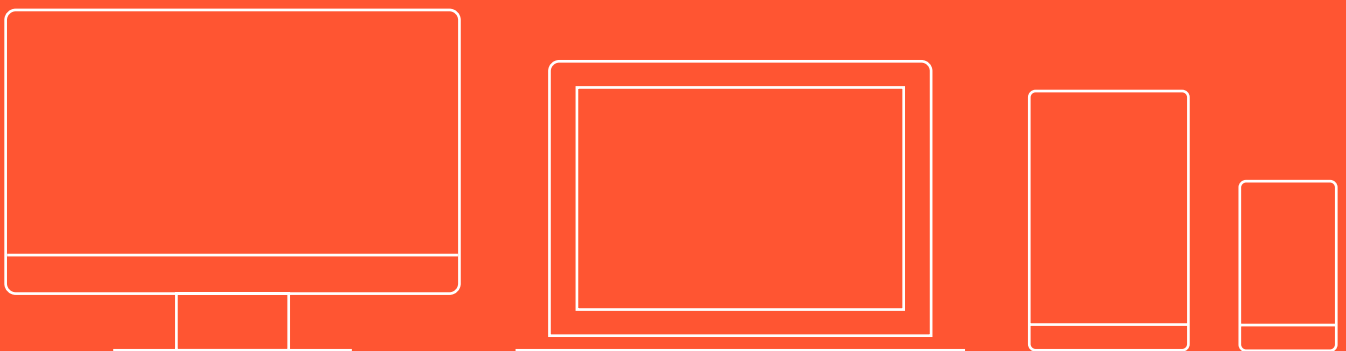# Sketchlab

Feasibility study and Interface design

Bachelor assignment

Kevin van der Ven

2016

Sketchlab

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Author
Kevin van der Ven
s10057078

Education
Kevin van der Ven
s10057078

Education
Industrial Design
University of Twente

Client
University of Twente
PO Box 217
7500 AE Enschede

Mentor CES/CELT
Karen Slotman

Mentor Design Sketching
Pepijn van Passel, Jeroen Beeloo

Examiner
Maarten Bonnema

PREFACE

In front of you is a report written as part of the bachelor assignment for the study Industrial Design at the University of Twente. The assignment has been executed in English as preferred by the client.

I approached the Design Sketching teachers when I first heard about the Sketchlab proposal. My love for interface design, my experience in web design, and my experience as a Design Sketching assistant made me immensely interested in the subject matter. I could never have imagined that I was able to play such a vital part in the design phase of Sketchlab. I am grateful that Pepijn van Passel en Jeroen Beeloo saw the value in my additions and expertise.

Postponing the bachelor assignment presentation, because of interfering schedules has given me the possibility to separate parts of the design phase from the main report, and display them as a separate design appendix.

I want to thank Pepijn van Passel, Jeroen Beeloo, and Karen Slotman in particular, for escorting me during the bachelor assignment.

I also want to thank Dennis Vierkant, Maaike Mulder-Nijkamp, and Charlotte Oude Alink for providing valuable information during the design process.

I hope to keep working on Sketchlab and see it through to completion.

Enschede, 2016,
Kevin van der Ven

SAMENVATTING

Dit verslag is gemaakt in het kader van de bachelor eindopdracht, voor de studie Industrieel ontwerpen aan de Universiteit Twente. De opdracht betreft het ontwerpen van een haalbare interface voor Sketchlab, een digitaal platform voor het leren van schetsvaardigheden voor ingenieurs.

De eerste stap in het ontwerpproces is een uitgebreide analysefase. In het eerste onderzoek zijn de belanghebbenden en doelgroep geanalyseerd. De doelgroep bestaat uit studenten en docenten die behoefte hebben aan een digitaal platform dat het tekenonderwijs verbetert door inzicht te geven, werklast te verminderen en schetsonderwijs open in plaats en tijd te maken.

Het tweede onderzoek betreft een analyse naar de beoogde functionaliteit. Deze functionaliteit is direct gebaseerd op de behoeftes en wensen van de gebruikers en levert een eerste inzicht in de structuur van Sketchlab.

Er is verder onderzoek gedaan naar de haalbaarheid van het platform. Door middel van een vergelijkingsanalyse is bepaald dat Sketchlab bij voorkeur als een web applicatie moet worden uitgewerkt. Door het combineren van een backend frameworks en verscheidene APIs is het mogelijk om in een korte tijd een werkend platform met specifieke functionaliteit te realiseren. Dit platform is volledig onder de controle van de universiteit en kan op die manier de juiste media distributierechten en gepaste omgang met vertrouwelijke informatie waarborgen.

Door tijdens de ontwikkeling van de pilot overbodige functionaliteit weg te laten is het mogelijk om een groot gedeelte van het budget aan de programmeurs te spenderen. Echter, studenten onder de begeleiding van een senior programmeur zullen worden ingezet om ook hier de kosten laag te houden. Door het gebruik van onervaren programmeurs zal ontwikkelen van het platform meer tijd kosten. Een traditionele ontwikkelingsmethode, met als doel werkende prototypes die getest kunnen worden opleveren, zal als leidraad dienen.

Als laatste deel van de ontdekkingsfase is er een onderzoek gedaan naar gebruikers interfaces, in specifiek social media apps en e-learning platforms. Aan de hand van enkele UX en lesgeef heuristieken is vervolgens bepaald hoe de interface zich moet gedragen om op een optimale manier informatie aan te bieden, gebruikers te motiveren en communicatie moet bevorderen.

Bij de ontwerpfase is er onder andere rekening gehouden met plaatsing, kleur, grootte, en complexiteit van de interface. Een indeling gebaseerd op het programma van eisen en een uitgebreide ontwerpfase zijn uiteindelijk uitgemond in een viertal concepten die. De concepten zijn na uitgebreid overleg samengevoegd met nieuwe inzichten tot één eindontwerp.

Het resultaat betreft een werkende interface voor een adaptieve web applicatie genaamd Sketchlab. De web app is opgedeeld in een hoofdpagina een persoonlijke pagina en een les materiaal overzicht, die voldoet aan alle vooraf gestelde eisen.

SUMMARY

This report has been made as part of the bachelor assignment of the study Industrial Design at the University of Twente. The assignment includes designing an interface for Sketchlab a platform to learn to sketch to engineers.

The design process started with an extensive analysis phase. The first research was done on the stakeholders and the target group. The target group consists out of students and teachers that need a digital sketching platform that improves design education, lessens the workload, and makes sketching open in time and place.

The second Analysis was used to determine the goals of the platform, and to turn them into a functionality overview that can be used to define Sketchlab features and structure.

During the feasibility study, it was concluded that, to reach the user set goals in the best way possible Sketchlab needs to be a web application. A first functional prototype can easily be achieved by combining backend frameworks and several APIs. A custom solution can be controlled by the University of Twente. This way proper media distribution rights and correct usage of confidential information can be guaranteed.

By focussing on vital functionality during the development of the platform, a large part of the budget can be redistributed to the programmers. However, junior programmers (university students) will be used under the guidance of a senior developer to program the platform. This will keep the cost low but will demand more time. A traditional, incremental development method will be used to create prototypes that can be tested.

The last part of the discovery phase included research on user experience and user interface design. By using UX and GUI principles combined with the information gained from the research on social media apps and e-learning platforms a general design direction was created. The design direction focusses on the optimal ways to provide information, motivate users, and promote user communication.

During the design phase took elements placement, color, size and the complexity of features amongst other things into account. A structure based on the program of requirements and a comprehensive design phase culminated into four concepts. After deliberate discussing with the client and the target group all the concepts were combined into one final concept.

The final result of the bachelor assignment is a working interface. The interface is divided into a landing page, a personal page and a course material overview that accomplish all the predetermined goals.

TABLE OF CONTENTS

The report covers a variety of subjects that have been researched throughout the bachelor assignment.

The bachelor assignment has been structured to provide a comprehensible report to the reader, even though the design phase and the analysis phase proceeded simultaneously.

Instead of creating a glossary, short recaps of subjects can be found throughout the report to explain terminology before it is used. Explanatory images and summaries are used to clarify and complement information heavy text.

The assignment description starts with the analysis phase in chapters 2 and 3. This research results in a program of requirements and design heuristics that are recapped in chapter 4 and serves as a foundation for the design phase.

The design phase in chapter 5 will explain the process behind the concepts and concept choices. The concepts are combined into a final concept.

he final part of the design phase is described in chapter 6 chapter. Chapter 6 will show an overview of the results and provide a link to the completed interface.

The last chapter will conclude the bachelor assignment by giving a short overview of all the results and by recommending next steps and solutions to problems that have not been solved yet.

1

1.1
INTRODUCTION

This report includes research on feasibility and usability, a design process and a completed concept paired with development schematics. The development of Sketchlab was done for the University of Twente as part of a bachelor assignment. It will be used as a pedestal for the rest of the platform, and it is a fundamental tool for the development process.

1.1.1 The Client

The University of Twente, UT for short, is a university located in Enschede, the Netherlands. The university was founded in 1961 and it was the third higher vocational institute of technology in the Netherlands to become a university. The Dutch government decided to locate the institute in Enschede, the main city of Twente, because of its rich industrial history and to provide the local economy a boost to compensate for the dwindling textile industry. To this day the university provides economic and social contributions to the region, which adheres to the entrepreneurial spirit of the university.

The University of Twente offers a broad selection of research and degree programs in the social sciences, behavioral sciences and engineering. There are five faculties at the university that in turn are organized into several departments.

The bachelor assignment was provided by the faculty CTW (Constructive Technical Sciences), in particular the design sketching department [1].

1.1.2 TEM

All bachelor programs at the University of Twente are designed according to The Twente Educational Model (TEM). TEM can be described by five pillars:

Modular education, Project-based work, Personal responsibility, Students learn together and Quick and correct fit.

TEM focusses on Student-driven learning. With student-driven learning, the student can take control of their activities and pace. Teachers provide feedback on the result and the learning process and encourage the students to gain new experience and explore unknown subjects [2].

1.1.3 Problem Context

One might suspect that, with upcoming advanced visualization and communication methods like wireframe tools and 3d-computergraphics, sketching skills are falling out of favor, but nothing is less true. Designers have always used sketching as an important tool in the design process, and it is still one of the most important skills in a designer's 'toolbox' according to Roller [3]. Sketching in the design context is often not a goal in itself, it can be considered as either a visualization or communication tool, and it plays an important role in the solution seeking process. According to Baskinger sketching is an increasingly sought after competence because of the diminishing amount of qualified designers.

Both the accumulated complexity of the design sketching courses and the diminishing teaching budgets contribute to the increasing importance of efficiency in education. It is important to educate students in such a matter that their skills also grow efficiently.

The growth in design skills depends on several factors, which can be influenced directly during the course, and the current way of teaching retains some of the most common issues that uphold low motivation amongst students according to Witteveen [4].

1.1.4 Purpose of Sketchlab

It is possible to provide a pragmatic teaching and learning solution by combining an e-learning environment, where students can learn basic sketching rules through both theoretical and practical examples at their pace, with a communicative environment that increases the interaction between students, teachers, and teaching-assistants. This platform will put more focus on the development of self-confidence during the practical design courses and increases the potency of the platform.

The main purpose of the platform is to improve both the expediency and the quality of the design sketching education by providing a digital tool or platform that complements or replaces the status quo. Thus, the platform will be used to abridge design sketching education, encompass the students current perceptions and to provide teachers with a tool that can be used to make the design education immersive, more attractive and more efficient.

1.1.5 Purpose of the Assignment

At the incipience of Sketchlab more research needs to be done before the development of the platform and the production of the content could commence. The client, partly due to the insistence of SURF, wishes for a feasibility study on Sketchlab and an exploration of alternative platforms and tools. Particularly tools and platforms that focus on uploading and maintaining content, giving peer feedback, and monitoring participants are to be included in the study [5]. The research will provide a pedestal on which the platform can be built.

The client also wishes for a structured, visual interface which can and will be used as a usability research tool, as a blueprint for the platform, and as a communication tool between all the involved parties.

Methods and Procedures

The feasibility study will be done by analyzing the users and usability, by doing a literature review to analyze the preferred and needed functionality, by exploring and explaining alternatives and competitors, and by looking into development strategies and ICT management techniques. The analysis of these subjects will result in a program of requirements that is used with the design and development of the platform.

The design results will be presented as an interactive model and as several flowcharts that will aid in the user research phase and development phase.

Conclusions and suggestions are obtained by research data analysis and research results generalization.

In this chapter, the consecutive parts of the feasibility study and the theoretical foundation for the design phase will be discussed and explained. The acquired information from several analyses will be used as the base for the recommendations and as a starting point for the user experience and graphic user interface design.

The first study is a user analysis. The user analysis is used to determine characteristics of primary and secondary users that will influence or shape the design process of the interface. This information can then be used to form use cases based upon workflow tasks and are thus vital to the composition of the software documentation.

The second study is a functionality analysis. In this analysis, the goals of the platform, set by CTW, CES/CELT and SURF, and the needs of the users will be transformed into functions that can, in turn, be used for the design and development phase.

The third study is a comparative study that researches and compares tools and platforms that are able to provide the functionality needed for Sketchlab. This analysis provides the foundation for the feasibility study.

The final study includes a summation of the cost and quality calculations concerning digital product development and recommendations based on the previous analyses and several ICT management techniques.

2

2.1
USER ANALYSIS

The platform is based on the user-centered design framework (UCD). This philosophy tries to optimize the product around the needs, wants and limitations of the end users (target group), rather than forcing the users to change their behavior.
　　　The platform requirements will be based on the functionality which in turn is based on the 'wants' and 'needs' of the trivial users.

2.1.1 Target group

The target audience for Sketchlab consists of anyone that wants to be acquainted with design sketching, and in particular engineers from the University of Twente.The target group can be divided into two primary users, the teacher and the student. Sketchlab has to provide an appropriate solution for both groups.

　　　The student group can be divided into several smaller factions. There are the students that currently attend design education at the 'University of Twente', students that attend design education at another university, university students that don't attend design education, and people without university affiliations and prior design education. According to the Sketchlab proposal, the focus group for the pilot will be first-year students of Creative Technology at the University of Twente. These students can be considered as one of the primary users of the platform when creating the first concept.

　　　The teachers could be anyone with design sketching teaching experience. However, for the pilot the current teachers of the design sketching courses that are affiliated with the University of Twente can be considered as part of the main target group.

2.1.2 Stakeholders

The term stakeholder has been broadened to include anyone who has an interest in the subject matter and without whose support the platform would cease to exist. This paragraph will give a general description of the important stakeholders.

Design sketching department

The design sketching department at the University of Twente conceptualized the first concept of Sketchlab and feels the need for a new platform that relates to the TEM, provides engineers with better Sketching education, and makes design sketching less teacher dependent. The design sketching department co-created the Sketchlab proposal with CES/CELT.

CES/CELT

Both CES (Centre for Educational Support) and CELT (Centre of Expertise in Learning and Teaching) of the University of Twente helped with the creation of the Sketchlab proposal and are thus intertwined with the subject matter. They provide information on several educational aspects concerning the platform and wish for educational improvements in digital design education.

SURF

SURF is a collaborative information technology organization for higher education and research in the Netherlands. Surf offers students, lecturers, and scientists access to internet and ICT facilities. The SURF holding serves as a platform where organizations work together to develop ICT innovations that are of strategic importance in the field of ICT, education, and research.

　　　SURF honored the Sketchlab project proposal and provided a subsidy for the project on several conditions. They advise looking at alternative solutions and platforms that focus on peer-feedback and monitoring because an existing platform might make the chance for adoption bigger.

Platform Users

The actual users of the design sketching platform will not just be the primary users. When making a product there will always be secondary and even tertiary users you need to cater to. Below you will see a list of all the users that are important to keep in mind throughout the several stages of the design process.

Student

The student is one of the main users of the platform. The focus group for the pilot will be first-year Creative Technology students at the University of Twente. The student has an average age of 18-22 years and is used to current technology.

　　　The student is an avid user of information and communication platforms and can quickly adapt to new platforms. They have little to no design sketching experience and are taking the course as an obligated part of the curriculum.

Stakeholders
Important users, contributers and shareholders of Sketchlab.

Client
One of the the most important stakeholders is the client. The client includes teachers from Industrial Design Sketching and researchers from CES/CELT.

Sponsor
SURF provides a substantial amount of the development cost. CES/CELT acts as their direct representative.

Target group
The target group includes Design Sketching students and teachers. They are intended to ultimately use the product routinely.

Primary Users
The target group belongs to the primary users, or the users that directly interact with the system. Other primary users are super-users, programmers and moderators. Different roles can overlap.

Secondary Users
Important secondary users of Sketchlab are users that don't interact with the platform directly but are still affected by it. Both the hosting company and the administrator are important secondary users.

fig 01. Stakeholder engagement [6]

Teacher

The teacher is a main user of Sketchlab. The focus group for the pilot will be teachers that are currently lecturing students in Design Sketching at the University of Twente.

The teacher is approximately 30-40 years old and grew up with computers. The teacher can adapt to new digital tools and platforms even though he or she is less used to the social media paradigm than the next generation.

Student assistant

The student assistant is a student at the University of Twente that has shown excellence in the design sketching subject matter. He or she now works as a teacher assistant and helps other students with any questions they might have about sketching.

The student assistants that will be used in the pilot have completed the first year of industrial design or creative technology. In the future a design sketching expert might be used to provide feedback.
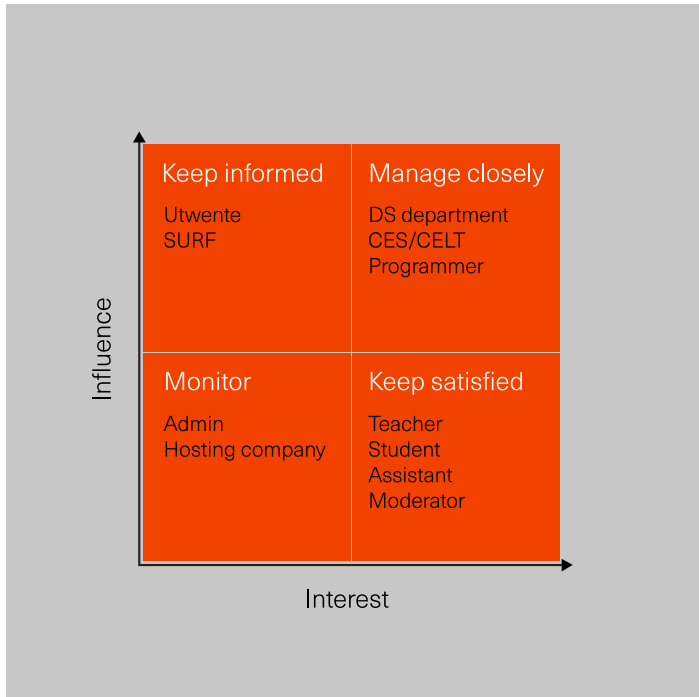
Programmer

The term programmer refers to a software or web developer. The programmers write, test, debug and maintain the platform.

A group of Information Technology students under the supervision of a senior programmer will be used to create the platform that will be utilized for the pilot.

Moderator

A moderator or Mod is a user that is granted access to change all the information on the platform. Common privileges of the moderator are removing, moving and

Keep informed	**Manage closely**	
Utwente	DS department	
SURF	CES/CELT	
	Programmer	
Monitor	**Keep satisfied**	
Admin	Teacher	
Hosting company	Student	
	Assistant	
	Moderator	

Influence / Interest

altering users and information. In the pilot the teachers will also act as the platforms moderators. They are able to change information or add information to the platform.

Administrator

The system administrator or Admin manages the technical details required to running a site. Administrators can create new sections and sub-sections and perform database operations.

The admin for Sketchlab will be a programmer affiliated to the platform.

Hosting Company

The platform will be hosted on University of Twente owned servers.

Most of the university -owned platforms are self-hosted to ensure safety, confidentiality and, intellectual property. The hosting company has their own hierarchy of system administrators.

2.1.3 Personas

The personas are used to model, summarize and communicate research about a group of people. Even though a persona is depicted as an individual, it represents a big portion of the target group.

These personas are created to determine the essential functionality of the platform and any wishes the users might have based on their needs and desires. The situation that is depicted in the next couple of descriptions is based on environmental factors, social aspects, and the use of technology. One extreme user has been identified to represent possible barriers.

fig 02. Student Persona, Ben

Student Persona

This is Ben; he is 19 years old and just started studying Creative Technology at the university of Twente. He just moved out of his parent's place and now lives by himself in a small room on campus. Ben has never been very disciplined. Nevertheless, Ben finished high school with an average seven out of ten, and started studying Creative technology because it seemed like something he might enjoy.

Ben usually starts working on his assignments during the course lectures because he often finds the lectures long and tedious. He would rather be playing video games, watching videos on Netflix, or going out with friends.

Ben hardly uses a laptop anymore, he consumes most media on his mobile devices. He uses too many social media, to share personal information, but it is an integral part of his life. And because all his favorite social media have an application nowadays Ben hardly visits websites anymore.

Finish first year of Creative Technology
to finish his first year of CT Ben has to complete all first-year courses including Design Sketching for Create.

Get more free time
Ben wants to have more free time to do the things he likes but to accomplish that goal he has to start managing his time more efficiently.

Keep up with digital trends
To stay in touch with friends and to keep current Ben has to use all the new apps that his surroundings are using.

Student Persona

This is Sasha; she is 30 years old. Sasha has been lecturing students in design sketching for two years now.

Sasha uses Facebook to keep in contact with her family and friends, and lately she has been watching videos on Youtube to become a better cook. She is a mother that loves her job but raising a young child and lecturing the Design Sketching course is very time-consuming.

The Design Sketching course budget gets smaller every year even though the number of students keeps rising, which means they have to find cheaper ways to continue providing quality education.

Sasha wants to give the creative technology students the tools they need to ideate and present their ideas, and she wishes for the students to be productive members during both the lectures and the practical lessons. She is happy that there are student assistants that help her out by answering questions and providing examples to students because sketching is very labor-intensive.

Teach students how to utilize design sketching
As a teacher it is important to make sure your students are able to complete the course goals.

User time more productively
If Sasha can use her face to face time more productively, there would be fewer contact hours needed. Or the same amount of contact hours for more students would be needed.

