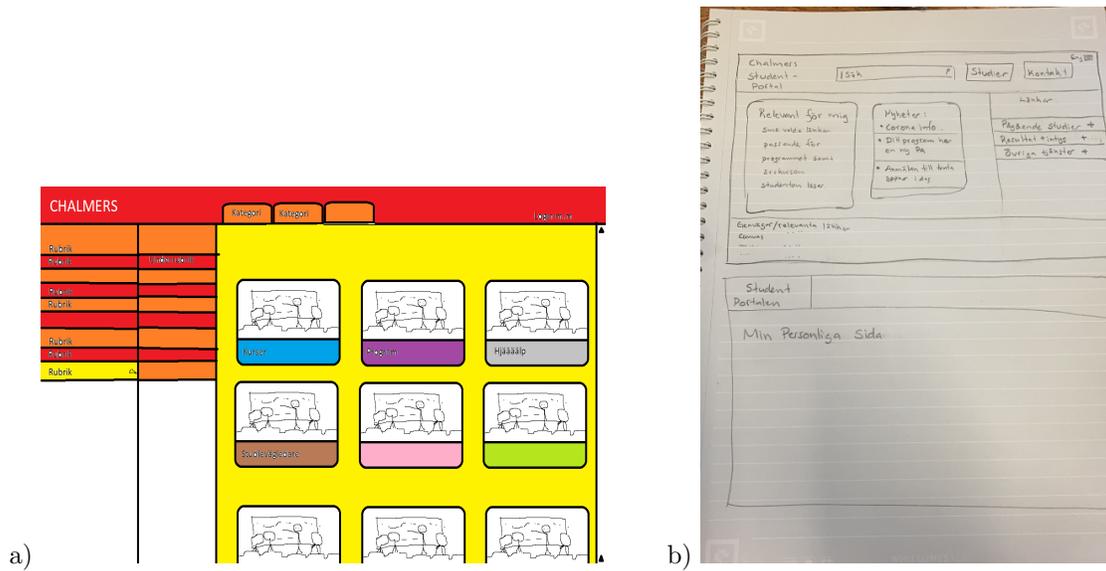


Figure 25: Homepage ideas for a new Studentportal, where Figure a) is colored and Figure b) is drawn with a regular pen.