Teach students the importance of design sketching
As a teacher, making students see the value in what you are teaching them can sometimes be more valuable than the actual things you teach them.

fig 03. Teacher Persona, Sasha

Extreme Persona

This, is mark; he is a 22 year old student that has to redo his first year of creative technology because he failed most creative courses last year. Mark is great in calculus but when it comes to creative thinking, and in particular design sketching, he struggles. Mark believes that it is not possible for him to get a high grade for design sketching, but he just wants to finish the course.

Mark is insecure about his drawings and his abilities, partly due to the fact that he is colorblind and has been bullied in the past.

Because of his distaste for drawing, Mark has never drawn anything prior to the design sketching course. He prefers to go hiking or to automate his home. Thus, programming and buying new technology are his main outlet.

Mark feels that social media are a waste of time. He just uses facebook to keep in contact with relatives. Because of this, Mark only uses his smartphone to browse websites when he is not near his computer.

fig 04. Extreme Persona, Mark

Finish Design Sketching with a passing grade
It is not possible for Mark to finish Design Sketching without extra help. However, Mark does not like social interaction, he prefers to compare his work to see his mistakes.

Get information quickly
Mark does not want to spend his entire day sketching. If he finds and understands the course materials faster he has relatively more time to spend on his drawing.

No social interaction
Mark does not like social interaction. He does not care about other drawings, and he feels that nobody else should care about his drawings either.

2.2
FUNCTION ANALYSIS

Function analysis is a method for analyzing and developing a function structure. The function structure is an abstract model of the platform that displays what the product should do.

A basic function analysis, based on the user research, provides an infrastructure for both the comparative analysis and the design phase.

2.2.1 Software Design Approach

A system is composed of multiple sub-systems. All these components together create a hierarchical structure.

Top-down design approaches the whole system as one entity and decomposes it based on characteristics. It is inherent that no coding can begin until a sufficient level of detail has been reached in the design of at least some part of the system.

Bottom-up design emphasizes coding and early testing, by using basic level components. The complexity of the system is increased by combining low-level components.

Top-down and bottom-up approaches are not practical individually. By providing a detailed design of the platform and by re-using code and combining basic modules it is possible to combine both approaches [7].

2.2.2 Basic Platform Functionality

The basics of the platform, or the features, are used to determine what distinguishes Sketchlab from other tools or platforms. It is also used to determine what links can be made between other platforms and tools.

Platform Goals

The goals of the platform have been based on brainstorm sessions with the client, user research,

and information provided in the Sketchlab proposal. It focusses on what the customer wants, and how to reach these goals.

The list of goals is split up in; goals that need to be reached in the pilot and goals that are to be achieved after the pilot.

Sketchlab Features

The basic functions of the platform are based on both the functionality that the clients insisted upon during the brainstorm and the functions or features distilled from the platform goals.

the list of platform goals and web app features is used to create a detailed program of requirements and to provide the foundation for the design phase.

2.2.3 User Stories

To identify specific users and user needs user stories based on the personas and stakeholders are used. A user story is a brief statement that identifies who the user is, what the user needs, and why the user needs it. It helps document practical differences between the users.

Sketchlab Pilot Goals

- Make Sketchlab available for University of Twente students and Teachers (Creative Technology in particular)

- Sketchlab needs to be in English because concerning bachelors are in English. (Cater to international students)

- Provide digital design sketching course materials to everyone for free

- Improve the expediency of the Design Sketching education

- Make sketching education open in time and place Make a platform that fits in with the current digital climate

- Sketchlab needs to complement the analog teaching environment

- Make a digital platform that suits student perceptions (Intuitive platform)

- Teach students how to sketch properly and how to use sketching as a design tool

- Teach students how to manage their time efficiently

- Motivate students to sketch

- Offer students a way to look at each other's work

- Offer students the possibility to exchange feedback Offer students the possibility to give feedback in groups

- Provide students the possibility to share and upload work in a trusted environment

- Give students insight into their progression

- Make sketching education less teacher dependent

- Lift teacher workload so that they can focus on guiding and stimulating students

- Provide teacher an overview of student progression

- Provide teachers the possibility to comment on students work

- Provide teachers the possibility to review and grade students work

- Provide teachers the possibility to expand upon the platform

- Provide teachers the possibility to edit information on the platform

Sketchlab Future Goals

- Appeal to an international audience

- Use the platform as a replacement for analog lectures in the future

- Make it available to external students and teachers in the future.

- Make revenue with the platform by selling licenses

Sketchlab Features

Available to Everyone

- Landing page/commercial page

- Platform introduction

- Registration method

- Course material overview

- Course materials/assignments

Student

- Login method

- Grouping capabilities

- Collective feedback capabilities

- Peer review capabilities

- Progression overview

- Portfolio

- Grade center

Teacher

- Login method

- Review capabilities

- Grade center

- Student overview

- Portfolio assignment overview

- Platform moderation capabilities
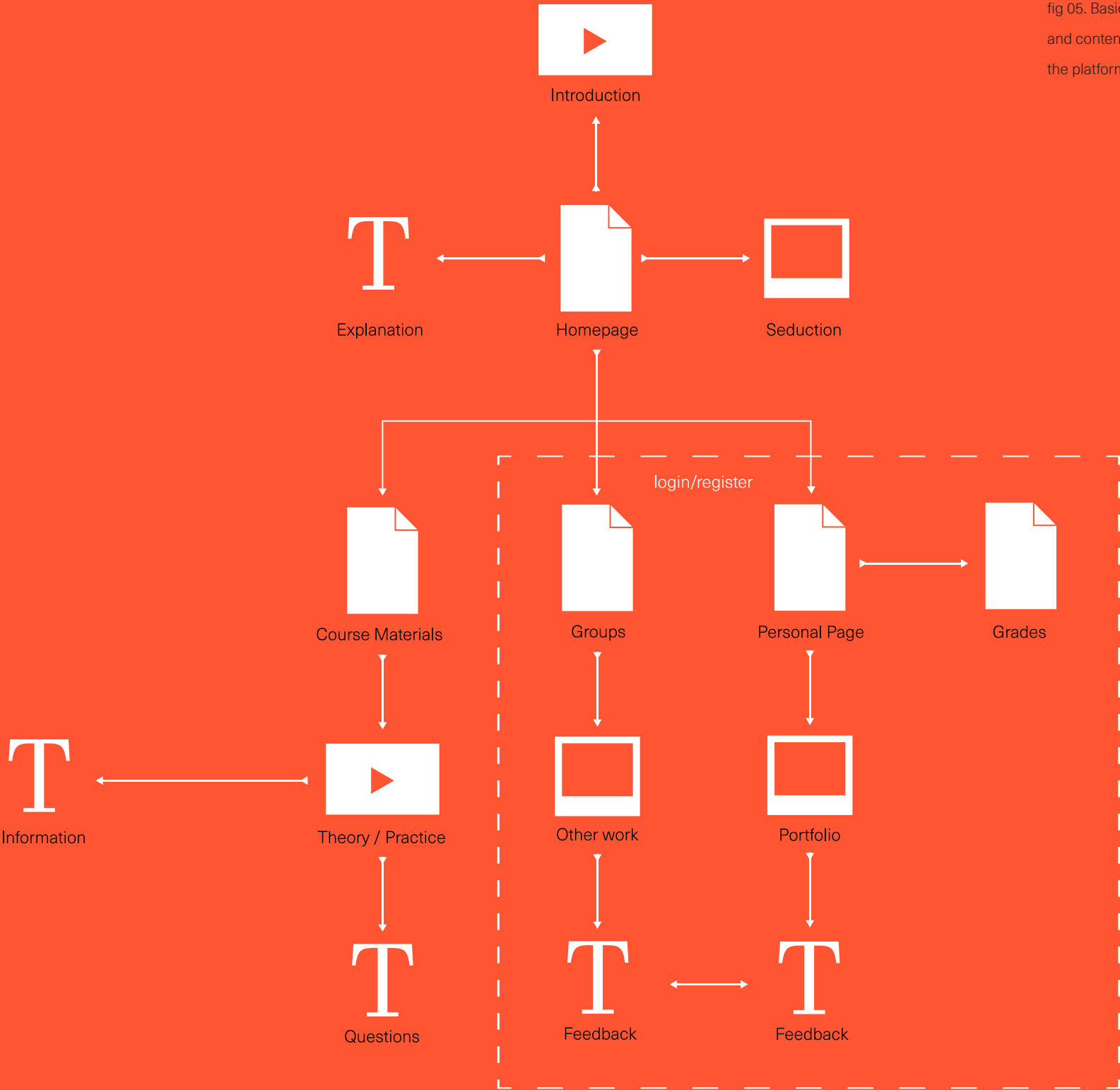
fig 05. Basic website structure and content division based on the platform goals

Introduction

Explanation   Homepage   Seduction

login/register

Course Materials   Groups   Personal Page   Grades

Information   Theory / Practice   Other work   Portfolio

Questions   Feedback   Feedback

2.3
COMPARATIVE ANALYSIS

The client, partly due to the insistence of SURF, wishes for a comparative study. In this paragraph, tools and platforms that can provide the functionality needed for Sketchlab are compared. By analyzing several relevant options and by comparing their pros and cons it is possible to make a substantiated conclusion on the matter

2.3.1 Problem Definition

According to the client, several risks need to be taken into account when creating the platform from scratch. The client believes that finding the right people to build the platform, and managing the limited amount of time efficiently are vital to succeeding.

SURF pointed out that it may not be viable to create a design sketching platform from scratch with a short time span and a limited budget. They mentioned that three of the four risks cited by the client have to do with the development of the platform. SURF insists that the client looks into alternative platforms to minimize the risk.

2.3.2 Program Choices

After the first meeting with the client, it became evident that they believed that they needed to create a new social media platform geared towards helping engineers with design sketching. The user analysis, on the other hand, showed that the social media market is oversaturated and that the target group would rather have a "tool" that caters to their specific needs. In the functionality analysis, those needs and goals were transformed into features that are used to determine what kind of tool the target group needs and how it will be created.

Sketchlab Risks
Probable risks that are likely to occur during the making of Sketclab

Development of the instruction materials (course materials) takes more time than intended.
The chance of occurance is medium and the impact is medium

Development of the platform takes more time than intended.
The chance of occurance is medium and the impact is high

Finding professional engineers to develop the platform proves difficult.
The chance of occurance is medium and the impact is high

Design Sketching teachers have a limited availability.
The chance of occurance is high and the impact is high

Application

An application or app is a software program designed to help someone perform an activity. While the word "app" has gained popularity in the context of mobile devices it still applies to programs in general. It can on any electronic device.

Native Application

Native applications are packaged software programs that you download and then run on the according operating system such as, a personal computer (desktop software app) or a mobile device (mobile app).

Website

A website is basically a web application, since it is an application run in a web browser. That is why semantically speaking websites and web applications are not entirely exclusive but a distinction can still be made.

Website is an anachronistic term that exists from the early days of the internet where the notion of a dynamic layer that can respond to user input was very limited. Thus, websites are defined as primarily informational and web application allow users to perform actions

Web Application

A web app or web application is a client-server software application which is run in a web browser. This means that it consists out of one or multiple programs that use the same source code on a web server. Common web applications include e-mail, search engines and wikis. [8][9].

Software companies blur the line by making online apps that offer downloadable counterparts.

Web app Advantages
Several advantages a web app provides over native applications and websites.

Fast development cycles makes it easy and cheap to build prototypes.

Only a web browser is needed for access on multiple devices and platforms.

A web app is updated instantly.

No downloads and storage spage are needed.

Web apps are easy to combine with other websites and web apps.

Web app Disadvantages

Internet is often required to use it.

Browsers are periodically updated.

Hosting costs (periodically)

As the internet connections become better and the mobile devices become more prevalent apps will shift to cloud based or online based environments. >

> Generally speaking, a mobile webapp should be considered the first step in developing a mobile presence, whereas an app is useful for developing an application for very specific purposes that can not be accomplished through a web browser.

Because web apps provide interactive engagement with users without any of the negative aspects native apps bring, it is the obvious choice.

2.3.3 Alternative Platforms

When creating a new product one cannot solely focus on goals. With goals comes risk and whereas the goals of the platform can be described as functionality the risks contribute to the failing of the entire product.

Here an overview of alternative platforms is shown, which can be used to create the web app that is needed. Only viable possibilities that can provide the desired functionality have been taken into account.

In the following analyses, general descriptions and examples for each platform are provided. The pros and cons of each platform are based on essential functionality and features, development cost, difficulty of the development, the development time, and the safety concerning confidential information and intellectual property. [10][11][12][13][14][15]

Platform overview

Social networking website
A social networking website is an online platform that allows users to create a public profile and interact with other users on the website.

Content management system
A content management system that supports the creation and modification of digital content using a common interface and supporting multiple users working in a collaborative environment.

White-label social network
A white label product or service is a product or service produced by one company that other companies rebrand to make it appear as if they had made it.

E-learning platforms
E-learning platforms typically include online access to learning content and tests, communication and collaboration tools for students, and course management and assessment facilities for instructors.

Backend web framework
A web framework or web application framework is a software framework that is designed to support the development of web applications including web services, web resources and web APIs

Pros & Cons

+ Best media distribution options
+ Users are already used to it
− No custom functionality possible
− Confidential information intrusion
− Loss of intelectual property

+ Usable without a coder
+ Free to use and redistribute
− Too much random functionality
− Custom functionality still need a coder
− Updates may break the platform
− Open source software is a hacker target

+ Built in administration tools
+ Built in social interaction capabilities
− High startup costs
− Many contraints in the layout
− Not possible to customize needs

+ Provides access to a wide audience
+ Relative low cost
+ Easy to use by non-coders
− Only caters to big or tiny platforms
− No costum back-end options for moderation
− Forced updates on the platform

+ Free to use
+ Supported and documented
+ Use modules for fast development
+ Available in popular programming languages
+ No limits to layouts and functionality
− Hard to learn/find coders

Tools, Web API
An API or application programming interface is a set of requirements that govern how one application can talk to another application. This way content that is created in one place can be dynamically updated in multiple locations on the web. The practice of publishing APIs has allowed web communities an open architecture for sharing content and data without providing all the software code.

It is possible to include prebuilt functionality by adding different APIs to the web app.

Some examples of functionality that might benefit Sketchlab are a social media login (OPENID), a commentary system (Disqus), a video hosting service and player(VIMEO), or even Google maps and Dropbox integration. Although, providing a common framework that allows data to be shared and reused across applications might not be the safest thing to do when working with confidential information.

2.3.4 Picking suitable Platforms

Social media platforms do not provide enough features to ensure vital functionality for Sketchlab. However, several social platform APIs can be included to add functionality to a custom web app.

White label social media platforms and e-learning platforms can provide Sketchlabs vital functionality. However, both of them provide too much functionality straight out of the box, and it is not or hardly possible to alter the features to create a custom user experience. >

> A custom web app created with either a CMS or a
Backend Framework will have all the vital functionality.
But changing the built-in management is often harder
and more costly than creating a custom experience by
using a framework.

Frameworks are mostly used in functionality
driven development. It is possible to combine several
modules and quickly create prototypes or initial
versions of the tool.

Although white-label social media platform,
an e-learning platform, and even a basic CMS require
someone experienced or someone willing to learn the
ins and outs, they provide the possibility to create a
platform without coding experience. Creating custom
solutions with a CMS and a Backend framework all
require coders that are experienced in the subject
matter.

To ensure safety and most of all confidential
usage of student information it is best to create a
custom platform by using one or multiple backend
frameworks. One of the biggest risks in using an
external platform is giving big companies access
to confidential information. External companies or
platforms can and may change their platform or
important clauses at any given time and render the tool
and the content moot.

2.4
FEASIBILITY ANALYSIS

This feasibility analysis consists out of two important feasibility factors.
One factor being the resource feasibility, which involves questions such as;
how much time is available to build the system, and what are the number of
resources required? The other factor being the financial feasibility, which can
be judged on dependencies such as time delays, and increases and decreases in
cost.

2.4.1 Platform Cost Indiction

**Competitive industry pressure and advancements
in web design tools have pushed the price for basic
websites down. However, the price for high end
websites and web apps has seen a steady rise.
The drive for higher-end, interactive and highly
functional design made the cost of websites
become more disparate.**

Asking how much a website costs is like asking
how much a car costs. A general indication can be
given but it depends on countless variables, and mainly
comes down to the programmers and designers used
to create the platform.

To the right an average cost indication based
on several sources can be seen. [16][17][18]
The cost indication is given in dollars mimicking the
sources cited.
A direct conversion to euros can be made. The
exchange rate is 1EUR=1.1157 at the time of writing.

The costs cover the low end and high end
spectrum. They include initial startup costs, and
average expenses on common website features. The
cost indication has been split up into meaningful
stages and critical factors of web development to help
with the planning of possible cost reduction, and to
decide if creating a website is feasible with the limited
amount of time and the limited budget.

Average production costs
Planning – $0 – $600
UX (sitemap, wireframes) – $0 – $1200
Visual Design – $1,200 – $2,400
multimedia design – $250 – $10,000
copyrighting – $50 – $500 (per article)
Programming – $3,000 – $4,800
Content Support – $240 – $600
Testing and Launch – $960 – $1200

Hourly rate web design/development
Freelance: $30-$90
Professional: $45-$120

Average extra expenses
Domain name – $5 – $15 (yearly)
Website Hosting – $75 – $200 (yearly)
CMS $0 – $1500(yearly)
E-commerce functionality $500-$5000 (1 time)
SEO $300-$1500 (monthly)
Ongoing website maintenance $500-$1250(yearly)

Average Cost: $5,640 – $11,400
* and up, depending
on fixed charges

2.4.2 Time Cost Quality

In the early stages of the feasibility analysis it was concluded, partly due to senior engineer Dennis Vierkant his insights that the development costs and time spend on this project depends heavily on the programmers that will be used.

The search for programmers that can provide the right expertise is usually based on functionality driven research and budget. What goals do you have, What functionality do you need and what's the budget are questions often asked.

Even though suggestions for programming tools or platforms can help when searching for capable programmers, how the programmers will meet the goals is decided by themselves.

In one of the early feasibility brainstorms it was decided that to keep the production costs low students of the university of Twente will be used to create the platform under the supervision of one or multiple senior IT engineers tied to the UT.

The constraints of the development process can be described as; scope (functionality), time (schedule), cost (resources) and product quality (performance). This is referred to as the project management triangle.

This graphic aid shows the near infinite priorities that exist between the competing values. When we show the project triangle as a "pick any two" we can reflect the fact that the three options are interrelated and that it is not possible to optimize all three. You can design something quick and to a high standard ,design something quick and cheap or design something with high quality cheaply. [19]
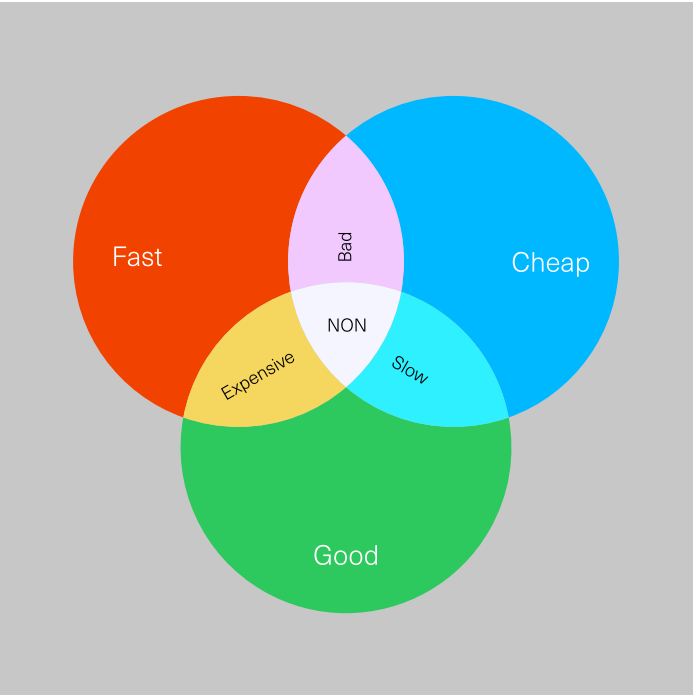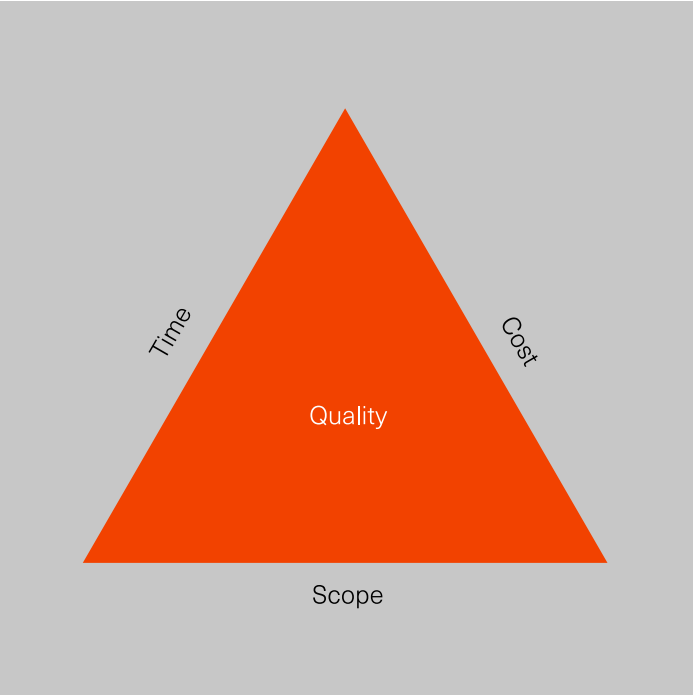

fig 06. Project management triangle

By choosing IT students under the guidance of a senior programmer, to program the platform, the cost for the platform will be significantly lower. It will, however, take relatively longer to deliver a high-quality product. Thus, vital features should be done faster, which will be more expensive, and low-priority features can take more time to develop.

2.4.3 Project Management

Proper managing of the project will be vital to make sure the IT students will provide the needed functionality for the assigned budget in the assigned amount of time the. By properly managing the product it is possible to minimize the biggest risk, which are mostly people related.

Plan-driven Development

The development of Sketchlab will be based on predictive, traditional development model.

Plan-driven development, or waterfall, methods incorporate: repeatability and predictability, a defined incremental process, extensive documentation, up-front system architecture, detailed plans, process monitoring, controlling and education, risk management, verification and validation.

By using a plan-driven development method it is possible to utilise previous experience and use junior developers. An estimation of time, costs and complexity can be foreseen.[appendix vergelijking]

A waterfall model assumes that everything is done according to planning. That is why it only works if the developers have designed and developed similar sofware in the past. [20]

Waterfall software development

Waterfall has a linear, non-iterative structure characteristic. All the steps are planned out.

Requirement analysis

The development team meets project stakeholders to identify needs and establish requirements to satisfy project goals. Requirement analysis initially is a feasibility study that identifies functional and non-functional requirements with its constraints.

Design

The development team converts requirements into representation of architectural model. Prototypes are created with functional algorithms and data structures. Design is finalised and overall of the project outcome depends on it.

Coding and implementation

The design is transformed into software

Testing

The software domain is tested for bugs. Different sets of tools are available for testers and developers to detect and fix defects in the software.

Maintenance

In the maintenance stage the product is updated, to meet changing needs and environments. It fixes undetected bugs and defects that might arise.

Incremental Model

To make the product lifecycle less static, and to reduce the risks of the project, an incremental is used. Each iteration of the incremental model can be seen project with its own lifecycle (this could be waterfall). The end product of each iteration is an executable system which is integrated and tested. An iteration usually lasts for a predefined, relatively short period of time

After the first increment, a core product is delivered that can be used and tested. Based on customer feedback, requirements are refined with each iteration.

The requirements are prioritised, the higher a requirements 's priority the earlier it is to be included in an increment. Thus, new functionality added should not be more important than that which exists in the current build. [21]

MoSCoW

The requirements for Sketchlab are turned into user stories and classified using the MoSCoW system. The MoSCoW method is a prioritization technique that is used to reach a common understanding with stakeholders on the importance they place on the delivery of each requirement. For this project this method is used to distinguish and prioritize functionality to aid in the management of the development process and manage time and resources efficiently, [22]

MoSCoW

The MoSCoW method is a prioritization technique that is used to order the importance of requirements.

M-Must haves

These requirements need to be met. Without this functionality the product is not usable.

S-Should haves

These requirements can be just as important as a must but they are not necessary for a working product.

C-Could haves

These requirements need to be met if there is enough time and budget to meet them.

W-Will not haves

These requirements won't be added to the current project. They are usually part of the recommendations.

This part of the discovery phase is used to gain an understanding of the Interface elements that will condition the design phase.

Both the user experience and graphics user interface are based on rational decision making. The design will be an evolution and not a revolution. Copying comparable functionality from existing solutions will be an integral part of the research.

The third analysis in this paragraph is about digital teaching heuristics, it explains why both peer evaluation and collective feedback possibilities are to be included in the platform. The most common pitfalls and opportunities concerning giving and receiving feedback are also disclosed.

3

3.1
INTERFACE DESIGN PRINCIPLES

The user interface (UI) or interface for short, is where the interactions between humans and products occur. The UI allows effective control of the product and feeds back information to aid in the decision making process. An interface can be physical like a keyboard or the buttons on a coffee machine but in case of Sketchlab it is digital and refers to the software layout on a screen.

In this paragraph, the basics of interface design are examined. The foundation for the design phase is created by analyzing common web apps, by using accepted user experience (UX) and graphical user interface (GUI) principles, and by looking into the main goal of Sketchlab which is educating (teaching/learning).

3.1.1 Analysis of User Interfaces

To create an interface that connects to the target group a small market research on commonly used web apps was done. These web apps are visited on a daily basis and are part of the target groups routine. The web apps chosen, provide at least several solutions on comparable functionality. The web app comparison also provides insight in additional functionality that might be needed or issues that may occur.

3.1.2 Interface of Popular Apps

popular apps that have been researched include; Gmail, Youtube, Instagram, Twitter and Facebook.

Even though all the web apps have different primary goals they still have much functionality with eachother and with Sketchlab in common. All the apps are heavily based around their users and deal with multimedia sharing and user communication.

3.1.3 Interface of E-learning Apps

Popular platforms that provide e-learning possibilities have also been researched. These platforms provide insights on digital education related problems. The list of platforms also includes e-learning platforms that do not focus on teaching creative skills.

E-learning platforms provide several possibilities for course layouts, grading methods, and reviewing methods.

The platforms that have been researched include; Blackboard, Khan academy, Coursera, Skillshare, Lynda and Digital Tutors.

Provide Information

Almost every platform provides descriptive information about the entire platform and the essential features. General information on a platform and about the usage of the platform is usually provided on the main page. The main page is generally not interactive as it just gives an overview.

The information can be provided as a video, text, or as an infographic, but more than often, a combination of methods is used.

Individual information about features are usually done with small indicative texts or tooltips that appear with a click or a hover.

Most platforms have a custom method to provide an overview of the most important information or media, but they are all heavily structured. Important information is always easy to reach and find. Most of he important information or media is provided as an overview. Usually a search option or filter is used to provide quick access. And to mark the importance of new or vital information iconography and color are often used as indicators.

Motivate Users

The best way to motivate visitors to start using or to keep using the platform is to create a lasting connection between the two. This relationship can be either emotional or purely functional. A visitor usually becomes a user once he registers to the platform.

It is possible to entice users into exploring the platform by challenging them or by providing valuable tools or information.

To seduce visitors to become active users, large, friendly welcoming messages, and images are often used. Several login and register indications are given throughout the platform. Even more prompts, in the form of popups and blocked content persuade visitors to become new users.

Giving users a profile page makes the platform feel personal. When users form an active part of the community by exchanging information and media on a daily basis, they become inseparable.

To motivate users to actively use the platform, gamification elements and rewards are often used. Gamification goals often go hand in hand with other user goals and provide a fun and addicting environment that provide to the sense of accomplishment and progression.

Other methods that are often used to stimulate active usage is constant feedback in the form of comments, ratings and personal media collections.

Communication between Users

Every analyzed platform provides a form of communication between users. And in most platforms, user communication is a primary feature.

Communication on trivial or personal matters are usually done through a PM (private message) or IM (instant messaging) system. It is a form of direct communication that can be done through text, video, and audio.

To share information or media so called posts or personal updates are used. This way information is made publicly available.

To get feedback on specific posts or media commenting systems are often used in combination with rating systems. Commenting systems provide users a posibility to leave a written message about the post, whereas ratings provide a quick way to share an opinion. Both of them combined provide an overview about the general opinion.

Friending systems are often used as a way to get updates about certain people. Grouping systems on the other hand provide the possibility to exchange information with specific groups of likeminded individuals.
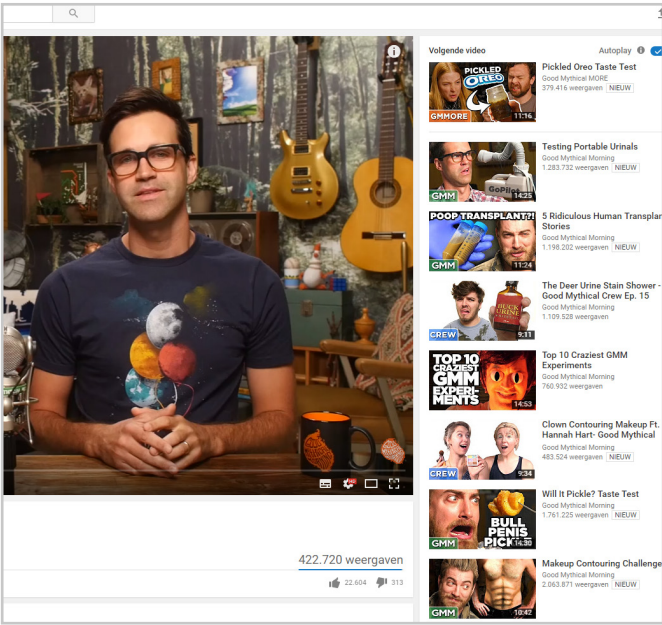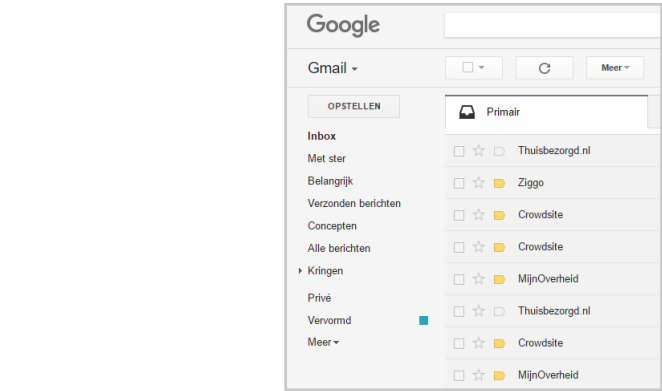
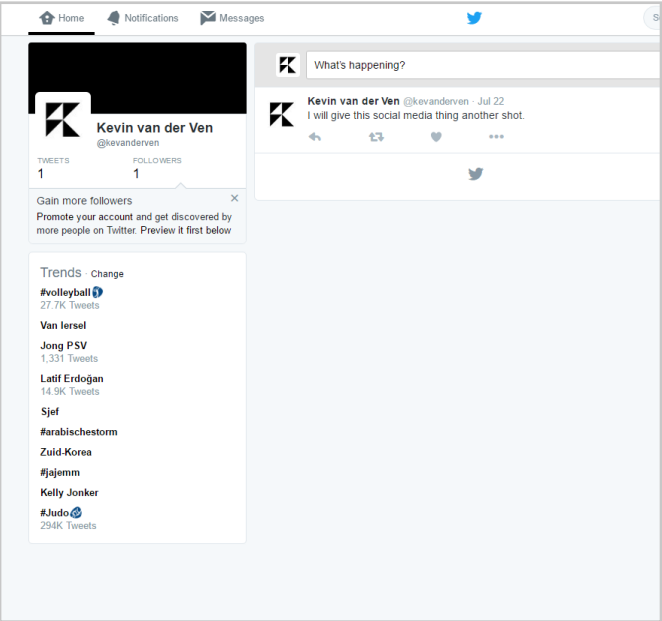fig 06. Clockwise from the top left; Gmail, Youtube, Twitter

fig 07. Skillshare

3.1.4 Interface Design Principles

All the Interfaces that have been analyzed look similar. Not only do these platforms use the same graphic elements, they also use comparable sizes, colors, and feature placement.

The platforms share most characteristics because they are aimed at the same audience. The designs are based on evolution rather than revolution, and they use visual elements that the general internet user already uses and understands.

Because Sketchlab users are part of this group of primary internet users, it is possible, and even common practice to design the interface by using the same principles.

User Experience

User experience, or UX, is the process of enhancing the experience that people have while interacting with a product. In short, it is design that focusses on usability to make a product user friendly,

Good design is easy to digest. The brain should not be doing most of the work. Good information hierarchy and clear copy are good examples of digestible design. Information needs to be explained in a human way. A design is clearer if it uses descriptive information instead of programming logic. Guidelines exist for a reason. It is possible to maximize user adaptation by using familiar patterns, icons and presentational styles. And simplifying complex problems will make the product more enjoyable. The less the user has to do the more delighted he will be with the solution.

To the right you can see a list of Jakob Nielsen's heuristics of interaction design. [23]

Interface Usability Heuristics

this is a list of heuristics that complement the principles for interaction design.

Visibility of system status

Keep users informed about what is happening, through appropiate feedback.

Match system and real world

Follow real world conventions. Speak the user his language and use metaphors.

User control and freedom

Have an emergency exit and support redo.

Provide information in multiple ways

Combine color, form, shape etc.

Consistency and standards

Give features with the same function the same appearance.

Recognition rather than recall

Make crucial information visible or easily retrievable whenever appropriate.

Aestethic and minimalist design

Do not add irrelevant information. More information equals less visibility.

Help and documentation

A system that can be used without documentation is better, but always provide it.

Error recovery and prevention

Help users recognize and recover from errors, or have no mistakes in the interface.

Graphical User Interface

The heuristics for designing any interface can be directly translated into a description for the Graphical User Interface (GUI). The GUI refers to a graphical representation of software on any screen, and the actions in a GUI are usually performed through direct manipulation of those graphical elements.

To create a clear, aesthetically pleasing interface you have to provide meaningful contrast, align screen elements and create groupings for example. [design appendix]

3.1.3 Digital Teaching Heuristics

The children now entering school are fully fledged digital natives, and using technology in the classroom is getting increasingly more important. By integrating digital tools with the current curriculum teachers can: provide quick feedback, increase student engagement and communication, improve access to the curriculum and increase instructional time. By being engaged in the learning process, and by taking ownership of their learning the students can be more productive and learn faster.

With digital learning students can take learning into their own hands which makes it possible to decrease the dependence on teachers for content and answers. It is widely accepted pedagogy that most students learn best when collaborating with others. Thus, a digital platform would allow learning to continue beyond the confines of a classroom [24].

How to give feedback

This list is a descriptive method on giving constructive feedback.

Writing a brief summary of your view of the assignment

Balancing negative with positive comments

Using constructive criticism to provide positive suggestions for improvement

Asking questions which encourage reflection about the work

Explaining all your comments

Suggesting follow up work and references

Suggesting specific ways to improve the assignment

Explaining the mark or the grade and explaining why

Offering help with specific problems

Offering the opportunity to discuss the assignment and your comments.

Peer Feedback

An important part of learning is self-assessment. Self-assessment can only be done when you notice your mistakes. By providing the possibility to compare finished assignments and by receiving and providing feedback a student is able to reflect on his own drawing.

In big groups it becomes impossible for the teachers to give personalized feedback on every assignment. Peer feedback can offer a solution in this area. When a student is working on an assignment it is often better to receive quick "incomplete" feedback from peers, or students on the same level.

Peer feedback is a two-way process in which feedback is exchanged between students, or peers, to provide them with opportunities to learn from each other. Peer feedback most commonly consists out of corrections, opinions, and suggestions. Peer feedback works well when the focus lies on either assessment of a product such as a drawing, or the performance of a certain skill. (tadfon)

Students have a dislike for grading peers, particularly in small, well-established groups. But once students have confidence in the feedback they give and receive peer feedback can be very useful. Student feedback can enhance student learning through analysis, reflection and diplomatic criticism. By putting the emphasis on critical feedback, rather than grades, it can be perceived useful and more rewarding than usual lecturer marked methods or peer reviewing methods [25].

By providing the option to give feedback in groups and by making feedback open to criticism it is possible to overcome some of the most common peer feedback obstacles. Because group feedback is based on multiple opinions students will take it more seriously than regular peer feedback. Students will also be more confident in providing feedback when other students agree with them.

Collective Feedback

Collective feedback, or feedback on an entire group, can be considered as a possible bridging method between individual teacher feedback and no teacher feedback. The teacher can give feedback on an entire group by highlighting some of the strong and weak points. This method is faster than giving everyone individual feedback and it forces students to compare their assignments with the work of others [26].

Teacher Feedback

Even though teacher feedback falls short sometimes or can be characterized as impersonal, it is still an important part of the student work evaluation process. Students sometimes lack the ability to give peer feedback owing to insufficient knowledge. Teacher feedback, on the other hand, can be based on experience in the subject matter.

Teacher feedback has proven to have more influence on students than peer feedback. The strict requirements are crucial for how students treat teacher commentary.

In this chapter, the conclusion and the decisions made throughout the research, based on information gained in the analyses, can be found. Here will be explained how these decisions came about and how they will influence the rest of the design process.

The first part of the conclusion explains relevant users and any critical information they provide.

The second part of the conclusion summarizes the decisions made in the comparative analysis and the feasibility analysis. This paragraph will explain key issues and how they are solved.

The final section shows the program of requirements. The list of requirements will be split up into functional requirements and usability requirements, and all requirements will have their criteria specified.

4

4.1
CONCLUSION OF THE ANALYSES

The analysis phase can be split up into the three following parts. The first one being the user goal research. In this analysis, the key users and stakeholders are defined, and their needs and wishes are translated into a basic functionality structure for Sketchlab.

In the second phase, the basic features are used to see what kind of platform is actually needed and how it can be achieved.

The final phase of the analysis defines three primary goals for Sketchlab namely, providing information, motivating users, and user communication. A comparative analysis of several platforms and user based design guidelines provide the foundation for the design phase.

4.1.1 Goals Features Function

The goals of the platform are mostly based on goals previously stated by the important stakeholders, SURF, CES/CELT and the Design Sketching Department of the University of Twente. (bron) The other important stakeholders are the users that make up the target group.

The Targetgroup can be split up into two primary users. You have the teachers and you have the students. Even though both groups have different goals, most of them overlap.

The teachers and the students have most ideologies in common. Both groups are used to current technology, and they want to make the design sketching courses clear so that students can pass the course. However, students prefer Sketchlab to be available on mobile screens. They want a tool that can quickly show them what assignments they need to make and how to get a passing grade. Students do not have the time to keep up with yet another social media platform.

Teachers want to spend less time explaining trivial course materials and grading assignmets so that they can spend more time in the classroom guiding and stimulating students. The teachers also wish for a platform that they can expand upon with new course materials.

Sketchlab Web Application

The goals that the user wants to achieve can be directly translated into features for Sketchlab. Important features that Sketchlab needs are, custom user profiles, a reviewing system (comments, ratings), a portfolio system to keep track of assignments, and a custom course structure to provide the design sketching materials.

Sketchlab needs to work on a PC, a laptop, and any relatively new mobile device (phones, tablets) for the unforeseeable future.

The best way to achieve the needed functionality is to create a web application by using one or multiple frameworks combined with APIs. A webapp focusses on interactivety between users and provides a platform independant solution.

4.1.2 Feasibililty Sketchlab

A simple cost indication shows how much a web-app "normally" costs and what areas use up most of the budget. At the moment of writing a big part of the planning and the design phase have already been completed or are near completion without spending any of the budget.

By using students that work for free (bachelor assignment etc.) or for less money than professionals (student assistant) it is possible to keep costs low. However, using inexperienced programmers will take more time, and one or multiple senior engineers are needed to lead and manage the groups properly to keep the quality consistent.

A functional product roadmap to lead the development phase will be based on this report. This guide specifies what functionality needs to be done in a specific timespan for a given budget. By using an incremental development model combined with one or multiple frameworks it is possible to get a prototype with primary functionality done in the given amount of time.

4.1.3 Interface Design

The Sketchlab interface has three essential functions. It has to provide information, motivate users, and provide user communication possibilities.

A comparative study and a deeper look into giving feecbak offer different options, possibilities, and solutions concerning these basic functions.

Apart from these studies a list of UX and GUI heuristics is used to make sure the entire platform is user-friendly. These general design principles are commonly used when designing web apps and can be correlated to other popular web apps.

All the information gained in the analysis will be translated into a program of requirements that in turn will be used in the design and development process.

Functional testing is carried out to ensure that the product behaves according to the functional requirements and does not take into consideration design principles. This entails a series of tests which perform a feature by feature validation of behaviour, using a wide range of normal and erroneous input data. In contrast, Usability testing focuses on customer acceptance and how well the customer can use the product to complete the required task. Usability testing investigates all aspects of the usability of a product, including overall structure, navigation flow, layout of elements on a page, clarity of content and overall behaviour.

functionality requirements	comments
Sketchlab needs to have a landing page available to everyone.	Introduce new students to sketchlab. Seduce prospects to join sketchlab. Serve as a recognition point and starting point.
Sketchlab needs to provide Design Sketching course materials to everyone.	Provide the course materials overview and assignments for free.
All users need to be able to log in with their university credentials.	The users in the pilot are CT students and DS teachers.
Sketchlab needs to provide communication methods to the users.	Provide a method for peer feedback. Provide a method for teacher feedback. Provide a method for collective feedback. Provide a method for rating (quick feedback) Provide the possibility for help/questions. Provide a way to share important information.
Sketchlab needs to provide grading possibilities.	Grades still need to be given to complete the course.
Sketchlab needs to provide grouping capabilities.	Group students together that are working on the same assignments. Classes and project groups.
Sketchlab needs to provide users a way to keep track of their progression.	Provide a method to keep track of own work. Provide a method to keep track of finished assignments.
Sketchlab needs to provide students a way to share sketching assignments.	Provide a method to look at other student work.
Sketchlab needs to provide an overview of students.	Teachers need a fast way to see the progression of students. Students need a way to see people in their group.
Sketchlab needs to be easily updateable and expandable by teachers.	The teachers will act as the moderators. Only use logical edit functionality, no complicated menus.
Sketchlab needs to work on both desktop solutions and mobile devices.	Most browsing is done on smartphones.

Sketchlab will be programmed by using one or multiple front-end and back-end frameworks.	The fameworks will be chosen by the group of students and the senior programmer.
Sketchlab needs to be created before testing starts within the assigned budget.	Total projectcost € 97.500 Testing will start in Feb 2017

usability requirements	comments
Sketchlab needs to be available in English.	Concerning bachelors are given in English
Sketchlab needs to improve the expediency of the design sketching education.	Provide a custom, consistent learning method. Provide good examples for the assignments.
Sketchlab needs to make sketching education open in time and place.	Make course materials available everywhere. Make course materials always availble.
Sketchlab needs to complement the analog sketching environment.	Provide an overview of materials shown in the classroom. Use digital materials in the classroom.
Sketchlab needs to suit student perceptions.	Mimick the looks of often used web apps. Use UX and GUI heuristics
Sketchlab needs to be intuitive.	Mimick the looks of often used web apps. Match system and the real world. Use recognition rather than recall.
Sketchlab needs to motivate students.	Use gamification elements. Create a relationship between user and platform. Make the user visit the platform on a daily basis.
The interface needs to be clear and legible.	Mimick the looks of often used web apps. Use aestethic and minimal design. Provide information in multiple ways. Keep the user informed about what is happening. Be consistent and use standards by grouping information with graphical user elements.
The interface needs to recover or prevent mistakes.	Always provide redo and undo options Always provide an emergency exit

In the concept phase, critical moments and choices made during the design process are disclosed. The program of requirements and other information gathered during the research phase are used to provide a guideline throughout the concept phase.

The concept phase was started by creating a general sitemap, based on the program of requirements and typical web app structures.

After deciding on a basic structure, various idea sketches were created to explore the possibilities within the confines.