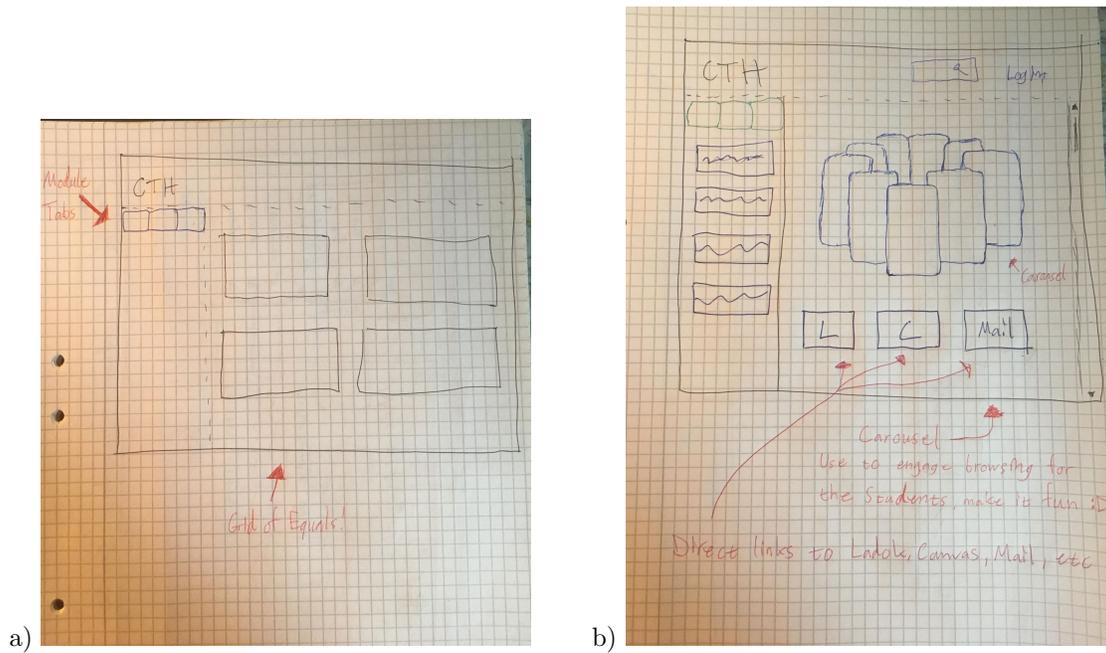


Figure 26: Homepage ideas for a new Studentportal, where the design patterns have been indicated in both Figure a) and Figure b).

## D Figma Prototypes Frontpage



Figure 27: Homepage ideas for a new Studentportal constructed in Figma. Figure a) promotes a dark theme as well as a grid system and Figure b) represents a more extensive frontpage with multiple interactive elements.

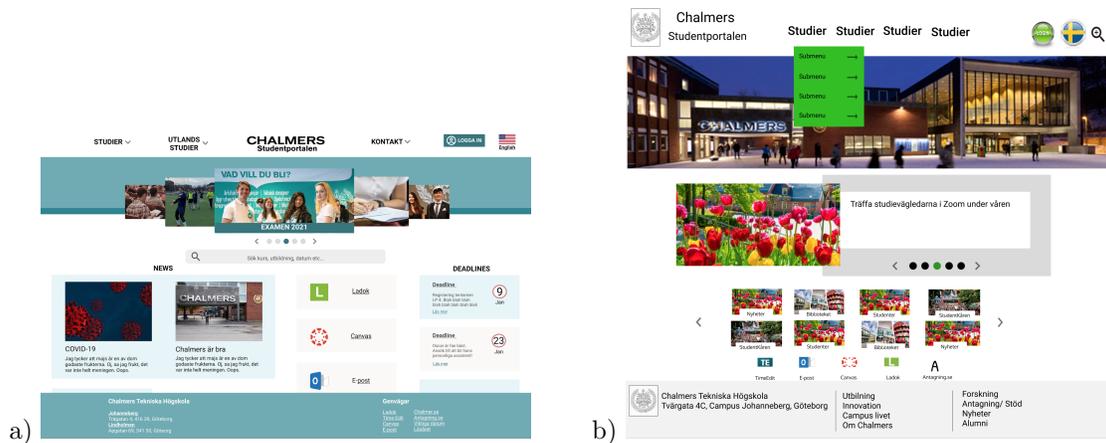
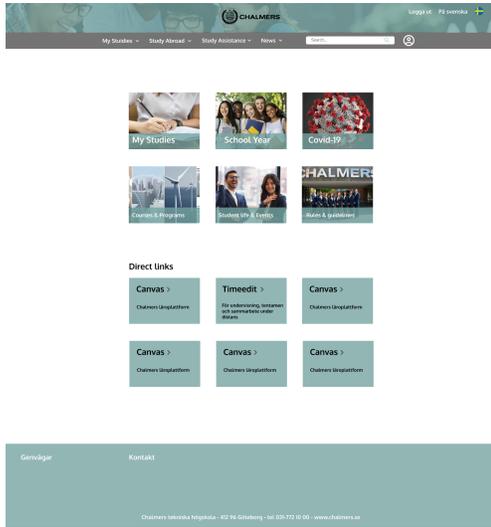
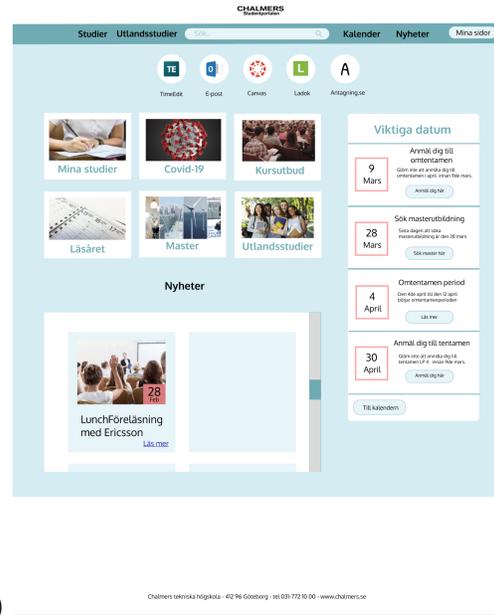