The most promising sketches from the idea generation were combined into five presentable concepts. These concepts were, in turn, presented to several important stakeholders to decide on a general direction for the final concept.

The entire design process, including sketches and wireframes, can be found in the design appendix.

5

5.1
CONCEPT IDEATION

The concept phase started by revisiting the main goals of the platform, and by structuring the functionality needed to reach these goals.

The platform is an open architecture primarily used to provide design sketching education to everyone, and to support teachers and students in the design sketching process. Therefore the three pillars of Sketchlab are, providing information, motivating users, and stimulating interaction between users.

5.1.1 Functionality Sketchlab

The needs of the primary users, being the student and the teacher, can be divided into three common goals that are intertwined. You can motivate people through predefined information or direct input from communication. Interaction in Sketchlab will be either motivational or informative. And the Information provided will, in turn, be used to promote user interaction or to motivate the users.

Every requirement, in one way or another, contributes to this philosophy.

Information

An important part of Sketchlab is informing the audience and in particular the users. It was previously defined that the course materials need to be available to the entire audience (everyone interested in Sketchlab). These course materials provide theoretical and practical information about design sketching.

Sketchlab needs to provide instructional information to the entire audience. Sketchlab has to show the user how to use the platform and why they should use the platform.

Personal information is only intended for active users. To become a user you need to register, or in the case of the pilot, log in with university credentials.
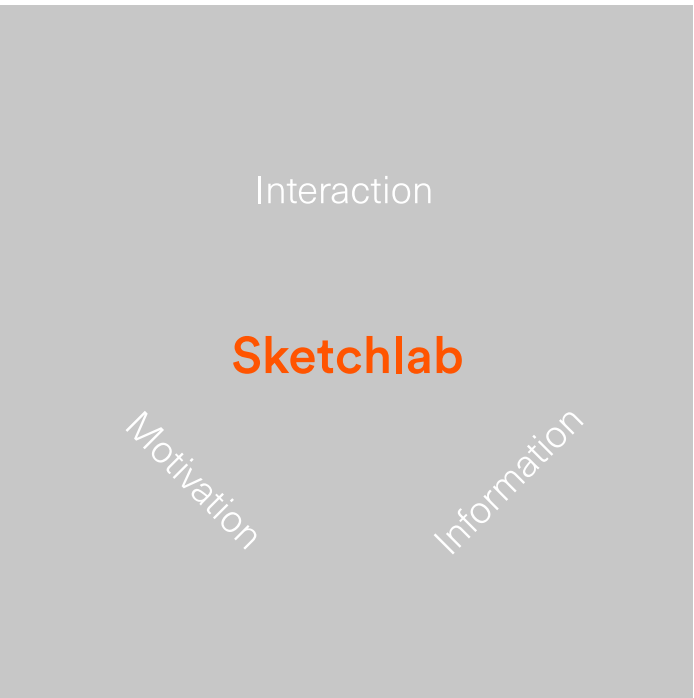

fig 08. Three pillars of the sketchlab interface

Personal information is information that is related to you and you alone. It includes your personalia, important messages and dates, group information, and feedback or ratings (grades) on assignments.

The course material structure needs to provide advanced sketchers the oppurtunity to do the assignments in an accelerated pace.

However, the course structure should also provide students that require more help with more information or exercises.

Teachers need a set of instructions on how to use the platform. Even though the same platform will be provided to all users, teachers will have additional functionality. Because the teachers will also be the moderators, they need to be able to change information and add new content to the platform.

Motivation

Apart from providing a clear overview of sketching materials, Sketchlab also has to motivate users to improve the expediency.

The audience needs to be motivated to start sketching or to start using Sketchlab. More importantly, the users need to be motivated to sketch regularly and to use Sketchlab on a regular basis.

New designers often lack the motivation to work on their sketching skills. By making Sketchlab part of a daily routine, it is possible to expose students more to the sketching environment. Digestible and approachable assignments should encourage this daily sketching routine. Furthermore, a personal portfolio and social interaction through commentary or feedback will also assist students. And Interesting posts or good work from peers can both inspire and motivate users.

By providing an easy to use platform that provides each user goal in less than three clicks, it is possible to make an intuitive tool that can provide a good alternative for mandatory motions like, grading portfolios, supporting students and lecturing them. By automating most of these necessary actions, it is possible to provide a nonintrusive solution.

Interaction

Interaction through communication and cooperation is an excellent way to motivate the users. The social cohesion will not only drive the users to use Sketchlab more, but it will also improve the sketching skills and thus the final results.

Personal pages and portfolios provide more possibilities for individual attention and personal development. The portfolio will hold all the assignments and provide a clear overview of student progression. Group activities, on the other hand, will provide inspiration and cooperation possibilities outside of school hours.

Direct interaction between student, teacher, teaching assistants, and students will provide an easy feedback tool that can help to fix mistakes and discourage harmful methods. While peer feedback possibilities will mostly provide a fast way to exchange opinions, to built confidence in a closed environment, or detect mistakes early on, teacher or teacher assistant feedback might provide more in-depth constructive criticism.

Flexibility

It is important to keep future user-goals (wishes) in mind when designing the interface. The grow of the platform, meaning more information or more users (internal or external) is not allowed to interfere with the functioning of the platform.

fig 09. Basic Sketchlab sitemap

5.1.2 Navigation and Content Mapping

By using centralized planning tools like a sitemap and a MoSCoW it is possible to create the first low fidelity model of the website. These tools are mainly used to clarify what content you need, and more importantly, what content you do not need.
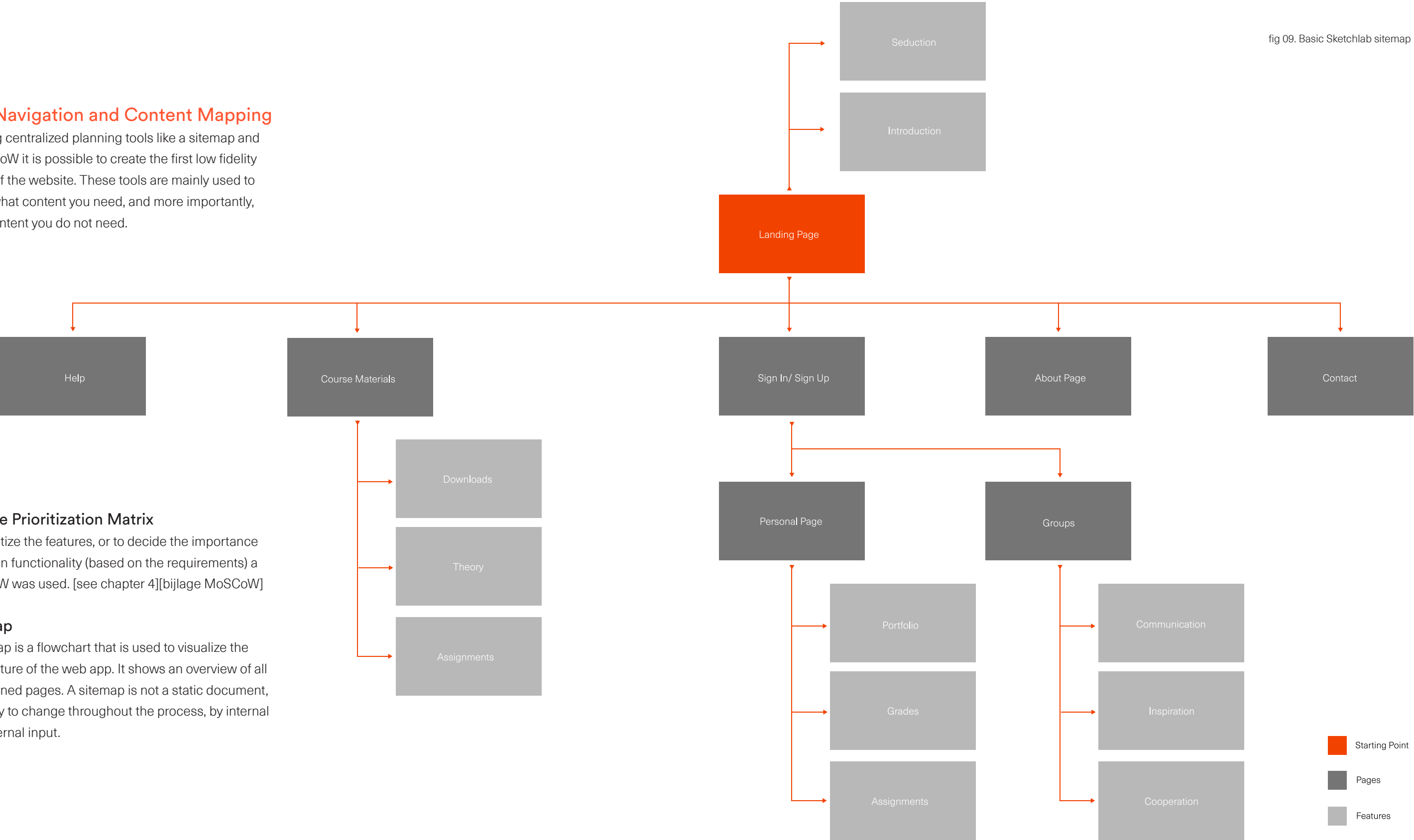
Feature Prioritization Matrix

To prioritize the features, or to decide the importance of certain functionality (based on the requirements) a MoSCoW was used. [see chapter 4][bijlage MoSCoW]

Sitemap

A sitemap is a flowchart that is used to visualize the architecture of the web app. It shows an overview of all the planned pages. A sitemap is not a static document, it is likely to change throughout the process, by internal and external input.

Seduction

Introduction

Landing Page

Help

Course Materials

Sign In/ Sign Up

About Page

Contact

Downloads

Theory

Assignments

Personal Page

Groups

Portfolio

Grades

Assignments

Communication

Inspiration

Cooperation

Starting Point

Pages

Features

5.1.3 Page Division

Main Page

The main page will focus as a starting point for the entire audience. This main page needs to seduce the audience, motivate the audience, and inform the audience.

The most important functionality of the main page is, providing information. There needs to be both an explanation about the platform and an introduction that explains how to use the tool.

The landing page needs to attract new users, and seduce the audience into using the sketching materials. The starting point needs to entice visitors to sign up/register for the platform.

The main page also needs to motivate the users. By motivating the audience or new users early on it is possible to provide a genuine reason for using the tool.

Login and Register

The register page will be only shown one time. When a user registers, he will be able to create a personal profile and specify a billing(payment) method. It will ask for real names; nicknames are not allowed.

After the registration is done the user will be able to, stay logged in, or quickly log in every time he visits Sketchlab.

Personal Page

Once a user logs in, he will be able to visit a personal page. This personal page shows user personalia and other relevant information. The personal page should provide, an overview of personal work, access to feedback on work, and access to the grade center.

Groups

The user should be able to visit any groups he is part of after he logged in.

These groups provide an overview of other users that are in the group. It shows the work of other users to provide inspiration and to provide feedback possibilities. These closed communities should make it easier to share work and to exchange opinions and constructive feedback on the subject matter.

The groups provide cooperation possibilities. Students are now able to work on assignments and projects together outside of school hours.

Help

The help page is where the user goes If the user has questions about the platform or any information provided on the platform. The help page contains frequently asked questions (FAQ) and a method to contact a platform moderator.

About

The about page will provide information about the institution and legal matters like, the terms of agreement, and the creative commons license.

It was decided early on that dedicating a page to this information was not needed. links to the appropriate materials will be provided in the footer of the website.

5.1.4 Wireframing

Different concepts for the web pages and features were sketched out during the design process, and ideas that started out as text were quickly transformed into wireframes.

A wireframe or a page schematic is a visual guide that represents the skeletal framework of a website or web app. The wireframes lack style and graphics but instead focus on functionality, behavior, and priority of the content.

The first set of low-fidelity wireframes is used to help arrange all the ideas into working solutions. These solutions accomplish the platform goals in the by combining all the ideas about the information design, navigation design, and interface design, in the best way possible. [see design appendix]

fig 10. Collection of wireframe sketches
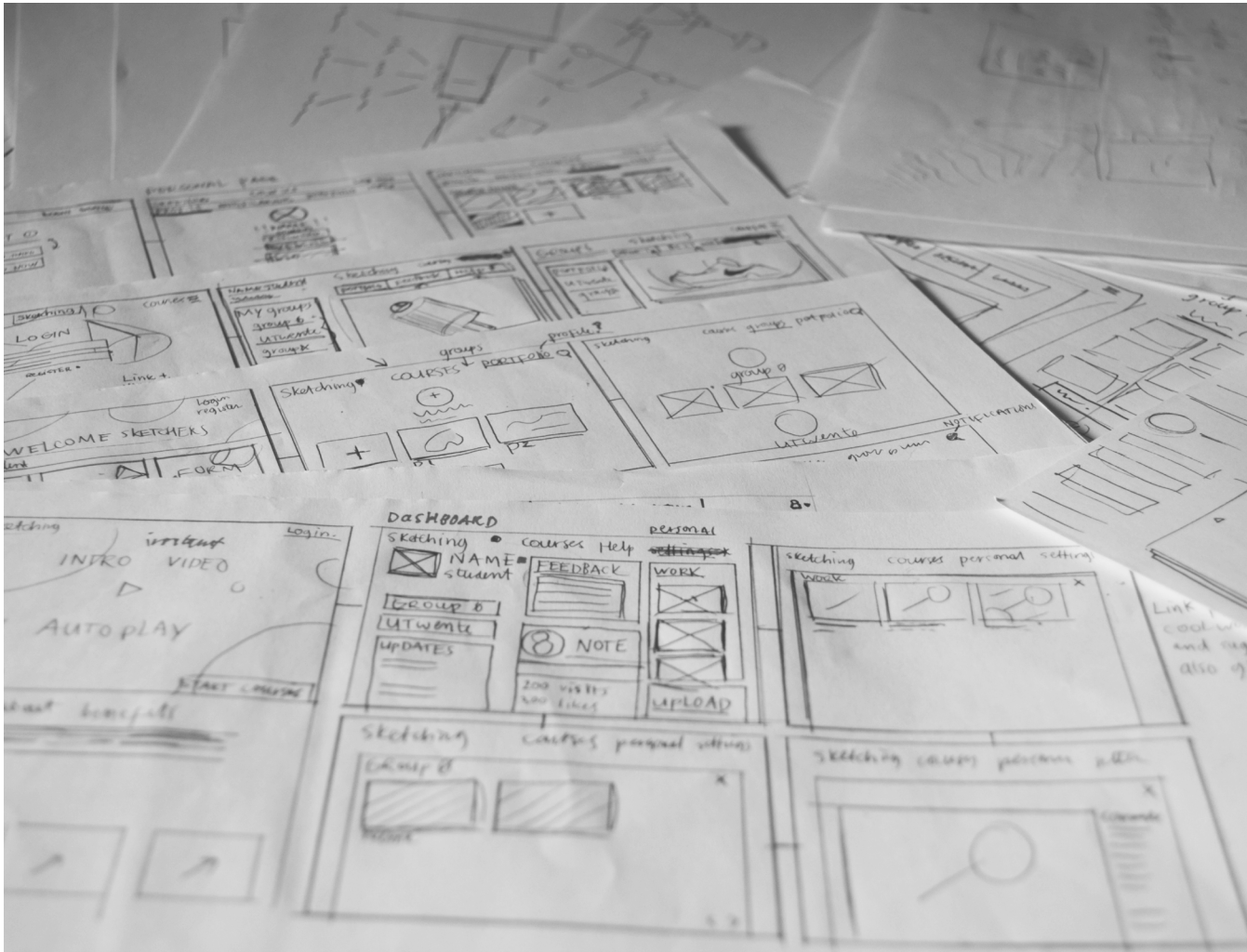
5.1.4 Concepts

The first part of the concept phase, also known as the idea phase was primarily used to explore possibilities within the constrained environment. Together with the clients, several decisions, based on proposed ideas, were made.

Four, albeit with overlapping features, concept directions are created by combining promising solutions.

High-fidelity wireframe sketches and single page designs are used to communicate the ideas to the clients. By keeping the wireframes on paper, it becomes easier to make notes, adjustments, and to combine several concepts. The single page designs, however, are used to provide a general perception of the platforms.

While the wireframes provide the essential features and states from each concept, the single page designs only show how the concept might look. Comparable stylistic choices were used for each concept not to distract from the functionality.

Concept Social Media

The first concept is based on social media designs. Each user has a personal page that can be shared with other people. This concept uses "friending" and "following" functionality that people are accustomed to nowadays.

The design revolves around personalization, because gaining these so called followers is an important part of this concept.
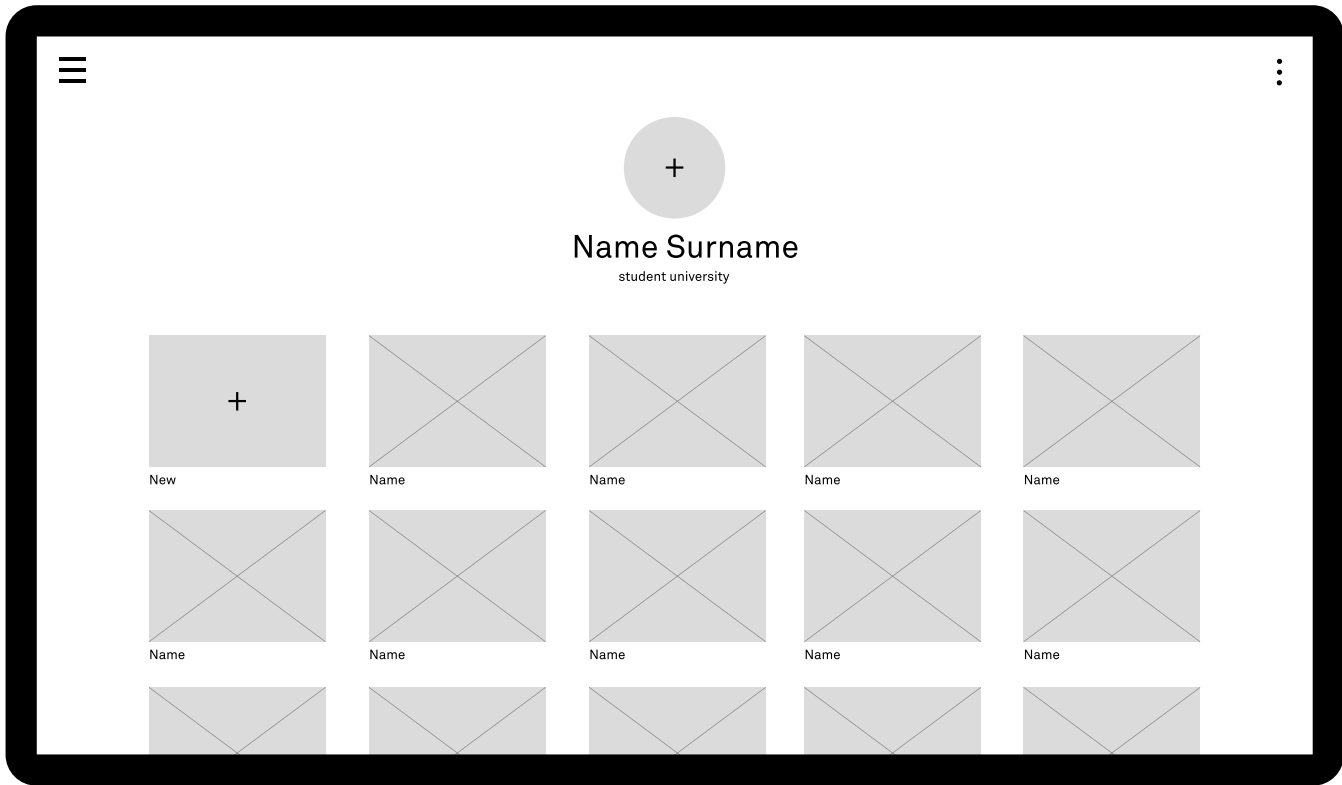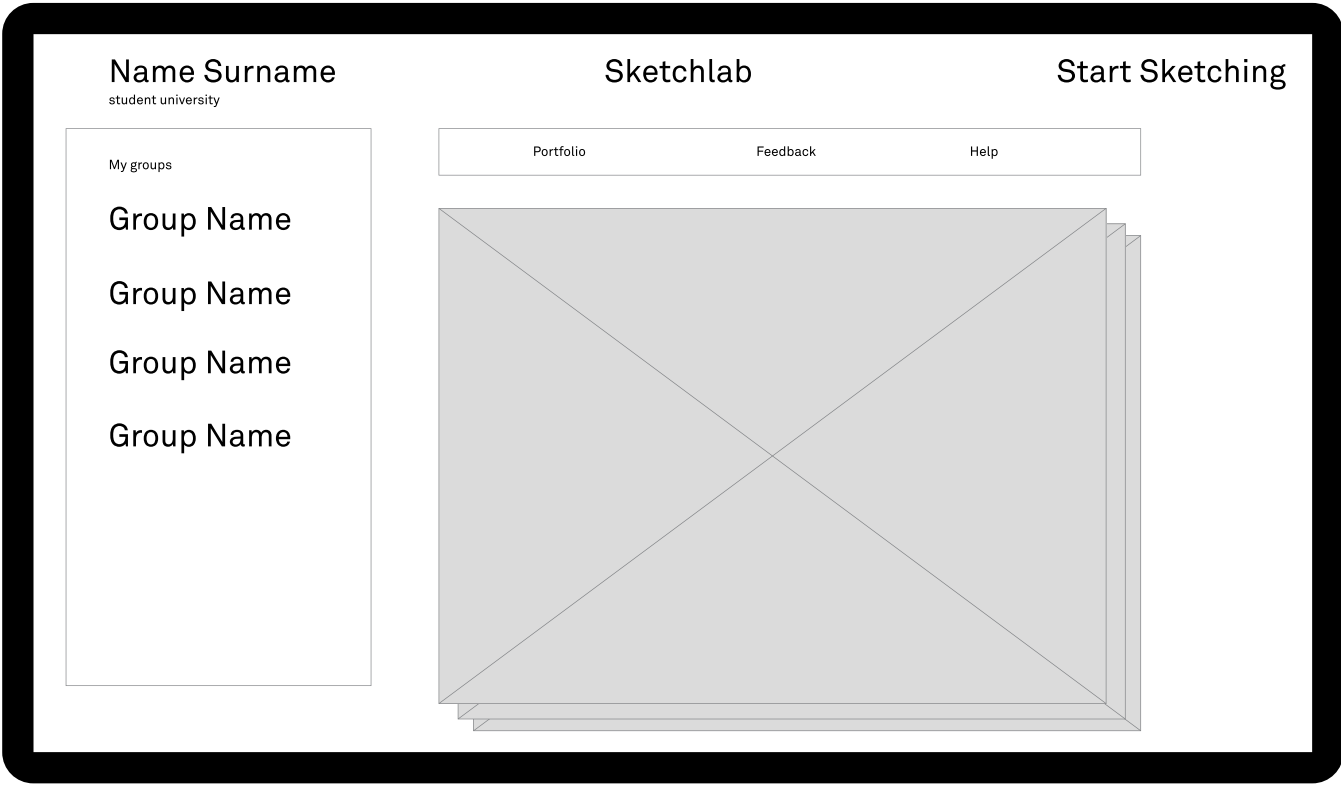
fig 12. Wireframe of the quick access concept

The user can personalize his page by adding information, changing simple styling options, and by having a custom avatar. Apart from the personal info, the user page will only display work created by that particular user.

The main page of the web app will be the so-called discovery page, and it will display important messages, and show a constant feed with work by other people.

The course materials hide behind the menu button. The menu overlay will show a "timeline" with videos ranging from basic to expert. This approach combined with a search option provides a step-by-step guide to learning to sketch without obstructing quick access to the materials.

Concept Quick Access

The second concept provides quick access to all important Sketchlab features. It focusses more on users that already know the platform and less on new users.

The main page is a login screen. However, the background on the main page displays the best work with the student name to act as a motivational tool for both the users and the audience.
At the bottom of the main page, a glimpse of an infographic can be seen. Below the fold, this entire infographic that explains what the platform does, can be seen.

The user will not be able to go back to the main page once logged in. The personal page will be the new landing page until the user logs out. >

fig 11. Wireframe of the social media concept

The main navigation bar that is always available only makes a division between the sketching materials and the personal page.

When the user registers, he will show a step by step process, akin to an installation wizard, on how to use the platform.

Once logged in the user will be taken directly to his personal page. The personal page has a chronological display of completed assignments and provides quick access to groups and feedback.

The course materials are arranged by categories. And each course material is a drop-down menu that displays, the theory, assignments, and exercises when clicked on.

Concept Ribbon

The third concept mostly focusses on the navigation ribbon at the top of the screen. In this concept the profile settings and actual content are intertwined, reminiscent of mobile apps. The navigation makes a distinction between the logo, the courses, and a login/logout option. Once an option is selected several other options, that relate to that page, will become available.

The logo will take you to the main screen, where you can pick between an introduction video and a "get started now" button.

The "courses" option will only be available once logged in. All the course materials will be sorted by difficulty, and the ribbon will provide filter options for the course materials. When a particular subject
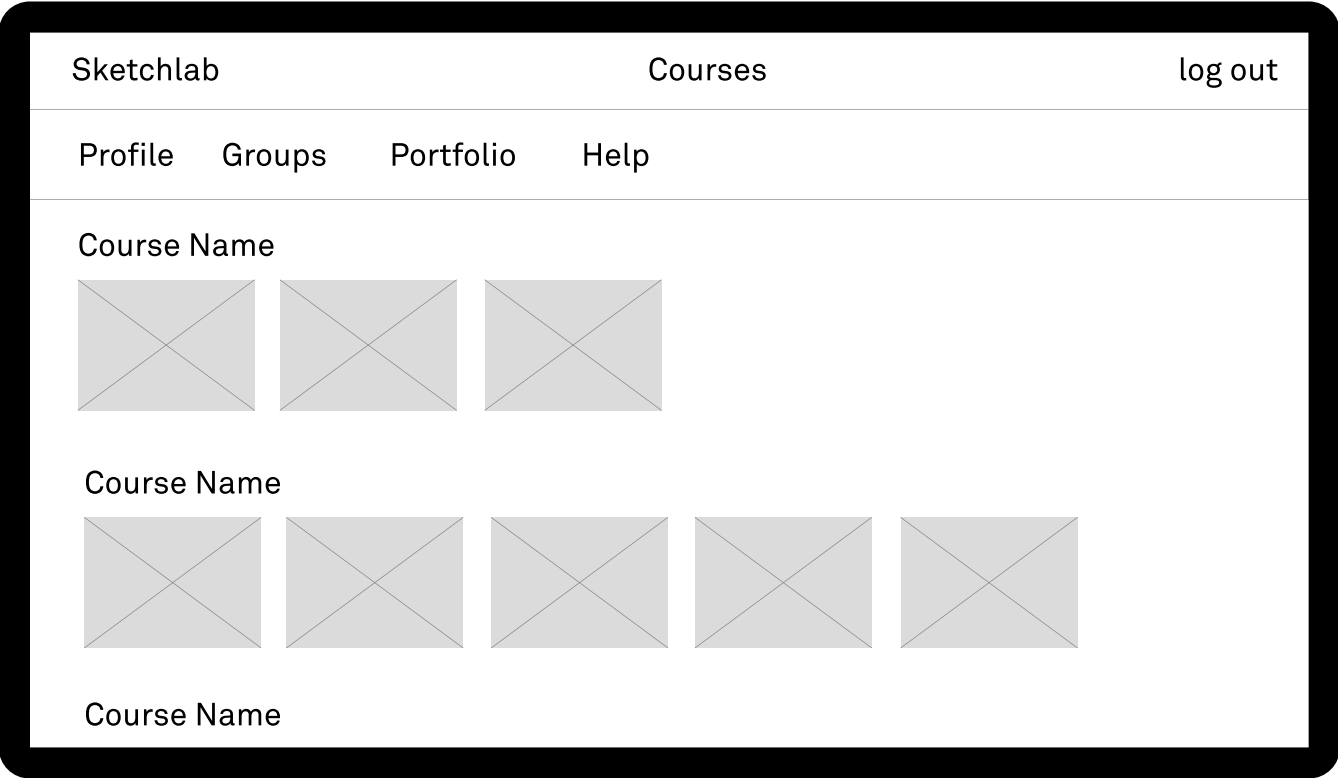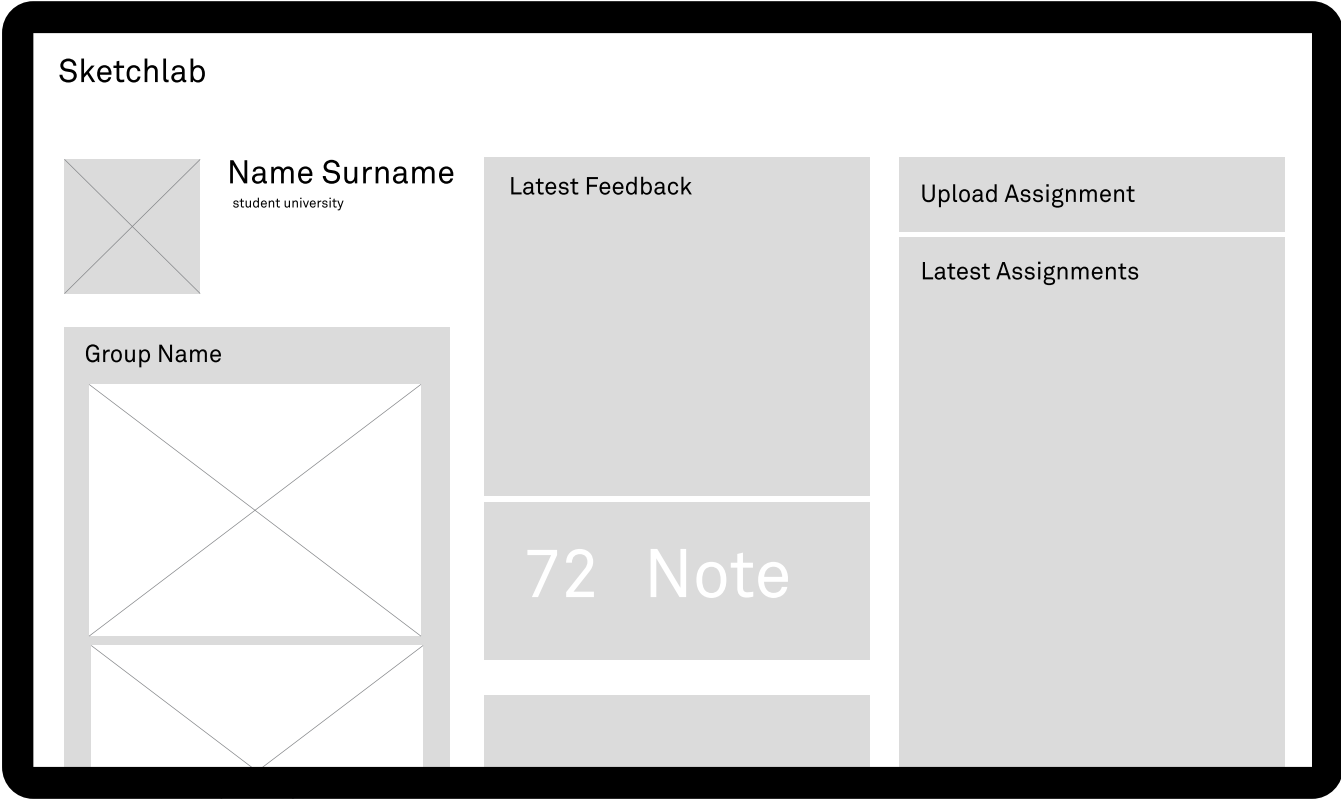
fig 14. Wireframe of the dashboard concept

is clicked. it will provide a video navigation structure. The video structure is an interactive video. One video has been recorded and split up into the following parts: theory, theory examples, an exercise, an application video, and the final assignments. A menu, also in the form of a ribbon, either horizontal or vertical, will provide quick access to each following part.

The portfolio focusses on keeping track of your personal workflow or work in progress. It allows for early on problem detection. Clicking on a thumbnail in the portfolio overview will provide a close up of the image and an overview of all the commentary. An overlay on the thumbnails that uses color and an icon will be used to indicate new commentary.

Concept Dashboard

The final concept is based on a dashboard. It provides fragments of all the information at once, in an ordered fashion. By grouping elements through several design heuristics, it is possible to provide everything at once and still be clear. Less important information is available once the user scrolls down.

The landing page of this concept is an introduction video on the platform that will automatically start playing. Once the video is over the user can read more info, look at the course materials directly or register/login. The main page is not available to the user once logged in; he will be taken directly to his personal dashboard.

The dashboard displays all the information in columns. The top right, the place where the target >

fig 13. Wireframe of the ribbon concept

> group usually looks first, will have the platform logo and personal information. Below the personal information, group information and updates will be available. The feedback, the grade, and the ratings are part of the middle row to be the center of attention. To the right, you can see your latest work and a big upload button. More information on an individual subject will become available by clicking on the more button in one of the tiles. All the information that the tiles display provides quick access to the recent activity.

The course structure is also divided into columns. The materials are divided by subject in the horizontal axis and by expertise on the vertical axis.

Each course material provides a step by step guide. Each step combines text, video and an image in chronological order.

Concept Combination

After several iterations on the concepts, and long dileberation, a conclusive concept was created by combining all the preferred elements from the previous concepts.

The combined concept distinctly provides three seperate overview. The main page will be used to introduce and explain the platform, to seduce and motivate users, and to provide quick access to the personal page and the course materials. All obligatory information that takes away from the actual tool have been moved to the footer.

The personal page provides quick access to all the updates. It uses an overview of the groups and the finished assignments (portfolio).

The final page provides a linear overview of all the course materials, and a filter to provide quick access to specific subjects.

Banner
Main point of recognition, provides a fast login method.

Background
Background displays fragments of the introduction video. Seductive texts and buttons are used for quick access.

Infographic
Visual and textual explanation of the platform goals.

Inspiration
Shows popular images made by Sketchlab users.

Footer
Mandatory information that takes away from the platform goals.

SKETCHLAB

Log in

WELCOME TO SKETCHLAB!

Drawing techniques for Engineers

Play Intro

Start sketching

My Portfolio

Take your classes online

Learn at your own pace   Create a Portfolio   Give and receive Feedback

Get Inspired

Get started Now

University of Twente
Copyright

Terms of agreement
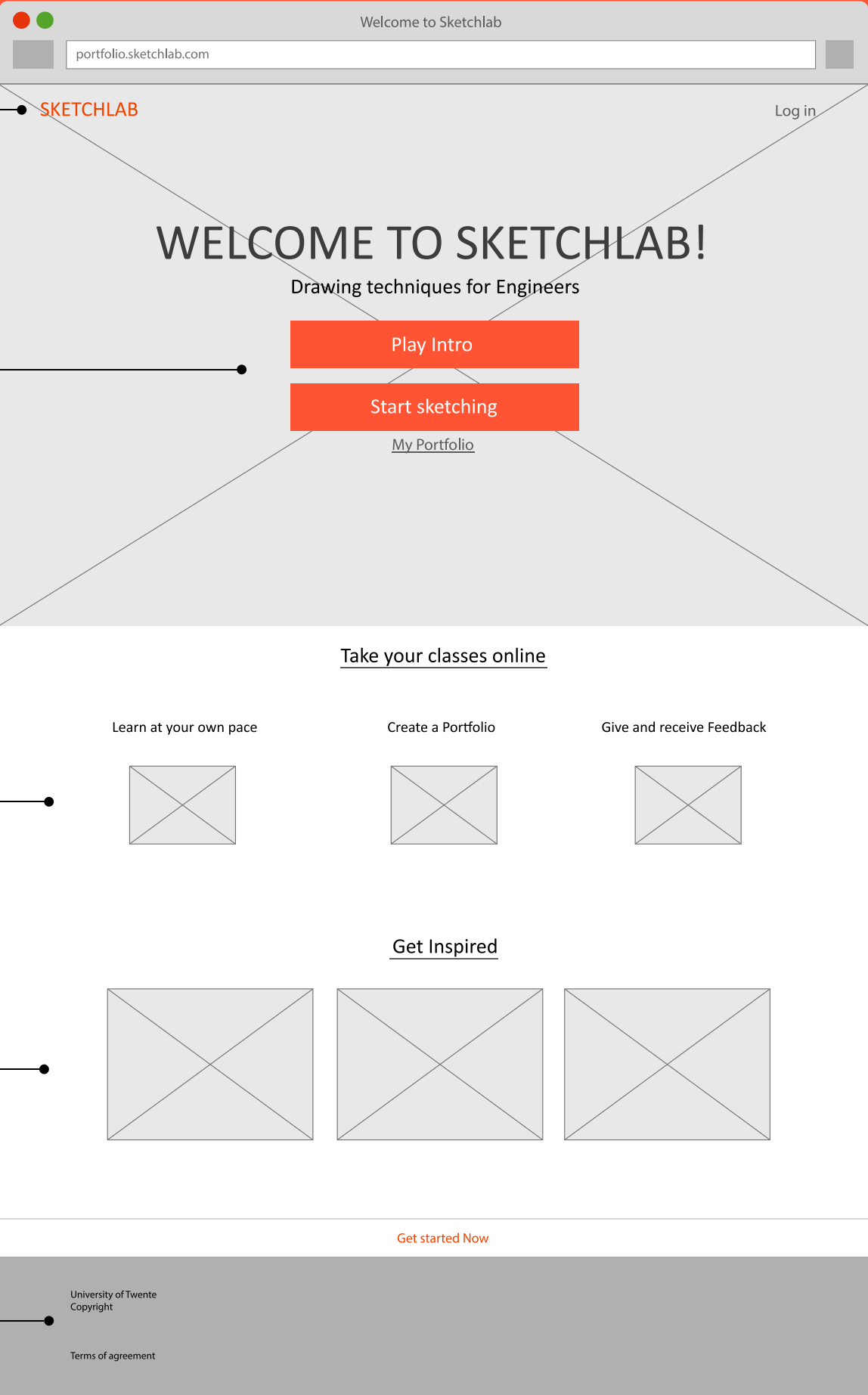
fig 15. Detailed wireframe of the combined concept

In the concept development phase, the final concept is explained. This chapter provides a detailed overview of the elements, the functionality, and the structure, that make up the prototype.

The concept development phase starts with an introduction to the final design. The beginning of the chapter will delve deeper into the appearance of the platform, by discussing the GUI decisions. The rest of the chapter is divided into the pages that make up the web app, and the important features on each page.

The last part of the development phase will give more insight into the prototyping stage. A short overview of technical details and a goal description will provide information for the conclusion and recommendations.

6

6.1

SKETCHLAB DESIGN

To promote usability amongst the users a coherent visual style was created. The visuals are based on the GUI and UX principles and allow for a unified experience across platforms and device sizes [appendix]. The graphics and animations are rooted in the same principles as most contemporary web applications.

6.1.1 Graphic Design

Minimalist and Aesthetically Pleasing
Fundamental design techniques based on grids, space, scale, color and imagery drive the visuals. The visual treatment is based on the flat aesthetic that focusses on functional information.

The colors used in the design will be bright, bold and fully saturated, because these colors are easy to pair with contrasting white or black text and gray backgrounds.

Visual layering

Techniques like textures, gradients and strokes are not needed. Hierarchy shall be reached visually by using real world visual cues like, proximity, drop shadows and atmospheric perspective. A third dimension will be added by layering containers on top of each other. Layered interfaces are inherently made for adaptive and responsive designs.

Motion provides meaning

All motion in the platform is initiated by the users. Simple and short transitions between elements mirror the physical world and provide an extra layer of understandability. Motion takes place in a single movement without breaking continuity.

Fonts

Type is stacked with clear hierarchy and two sans serif fonts are used for the entire platform.
Sans serif fonts are easy to read on screens and do not provide a lot of character by themselves. Multiple widths and sizes of the same font provide enough versatility for a clear structure.

Copy

Copy, or written matter, will be short and to the point. Slabs of text will only provide needed information, and they always use a correct hierarchy. Thus, there will be one headline on each page, and paragraphs will be accompanied by their own headlines.

Descriptive terminology will be used throughout the navigation. While expressive language will be used on the main page and in the course materials, the rest of the navigation will use terminology that embodies information.

Logo

The Sketchlab logo fits in with the rest of the platform. It sports the main color of the platform, a friendly bright orange. The logo is descriptive like the rest of the terminology, and it will be placed in the top left corner, that being the first spot western language users will look
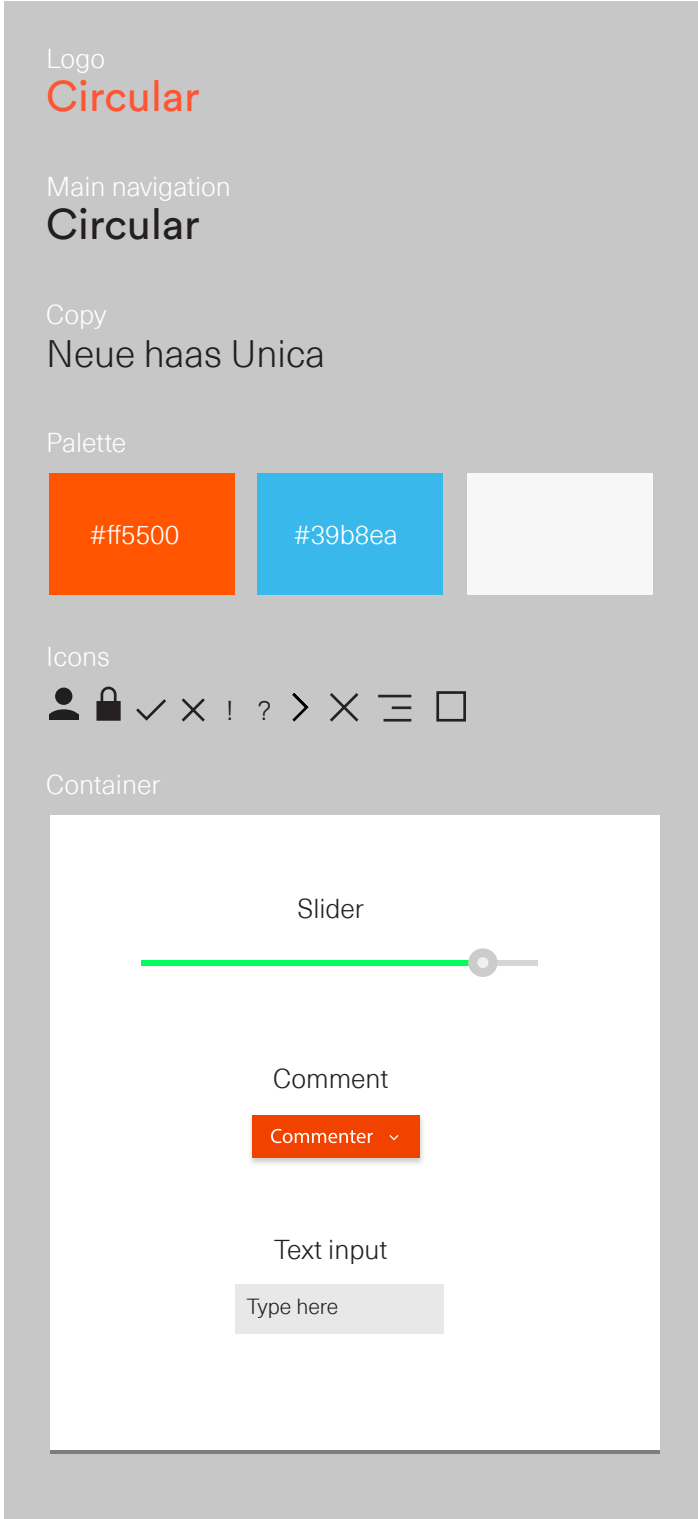
Iconography

Icons are used throughout the platform as an extra visual aid. Icons in Sketchlab are used to, draw attention, call to action, and indicate direction. These icons will provide shortcuts and quick access to information, once the user is accustomed to the platform. Icons are supporting graphics, and they are to be used in conjunction with text-based content, and accurately represent or describe the content.
This style tile provides a quick overview of the design. The style tile includes fonts, patterns, textures and interface elements.