Figure 28: Homepage ideas for a new Studentportal constructed in Figma. Figure a) promotes a carousel pattern and direct links while Figure b) has more focus on the menu items as well as the grid elements.



a)



b)

Figure 29: Homepage ideas for a new Studentportal constructed in Figma. Figure a) utilizes the thumbnail grid system while Figure b) especially promotes direct links, news and important dates.

## E Emotion Chart

### Positiva Känslor

Sympatisk	Respekt	Snällhet	Lust
Kärlek	Beundrande	Dyrkan	Önskan
Lättnad	Drömmig	Avslappnad	Förhoppningsfull
Eufori	Glädje	Nöjd	Självsäker
Förtrollad	Stolt	Inspirerad	Fascinerad
Modig	Tillfredsställd	Energifylld	Överraskad
Munter	Ivrig	Lycka	Hämförd
Triumf	Hopp	Extas	Upprymd
Förtjusning	Skojig	Optimism	Entusiasm

### Negativa Känslor

Olust	Ilska	Bitter	Arg
Tjurig	Sorg	Irriterad	Depression
Motbjudande	Ångest	Hata	Besviken
Hopplöshet	Upprörd	Förvirrad	Paralyserad
Överväldigad	Smärta	Panik	Missnöjd
Ensamhet	Fruktan	Nervositet	Obehag

### System-beskrivande adjektiv

Ineffektiv	Intressant	Rolig	Förståelig
Effektiv	Ointressant	Tråkig	Förvirrande
Inkluderande	Inbjudande	Muntert	Lugnande
Icke-inkluderande	Frånstötande	Dystert	Stress givande
Lättanvändligt	Strukturerat/ Överskådligt	Snabbt	Användbart
Icke lättanvändligt	Rörigt	Tidskrävande	Oanvändbart

## F User stories

An extraction of all the user stories. Not all of the user stories are included because there are too many and they do not add any additional value. The ones presented are the most important and they are mixed as well.

- As a student I want specific information about my program and my year to be shown as a default so I don't get shown unnecessarily information that I don't care about.
- As a student I want an accordion in the menu so I don't get overwhelmed with too much information and can find the right page easier.
- As a student, I want to be able to reach Ladok from the Studentportal so that I can check my finished courses and my grades.
- As a student, I would like to be able to see what future courses I have so that I know what I will be studying.
- As a student, I want to be able to find information about mandatory/elective courses so that I can plan my curriculum to the best of my ability.
- As a student, I want hover tools so I know what's interactive.
- As a student, I want to be able to find contact information about people working at Chalmers so that I can send them any question that I may have.
- As a student, I want breadcrumbs so I don't get lost on the page.
- As a student I want a sitemap footer on all pages so I can find commonly used information quickly.
- As a student I would like to have a page with general information about examinations so I can read and be prepared for it.
- As a student I want a page where I can see the different Tracks courses so I can find one that might interest me.
- As a student I want a start page with the feature, search, and browse pattern so I find the page inviting and functional.
- As a student I want to have a search bar so I can find information even if I don't know how to navigate.
- As a student I want the deadlines that are soon happening to be shown on the first page so I don't miss them.
- As a student I want fatmenus so I can reach all pages no matter where I am in the site in one click.
- As a student I would like to find detailed information about the courses I can choose to take so that I can make an informed decision when choosing which course to take.
- As a student I want a search page so I can filter my searches and see the search results.