6.1.2 Graphic Elements

The interface consists of many seperate elements. buttons, text, sliders, paragraphs, and lists all use the same stylistic choices to create a coherent platform. On the other hand these elements need to be distinctive enough to provide contrast with the surroundings to stand out.

fig 16. A style tile that shows a compilation of common interface elements.

Logo
Circular

Main navigation
Circular

Copy
Neue haas Unica

Palette

| #ff5500 | #39b8ea | |

Icons

Container

Slider

Comment
Commenter

Text input
Type here

6.2
SYSTEM STRUCTURE

The name Sketchlab is descriptive for the platform, it is an area where you experiment and learn about sketching. Sketchlab provides Design Sketching students the possibility to learn at their own pace, to create and upkeep an online portfolio, and to cooperate with likeminded individuals.

Sketchlab is divided into a landing page, a personal page, and a course structure. These so called pages provide overviews of important functionality that accomplish all the predefined user goals in a non-intrusive matter.

This paragraph will justify choices made throughout the final concept. It will rationalize page structure and functionality design through a step-by-step explanation of Sketchlab.

6.2.1 Main Navigation

The header is the only part of Sketchlab that is always visible. The header, or the area at the top of the web app, provides quick access to the most important parts of Sketchlab.

The top left of the banner always displays the Sketchlab logo, and it links back to the main page because the user expects this functionality from the logo. The top right of the navigation will provide the possibility to quickly log in to the platform, in case the user gets logged out. But when a user logs in for the first time he will be taken to the registration page.

Once the user has logged in, the login button becomes a direct link to the personal page (which is the main page at this point). And a direct link to the course materials will become available.

The bottom of each page will display the same footer. This footer includes information that does not influence the user directly. The footer will hold, copyright information, terms of license and agreement, sponsorship information, and a direct contact option if the user has questions about the platform.

6.2.2 Main Page

The main page or the landing page is the first page a new user will see when he visits the Sketchlab URL. The landing page is one of Sketchlabs public pages, and it caters to the entire audience. The landing page provides direct access to, sketching materials, and to the personal page by logging in or registering.

Information

The first function of the main page is to introduce new users to the platform. The background of the very first page the user sees displays fragments of the introduction video as both an explanatory and visual indicator. A welcoming message leads the user to two buttons that are centralized on the page. The top button will start a video introduction, and the bottom button will bring the user directly to course materials.

At the bottom of the screen, the title for the infographic can be seen. This title makes sure the user knows there is more information below the fold. The infographic combines visuals and text to provide a short explanation about the platform to people that skip the video.

Below the infographic a collection of the best drawings will be displayed. This will provide insight in what you can achieve when you join the platform.

Seduction and Motivation

The second function of the main page is to seduce, or inspire the audience and users. By using personal terminology and proper placement of elements it is possible to cognitively and physically force the audience to become a user. Realistic promises, free samples (course materials) and constant visual feedback that the user is able to log into the platform will seduce new users and make sure old users Log back in whenever they are logged out.

Login and Register

If a user gets logged out he can click on one of the several links that will bring him to the login page. The login page provides university students the possibility to directly log in with their university credentials.

When logging in for the first time, the user picks what groups he or she belongs to, The rest of the information is already part of the student database.

New users that are not affiliated with the university will be provided with billing options. From this personal information a profile will be created.

6.2.3 Personal Page

The personal page, or hub if you may, replaces the main page once a user has logged into Sketchlab. The personal page provides quick access to a message inbox, a gradecenter, a portfolio, and all the groups the user joined. The central content of the personal page can be changed by the use two navigation bars.

Notifications

The first thing a user sees when he is logged into Sketchlab is the notifications panel. This section provides an inbox for all the important messages. The strict hierarchy, color, and iconography provide an understandable overview of all the updates that are important to the user.

Warnings, like an approaching deadline, are placed at the top and displayed in bright orange with an exclamation mark.

Questions or suggestions are placed beneath the warnings. They are used as an extra peer to peer feedback incentive. They are displayed in a friendly blue and use a question mark icon.

Below the important messages, the user can find a feedback feed. This overview shows all the exchanged feedback between the user and his fellow users. The feedback is ordered both chronologically and grouped. When feedback is not yet read it will be displayed in an active state, in this case with a white background. All the notifications link to relevant information.

Portfolio

By using the navigation on top of the personal hub the user can switch to his portfolio page. The portfolio page serves as a progression overview. The portfolio page shows all the assignments made by the user in chronological order (newest assignment top left). Each assignment tile displays a preview of the assignment, a link back to the course materials, the individual points of reference (what was important in this assignment), and how other users rated the project. ›
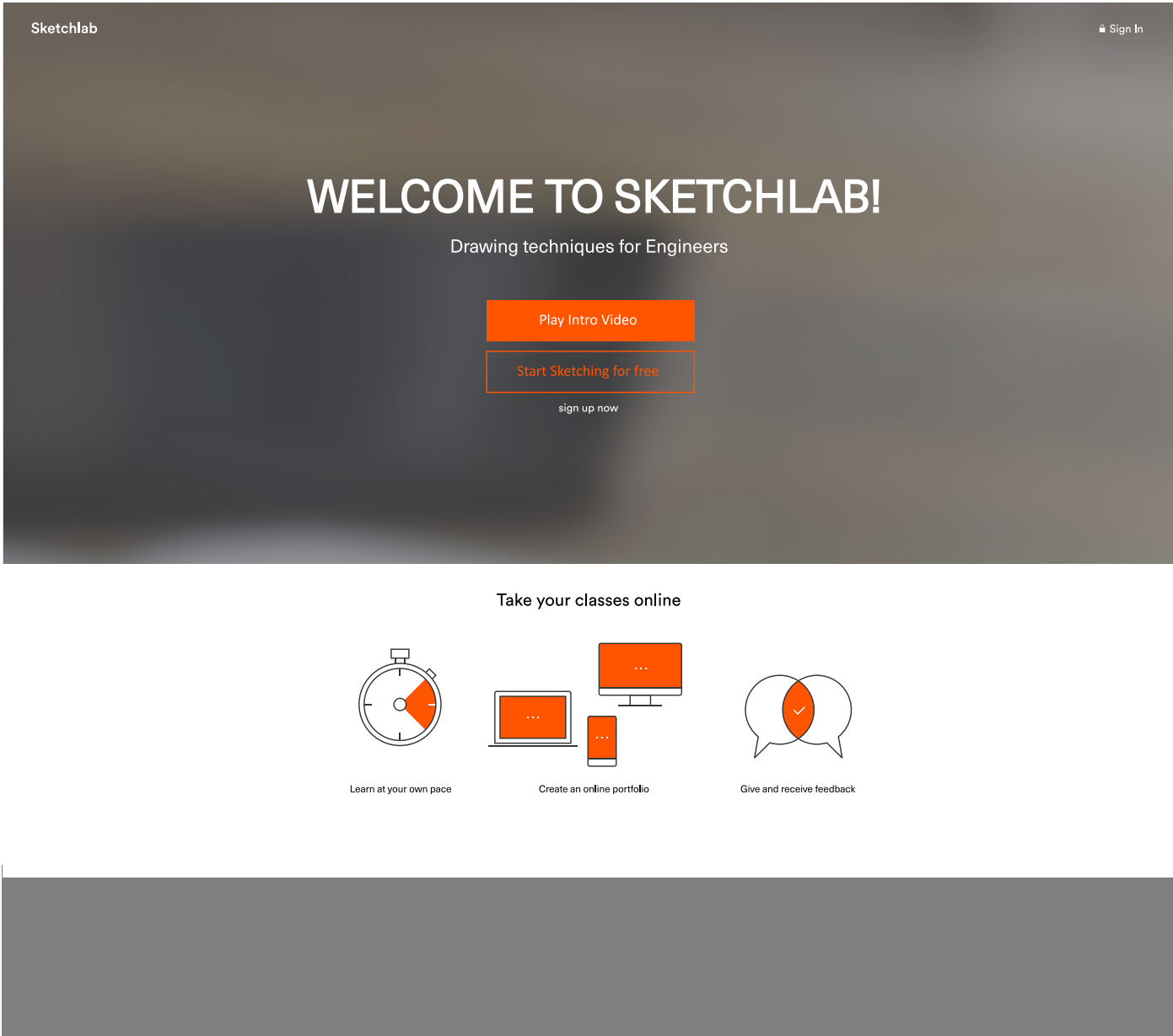
www.kevinvanderven.com/sketchlab

> The rating display provides a quick overview of what people think about your drawing. A colored line combined with a plus or minus symbol and the amount of ratings and comments the user has received used to indicate quickly assignments that need attention.

The user opens the so called project page whenever he clicks on the rating or the image of the portfolio tile.

Project Page

The project page layers on top of the personal page, and it provides a full overview of the drawing, the rating, and all the provided feedback.

The top left of the page displays a link to the course subject the assignment was part of. If a user edits an assignment, the previous version can still be visited by clicking on the version button. Below the course subject name the creator of the assignment, and the date of completion are shown. Every new application layer will have a close button at the top right, just beneath the personal page button. And next to the close button will be either the editing or report button.

The main content is a fullscreen image of the assignment. It displays links to comments that people have left about certain aspects of the drawing. It is possible for the user to leave a comment by either clicking on the drawing or to use the general comment section.

Thumbnails of the exercises or extra materials are displayed below the assignment image. The image in the container and the comment layer will change when the user clicks on one of these thumbnails.

On the right side, a rating system, in the form of a color changing slider, can be seen. This slider is meant to provide an overview of what the general populous thinks about the drawing. This method makes it easy for users to give their opinion about a drawing. Smart scaling could obstruct any mistakes and misusage of the system. Multiple very good ratings could negate one bad rating for example.

The teacher evaluation will only be available once the portfolio is graded. Only hand in assignments will be evaluated. It will use a simple rubric with predefined assignment goals.

At the bottom of the project page will be the comment section. Here the users have another possibility to leave a comment. The comment overview provides a discussion and review section for peer to peer feedback. Student assistants might be used to give appropriate feedback. The comments on the drawing and the comments in the comment section have a direct link.

Grade Center

The Grade Center is a separate overview window because it displays, arguably some of the most important information on the platform. This window will remain empty until the first go, no-go of Design Sketching takes place. The go no, no-go is the first portfolio review, done by a teacher, when a specific part of the portfolio is done.

The grade center shows the grade a user receives from the teacher and an overview of all the arguments accompanying the grade. The arguments are links that link back to the specific assignments.
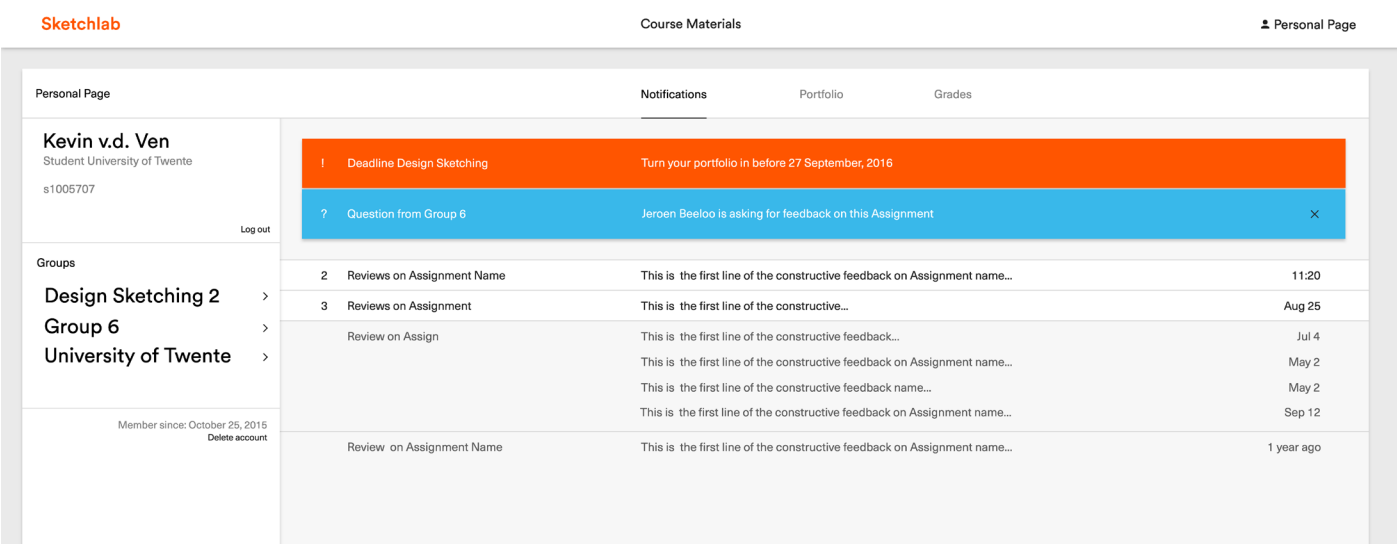
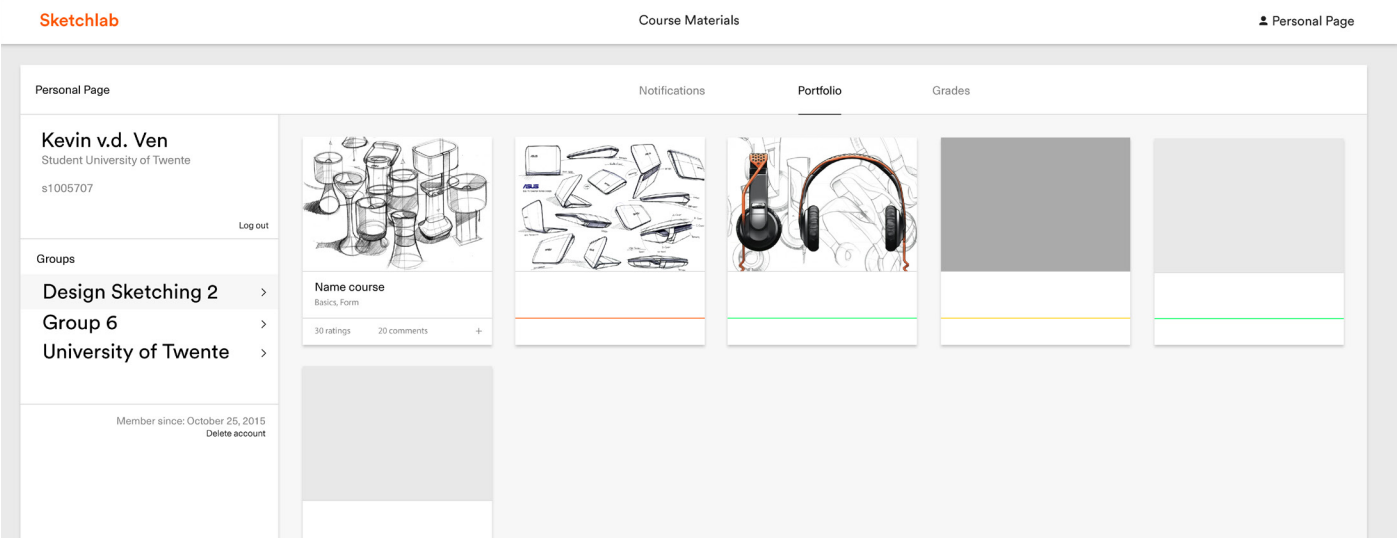www.kevinvanderven.com/sketchlab/personalpage

fig 18. Prototype notifications

fig 19. Prototype portfolio

Group Page

The group navigation is on the right side of the personal page, just below the personal information. The groups distinguish themselves from the other navigation items through placement and appearance. Arrows are used to indicate where the information will be displayed.

When the user clicks on a group both the personal page navigation and the personal page container will provide new information. The group navigation provides a link to the newest work in the group, the best work in the group, and all the members of the group.

The tiles on the group pages only differ on one point with the tiles on the personal page. To preserve biased rating, the user only sees his rating. The overview of ratings is only meant for the creator.

6.2.4 Course Material Overview

The Course material overview needs to provide a consistent experience for the entire audience. Once a user logs in the material overview will display additional functionality. It was decided that the general audience and the platforms users can not be catered to in the same way.

General overview

The general audience craves an understandable overview with quick access to any solution to their problem. For example, someone in the audience might only visit Sketchlab for tips on constructing a drop shadow. The audience will only be provided the bare necessities, which includes only an overview of instructional videos. Progression overview,

assignments, downloadable tools and extra materials are only intended for users.

The general course material overview uses both the x and y-axis to distinguish difficulty. From left to right the level of course materials ranges from basic to expert. The further the user scrolls down the more advanced the subjects will be. All the course subjects after the introduction require advanced knowledge of the previous "level".

A navigation reminiscent of the group navigation provides quick access to the right section. A change in hue will indicate the activity of the navigation and any visited links.

Progression Overview

The Course material overview for the users provides a digital solution to the analog course materials. A step-by -step progression will make sure users finish all the assignments before they can continue to the next phase. Only if the user finishes a level by uploading a finished assignment, a new level will open. A level may provide multiple assignments at once.

Once a course material is finished, it will be "deactivated" and grayed out. The user can still visit the course material, but when he edits the assignment, a new version will be created. (see project page)

The previously used division between the introduction, the basics, the form, explorative sketching, persuasive sketching, and explanative sketching will be provided as a filter to distuinguish between the different types of sketching.

A visual indication of the deadlines will provide a sense of progression and accomplishment.
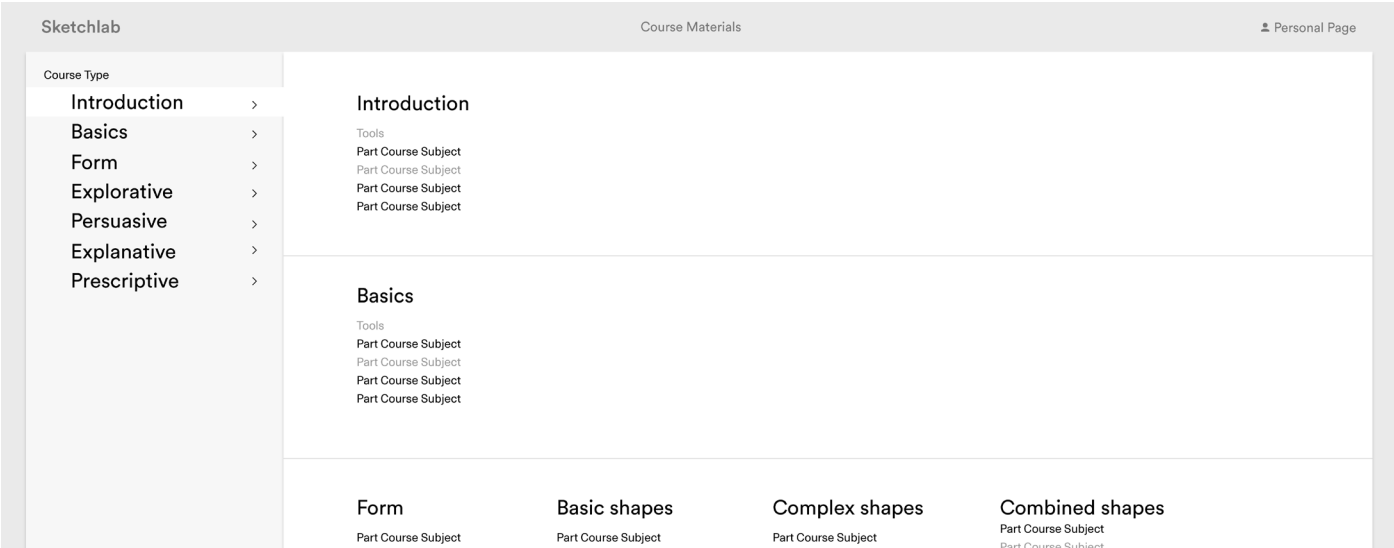
www.kevinvanderven.com/sketchlab/coursematerials

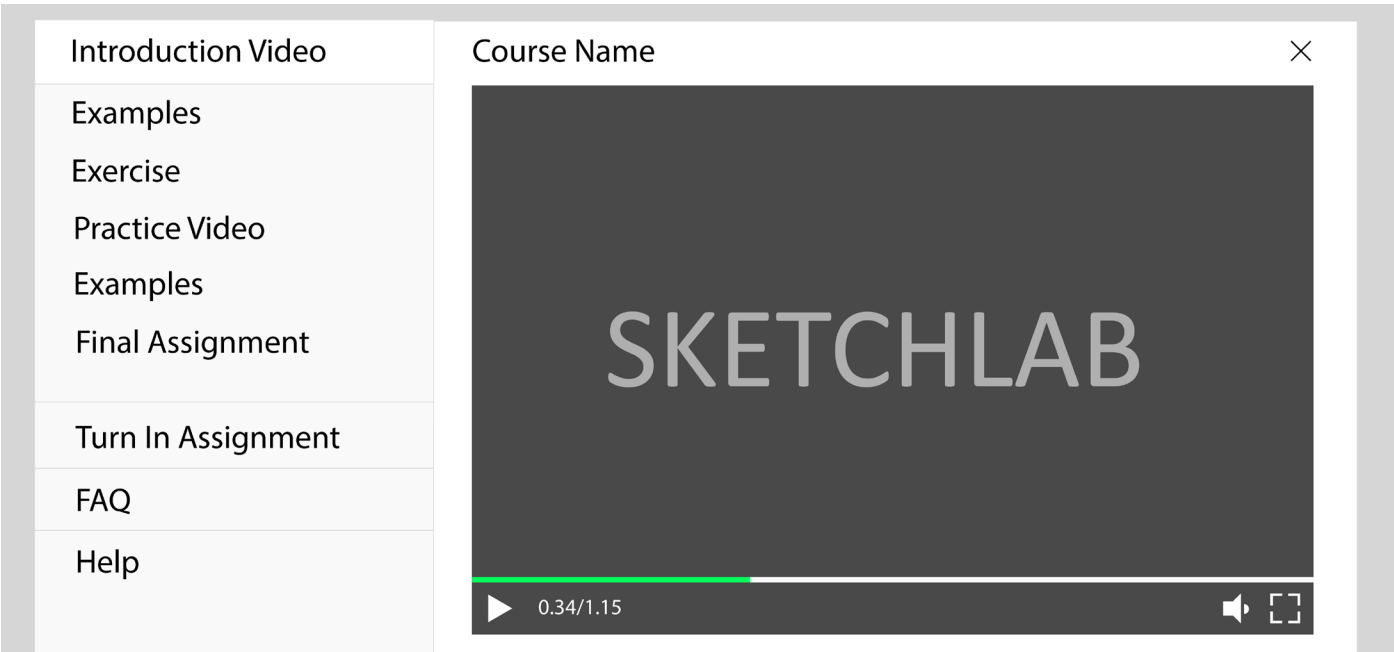
fig 20. Prototype course material overview

fig 21. Prototype course material page

Course Materials

A course material is a bite-sized piece of information on a specific subject matter. The course materials have been based on the Design Sketching curriculum and only treat one subject at a time.

Course Material Page

An overview of a specific course material will be available when the user clicks on a subject. This page often provides the following information; An introduction, subject examples, one or multiple exercises, a practice explanation, assignment examples, and a final assignment. Extra materials in the form of exercises or downloads may be added. This is also the place where a user turns in the assignment, checks the frequently asked questions, or asks for help on the subject matter.

Both the introduction and the explanation use an explanatory video that focusses on the subject matter. All videos are audio visual narratives. In other words, no decoration or background music is used. Every segment of the course material page uses a short written explanation to accompany the materials. And the examples will be provided as images.

Linking the assignment and the turn in point provides a direct connection between the two. The turn in function is placed at the bottom to indicate that there is an assignment that precedes it. Providing quick access to the turn in point is needed for the student that finished the assignment in the classroom.

Combining all the information about the assignment in one place, makes sense from a usability standpoint, and it makes automating and generating information much easier.

6.2.5 The Teacher

The teacher, one of the main users of the platform uses an adjusted version of Sketchlab. The teacher goals however, are both education related and moderation related.

Teacher Page

The personal page of a teacher, or teacher page, is less important to the teacher than the group pages and student personal pages.

The teacher page does not have a portfolio section. Instead, the teacher page only has a notification system and a group navigation.

The notification system will show deadline message when the teacher needs to grade portfolios. The notifications system will also show notifications if there are people with questions about a specific part of the platform or if there is the need for user moderation.

The group links will show all the teacher his groups (or classes in this case). On the group page the teacher can see an overview of all the student work, and overview of the group members, and an overview of predefined exercises that need to be marked. These exercises will be automatically added and grouped under a specific student name.

Moderating

The teacher is the only user that can visit other user pages. The teacher can see all the information a student can see, and he can edit all the same things as the student. Student moderation includes deleting a user and editing or deleting assignments.

The teacher can create new groups and moderate them through simple edit functions. ›

> A teacher can add and change the course materials on the course material overview page. Clear and distinctive editing iconsare placed amongst the structure.

6.2.6 Prototype

The final design is made into a functional prototype that will be used for both usability and feasibility testing in the next stage of the production phase.

The prototype is almost a direct copy of the final design, and it provides a realistic model of the final web app.

The adaptive application is built in HTML, CSS and Javascript, and it works on computers, laptops and other mobile devices. The animation and realistic responses will provide a pragmatic model that can be adjusted and edited throughout the rest of the development phase.

Practical details on the prototype can be found online. Features withing the code have been documented. www.kevinvanderven.com/sketchlab

In the final chapter, the conclusions on the bachelor assignment and the recommendations for Sketchlab are discussed.

The conclusion includes a summary of the subject matter, combined with several findings that were made throughout and after the execution of the bachelor assignment.

The recommendations are based on the conclusion, and provide material that can be used to improve upon the current status quo.

7

7.1

CONCLUSION AND RECOMMENDATIONS

The main purpose of this bachelor assignment was to provide a feasible prototype for Sketchlab. Based on several months of research and years of experience as a student, a teaching assistant, and a front end webdeveloper, a highly functional and realistic concept for Sketchlab was created. The bachelorassignment surpassed the predefined client goals and will provide a suitable tool for future development of the platform.

Sketchlab is an innovative tool that provides and improves online sketching education. Sketchlab represents the primary needs of teachers and students, and it provides a motivating learning environment that can inform and attract new users.

Sketchlab is a web application reminiscent of popular social media and e-learning apps. The adaptive design, based on user experience heuristics, can be accessed everwhere on a caliber of screen sizes at any given time. The main structure of Sketchlab is divided into, the main page accessible by everyone, a course materials overview that combines theory and assignments, and a personal page only available to users that are logged in, The portfolio and group pages are promising solutions that facilitate user progression and personal development through personal feedback and cooperation.

The interface prototype provides a tool that can be used for usability testing and feasibility estimates done by the programmers.

Sketchlab will be developed by using several backend frameworks and APIs that the programmers often use. The senior programmer that coordinates the student programmers will follow a strict development plan based on the MoSCoW that allows room for testing after each iteration of the platform.

However, by using cheap labor the time needed to create the platform will exponentially rise, which needs to be taken into account.

All the requirements in the program of requirements have been met to a certain extent. However, further research on the course materials needs to be done before or during the usability testing, because the combination of digital and analog teaching methods provide an endless amount of teaching possibilities. Once a final course material division has been made a new course structure will be needed. Templates to keep the content consistent throughout the platform should be made. Once these final decisions are in place, a proper editing method for the teachers should be created to accompany the new interface.

Usability testing and feasibility assessments will provide new and vital information. It is important to do these tests before starting the development phase.

The first usability tests will be based on user stories, and both the teacher and the student group should be part of these usability tests.

Together with the programmers a reasonable development planning based the main functionality needed for the pilot and an adjusted program of requirements based on new information can be made.

If budget and time would have allowed it, gamification features could have been added to the platform. By rewarding students for good behavior a better relationship between user and platform can be achieved. A proper "game" could also provide a fun way to quickly provide ratings or feedback to peers.

All in all, the final result can be seen as a big step in the right direction that can potentially be expanded into a marketable tool that caters to the entire design sketching userbase.

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Appendix
Design Process

Bachelor assignment

Kevin van der Ven

2016
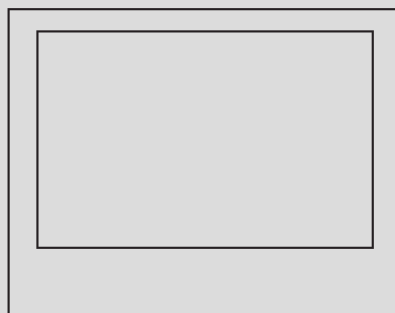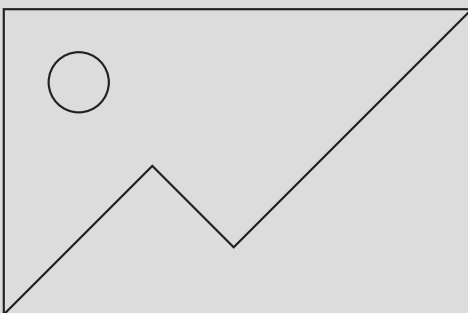
This appendix is a visual extension for the design process, in chronological order. This imagery has been separated from the main report because an extensive part of the design process took place on paper.

Low fidelity wireframes, paper prototypes, and handwritten overviews provided approachable presentation materials for the brainstorming sessions. The "basic" sketches welcome change and user input, by providing an overview of possibilities, and a canvas that can be used for adjustments and commentary.

The sketches have been heavily altered during the design phase and may look confusing. Overlays with additional information will be used to clarify the images where needed.

The first part of the appendix shows an overview of early planning and functionality brainstorming sessions. The client, being part of the target group, provided crucial insight.

1

Client Initial Meeting Designer

WEEK 1

Needs Assessment Feedback WEEK 2 Needs Assessment Feedback

WEEK 3

Research WEEK 4

Site Outline Review WEEK 5 Site Outline

Site Map Review WEEK 6 Site Outline

Wireframe Review WEEK 7 Wireframes

WEEK 8 Content Outline

Site Content Submission WEEK 9

WEEK 10

Landing Page Review WEEK 11 Landing Page Artwork

Inner Page Review WEEK 12 Inner Page Artwork

WEEK 10

WEEK 11 First Prototype

WEEK 12

Usability Testing

Phase

Initation Planning Content Design Development Launch

Involvement

Milestone Importance

Less More

Average Great

A visual information architecture planning was created to map out important stages throughout the design phase. The development and launch phase have not been added yet.

Requirements portfolio systeem

teaching goal sketchbook

learning skills students

- Time management
- Self directed learning — guided learning
- Self evaluation
- peer evaluation — commenting — gro
- reading
- listening
- presenting work
- course management
- motivating others
- learn skill, drawing

portfolio or

- Help inhoudelijk óf open vraag
- important data (in leeromment).
- Automatisch updaten mains, tool cijfers

- Beperkt toegang, anders inloggen
- boom niet samen komen
  zijspoor

- kleuren voor meldingen structuur

- zelf keuze openbaar

groep door docent niet door persoon
klasje.
vrijwillig tekeningen uploaden
concepten
beoordelen portfolio einde
groep & commentaar.

follow system

content → ← updates
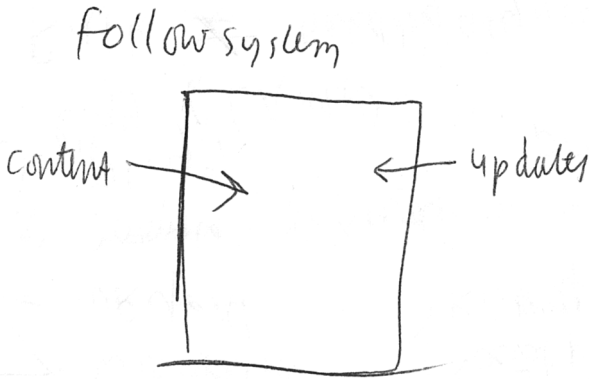
After extensive reading of the provided material the project was kicked off with a first brainstorm. During this brainstorm, several wordclouds were created to plot a general direction for the platform.

t, livestream
op sketches
scenario sketching
internal

d links

combineer
theorie en praktijk

indeling
ing !!

thing? only

tools
commercial? 5
landing page? 2
different from main
page

Zoek optie?
gewoon veel overzichtelijk
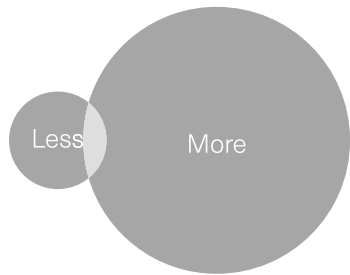PS1 DS2 PS3.
turn in everything

group mats

INTRO   Forum
            communication   Theor
   profile
      collection

Free/prospect   Analog
   activity   digital
      updates

personal page — navigation

upload

main page

teaching
posts   links
                  updates
group
updates

Help function

Q/A FAQ open
          vraag
          systeem
          turn in
          posts

forever gone?

personal main page
make a platform!!
don't make
          a too!

inleveren bij u? personal
          recommendations

kort bondig, veel onderwerpen

portfolio
etches/other   feedback/review — quality control
in profile   work/posts   profile posts — comments
         student
              admin tools
                 teacher
              assignmight
              students

follow/friend groups!   personal

collection

personal

group?
groups?

- post updates to groups
- zelfstandig inleveren
- inleveren bij project — koppeling portfolio
- chronologisch/opbouwend, uitgspect? !! ! make
              main a tool

Rubrik
par 2 peer

BASICS F

UPDATES
! IMPORT INFO
FRIEND/FOLLOW
POSTS/sketches
feedback : $?
COMMENTS
GROUPS
OUT
PORTFOLIO
OUT
REVIEW
STUDENT
GRADES
PROSPECT!
STUDENT— IN
TEACHER
profile
ASS.
ADMIN TOOLS
EVALUATION
PERSONAL PAGE
Questions
STUDENT
NAVIGATIO
ASSISTENT
HELP
SEARCH?
~~QUESTIONS IN~~
Q/A
MAIN PAGE
PORTFOLIO/EXAMPLES
FAQ
OPEN
QUESTION
Li
PERSONAL
GROUP
UPDATES
UPDATES
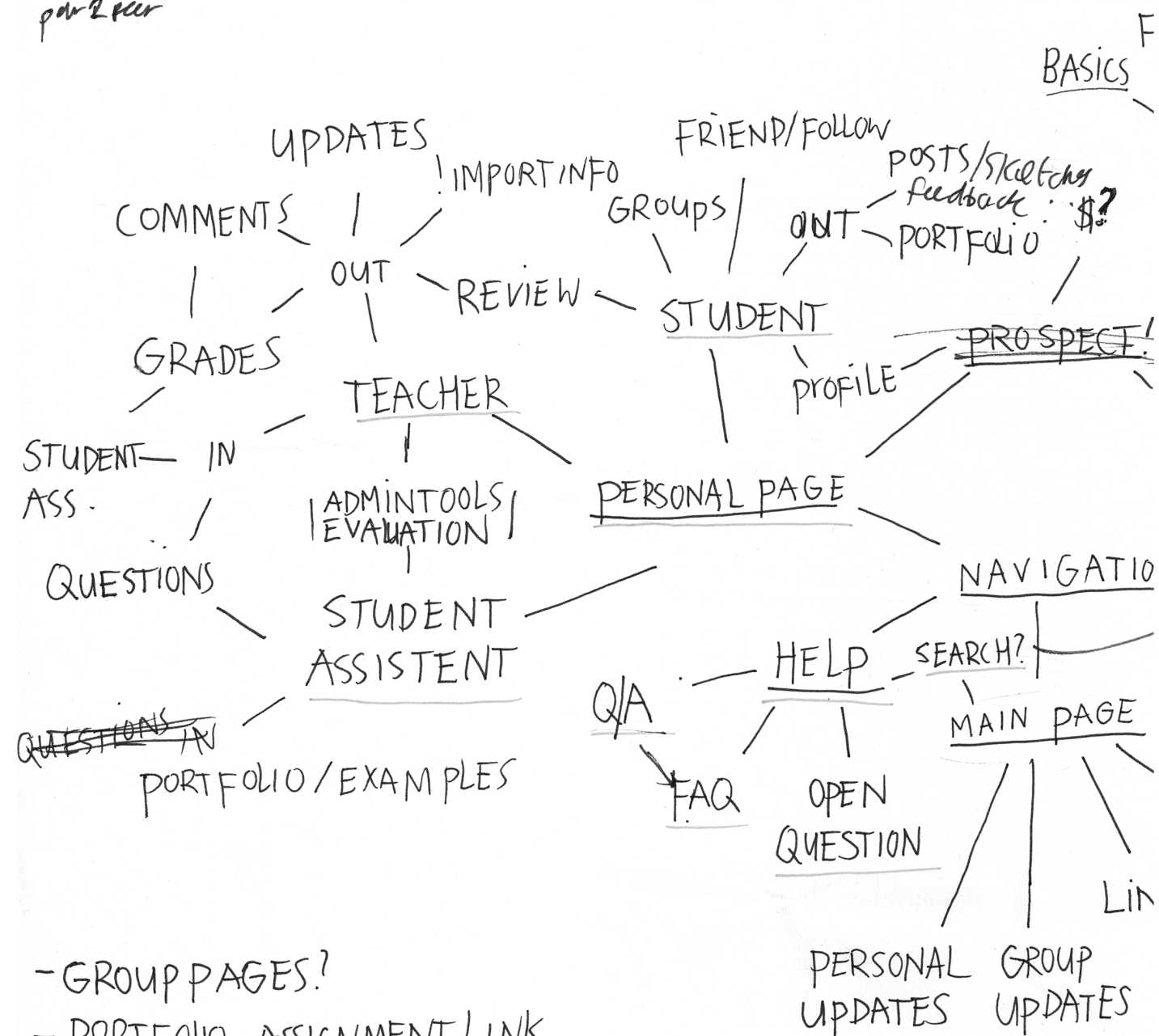
- GROUP PAGES?
- PORTFOLIO - ASSIGNMENT LINK
- LESSON PACKAGES - EXPOSE ALL COURSES
- CHRONOLOGICAL / ALPHABETICAL
- MAIN PAGE FOR OUTSIDERS —
- SEARCH

FORM IDEATION
COMMUNICATION
DIGITAL SKETCHING ? Digital basics ?
verurlg
DIGITAL
EXAMPLES EXCERCISES
ANALOG
THEORY — PRACTICE
EXTERNAL
INTRO
INTERNAL
SUGGESTIONS
COURSE MATERIALS
1 teaser
2 na inloggen ziehbur
+ betala
ION
UPLOAD ass. / TURN IN
COMMERCIAL LANDING PAGE ?
! IMPORTANT INFO

NKS / Tips, TRICK
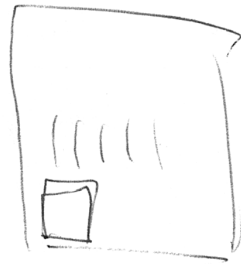
- commenting — profiles
          — work
- user profiles — user page — posting
                              work
                              avatar name statistics
                                      title/rank
+ front page
- COURSES — Structure
          — videos
          PP stream/direct content
          User levels — User Fee — student — assistent — teacher
                                                        admin
          grouping — group updates
                                    No-login   How werum
                                    front page
                                    student   docent
          belonging info irregularly but very
                          install

users ambition
text   video
post
powerpointlike

front page

portal

messaging apps → more lines   open source — sneller
web app framework   CMS → website   meer oathellin
CMS not secure   framework → web app
ASP.Net   vine/instagram
Railway   angular   Google+
Plone   knockout   facebook
Django   social netwerken   youtube
pytlabel   twitter
Yii   — white label netwerk softw.   PHP Fox
access control   — hosted dont yourself   — socialengine
(ite   concrete5   Ning?
                 wordpress   social platform
                 DRUPAL   Kickapps
drupal   Joomla Oxwal
high   Q(cq5   Drupal (more of a framework)
ustom   xy (CLAMP) very modular django CMS
budd   No handling asynchroog icons
                     direct chat
                 odle.js
                 ocket.IO

web 2.0 — dynamic content   CMF
API disqus   CMS
     overview
CMS = heavyload   web app framework
      bloat   code referenc Social network
                    — SocialGo — website builder
CMS — social engine
      fineline
CMS = becoming source code access   groot
       framework data ownership   reel function
CMS = small   aanschaf kosten
Framework = large   vrel aanpass
 — no coding   concessies
 — no maintenance   betaalde plugins
 — pay.

symfony
PHP frameworks — codeIgniter   IPv Django — Python
                Cake PHP — goedwerkende voorwaardig   PHP zend
combine frameworks FuelPHP   deelnemers
                             wlf gebaud gean template

The second part of the appendix shows a collection
of wireframes made during the ideation phase. The
sketches often use an intermediate shape to mimmick
the small and big displays.

Only the best ideas have been presented to the
clients. Several complementary ideas were combined into
concepts. The low fidelity concepts provided possibility
for guided client input.

2
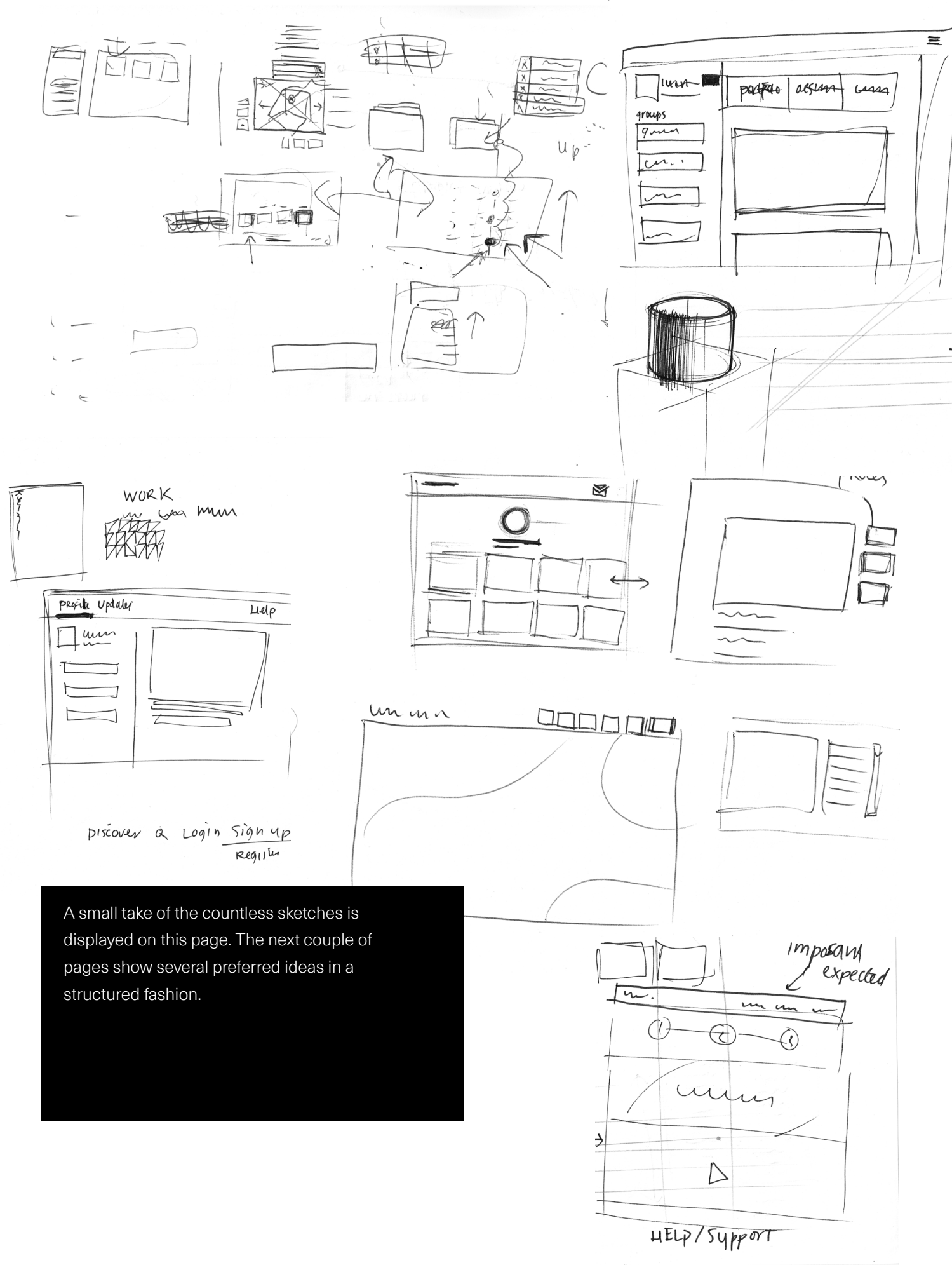
A small take of the countless sketches is displayed on this page. The next couple of pages show several preferred ideas in a structured fashion.

WORK

Profile Updater   Help

Discover Q Login Sign Up
Register

HELP/Support

important expected

LOGIN

JOIN

LOGO   LOGIN REGISTER
                                       LOGO

LOGIN REGISTER

AUTOSTART INTRO VIDEO

DRAWING STUDENT +LINK

exp COURSES

BELOW THE FOLD

Help

COURSES

LINK   WALKTHROUGH

DISCLAIMER   COPYRIGHT

BEFORE SCROLL

AFTER SCROLL

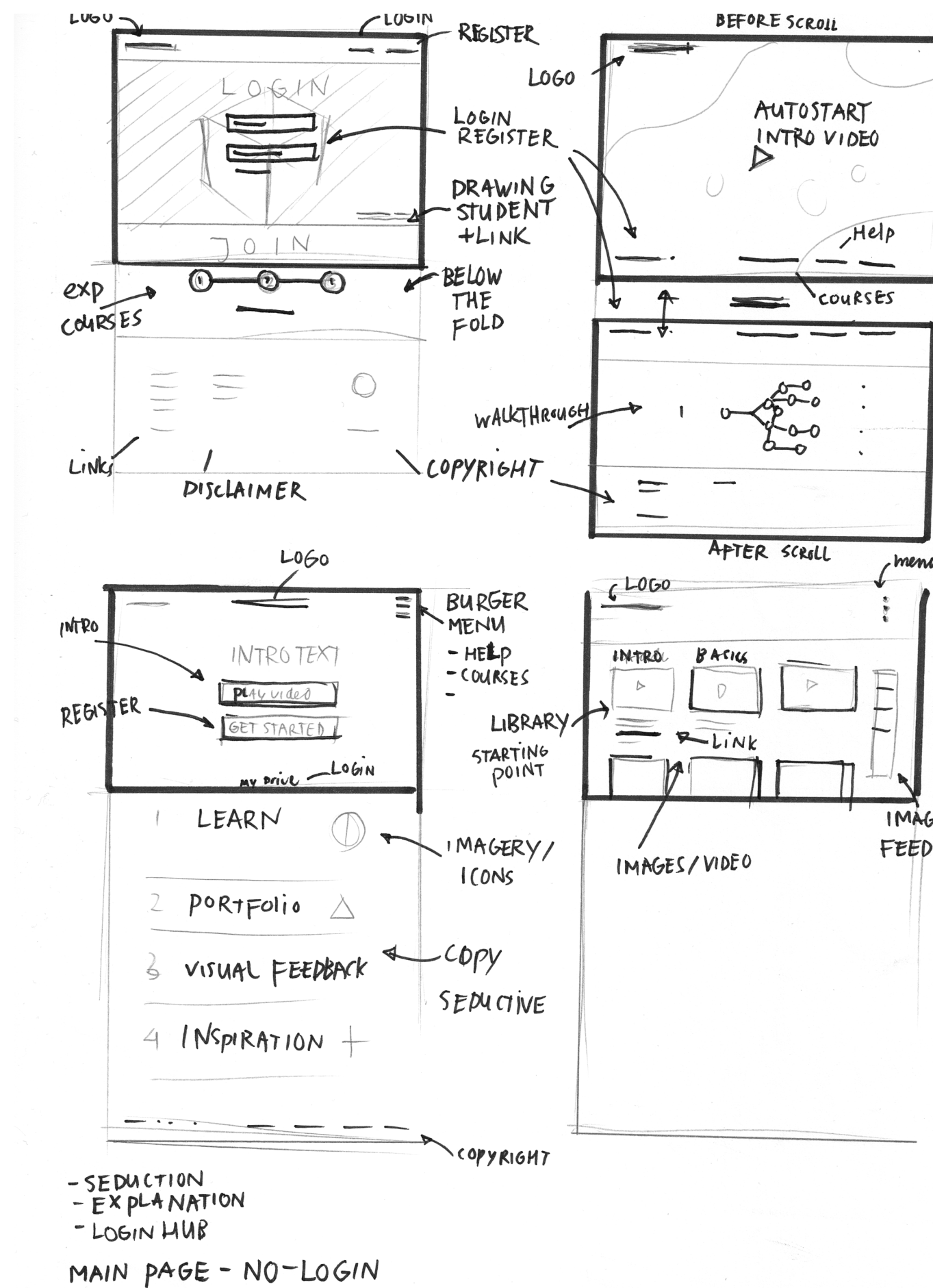LOGO   BURGER MENU
                        - HELP
INTRO   - COURSES
INTRO TEXT   -

PLAY VIDEO
REGISTER
GET STARTED   LIBRARY
                        STARTING POINT
MY DRIVE   LOGIN

1 LEARN   ◐   IMAGERY/ICONS

2 PORTFOLIO △

3 VISUAL FEEDBACK   ← COPY

4 INSPIRATION +   SEDUCTIVE

COPYRIGHT

LOGO   menu

INTRO   BASICS

LINK

IMAGES/VIDEO   IMAG FEED

- SEDUCTION
- EXPLANATION
- LOGIN HUB

MAIN PAGE - NO-LOGIN

LOGO
CLOSE ✕
BASICS
+
INTRO! collapsable!
ANOLOG
COURSES = MENU
FORM IDEATION COMMUN
submenus
DIGITAL
FOOTER
INFO
COPYRIGH

INTRO No editing
BASICS
NEXT

CHRONOLOGICAL subjects
COLLAPSE ↓
INTRO +
BASICS − or ✕
1
2 MAYBE NUMBERS
3
ORDER →
FORM +
IDEATION +
COMMUNICATION +

INFO OVERLOAD VS USABILITY
BASICS FORM DIGITAL
IDEATION
INTRO
COMMUNICATION
△
☆ symbols?
?

INTRO BASIC un
sub area
INTRO
▷
HELP AT COURSES PAGE.

- COURSE OVERVIEW
- STRUCTURED
COURSE MENU - NoLogin / Login

- App approach
- No mobile-first
- NO ENDLESS SUBMENU
- NO going in and out of pages

AVATAR + NAME + TITLE
PERSONALIA
○ NAME portfolio Feedback sketch
NUTU
NAME
COURSES
GROUP
GROUP
pr. 01
Groups
NOTIFICATION word
COMMENTS
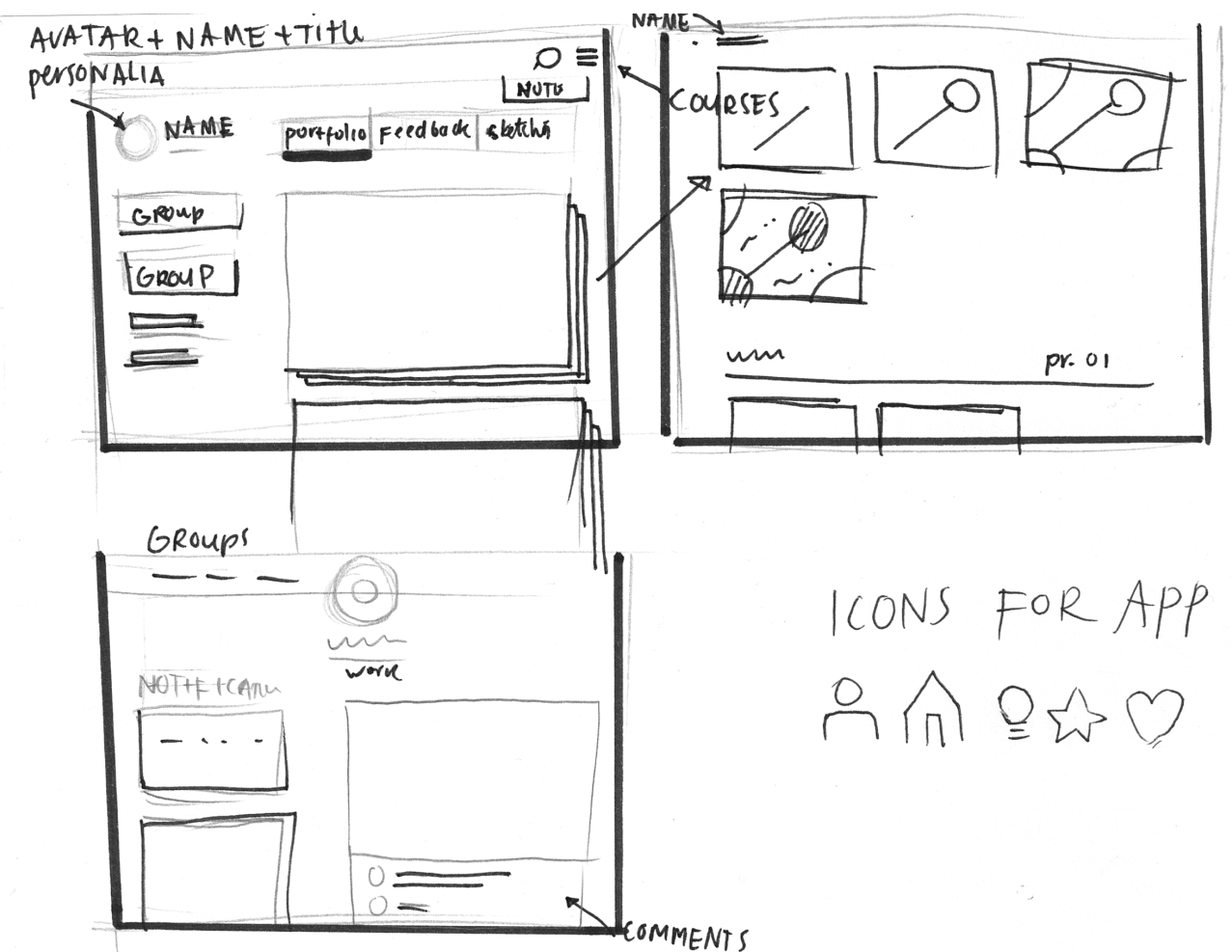
ICONS FOR APP
☺ ⌂ ⚲ ☆ ♡

- koppelen inleveren en les

personal / Mainpage
UPLOAD project
COURSE 2
GROUP 1
Utwerk
courses portfolio
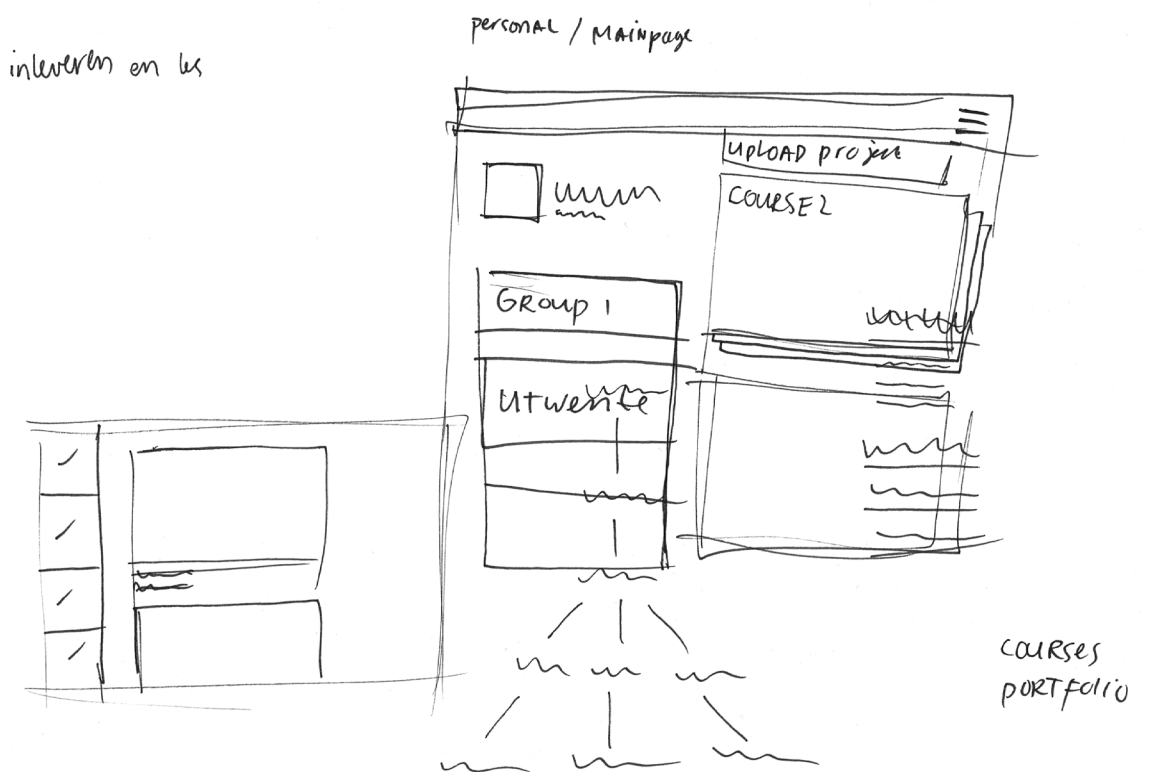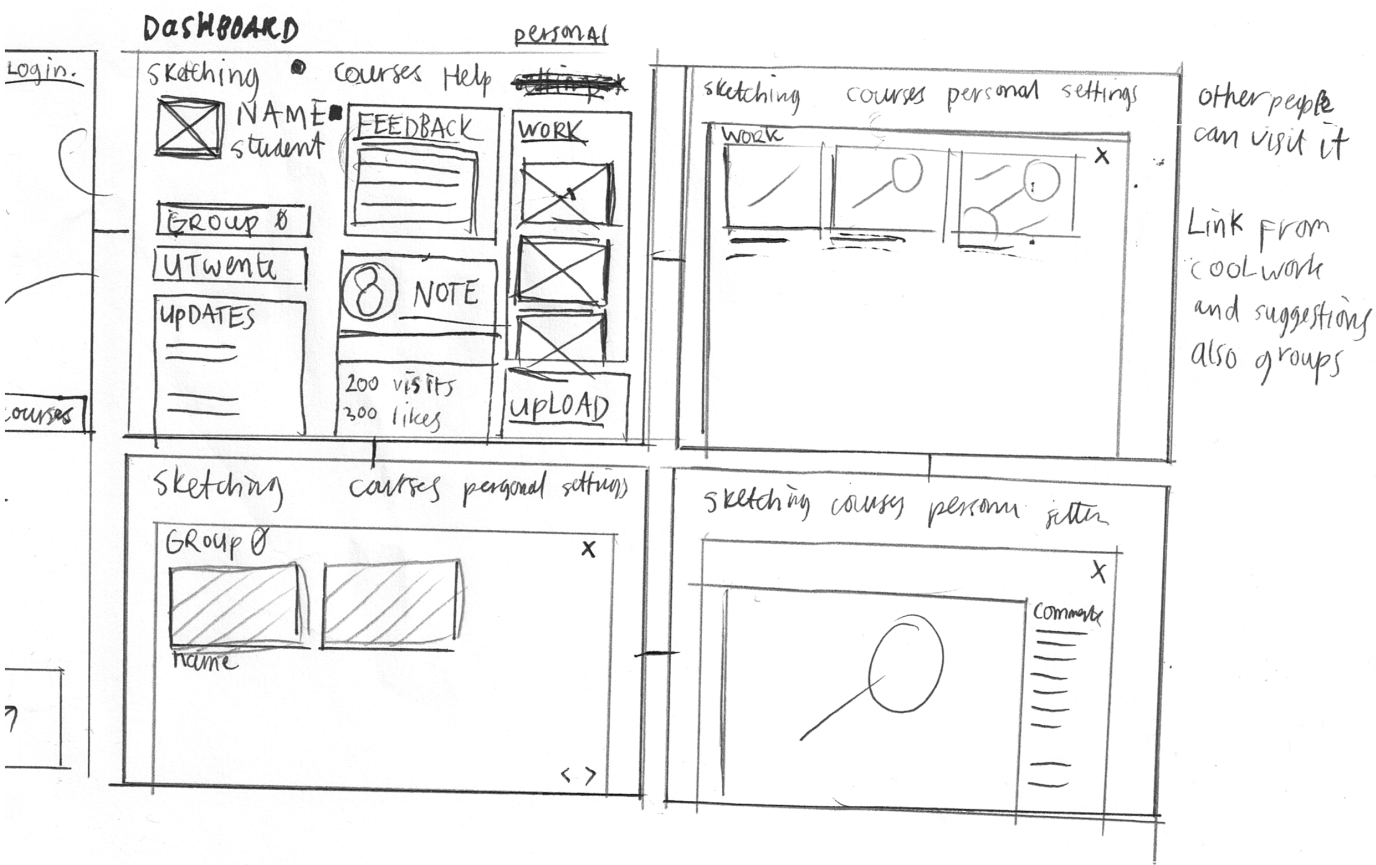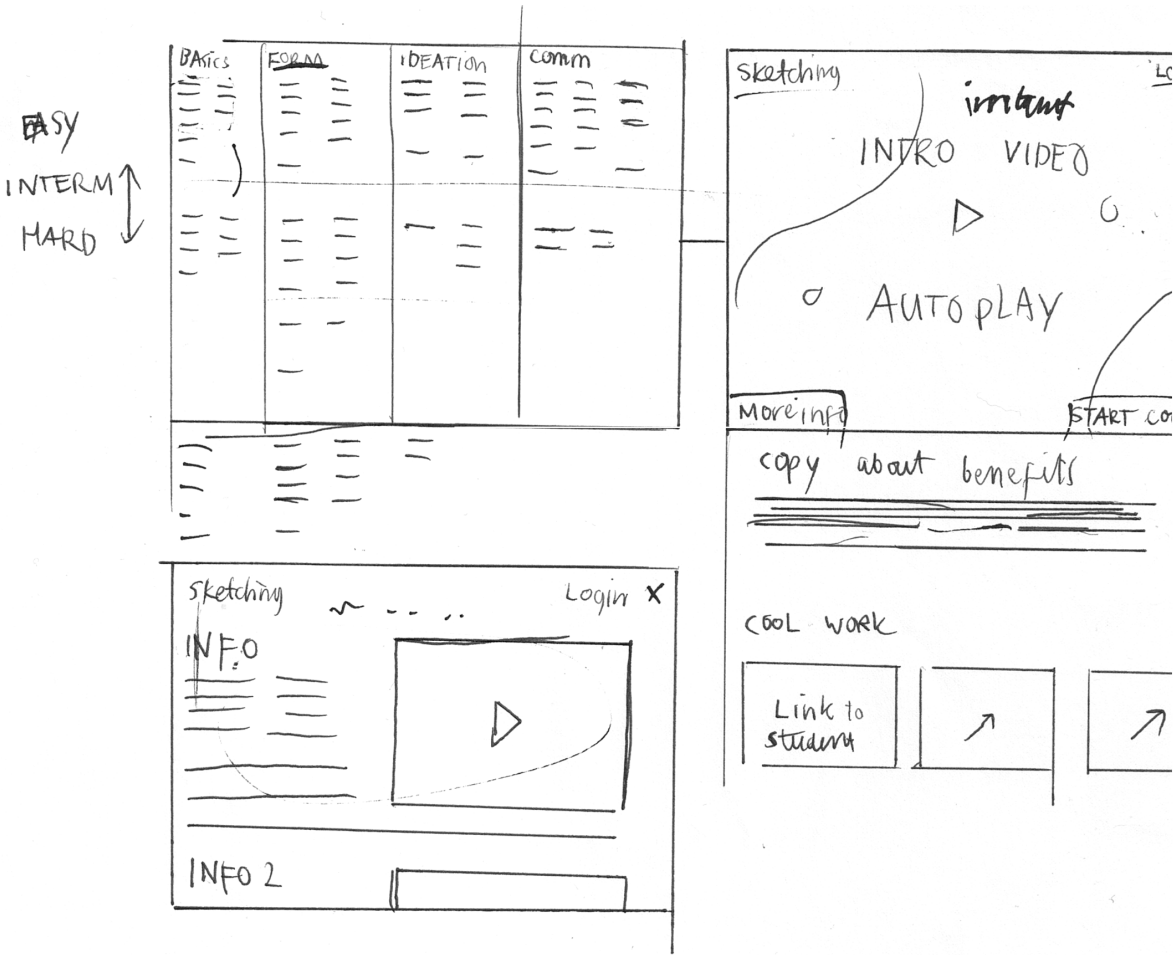
The following pages display the paper concepts that were used to communicate promising ideas to the clients. These concepts and new client/ target group insights are eventually combined into one final concept.

COURSE MATERIALS

MAIN PAGE

PERSONAL PAGE

FORM COMUNICM HELP

Sketching — login surm

INTRO	+
BASICS	+
FORM	+
IDEATION	+
CRMMUNICATION	+

basic   expert

1
2
3
4

Sketchng — login surm
INTRO
BASICS
FORM

Sketchng — login surm
BACK TO COURSES

COURSE NAME
1
2
3
4
5

VIDEO
▶

FAQ ?

Info About

SKETCHING

INTRO TEXT ①

PLAY VIDEO INTRO

GET STARTED NOW

MY PAGE login

LEARN ✏

PORTFOLIO ○△

FEEDBACK ✓✗

INSPIRATION ⬡

LINKS COPYRIGHT DIS

LOGIN SIGNUP

DISCLAIMER

SKETCHING   COURSES   Log out
PROFILE NOTIFICATIONS PORTFOLIO HELP

⊗

!!NAME!!
STUDENT
PASSWORD
WEBSITE
BIO

Sketching   Courses   LOG OUT
PROFILE NOTIFICATIONS PORTFOLIO HELP

TURN IN ASSIG.
20- click here

Drawing name ②   comments
Drawing   ③   FEEDBACK
                ④   GROUP NOTES
Drawing   UPDATES

▼

2MB
PNG

SKETCHING   COURSES   LOG OUT
profile NOTIFICATIONS PORTFOLIO HELP

COURSE NAME — link naar vak

+

OTHER COURSE NAME

SKETCHING   COURSES   LOG OUT
<   UPLOAD   CLOSE BACK!

PNG

+

↓ DOWLOAD

COMMENTS

Normal

SKETCHING   COURSES   Log out
<   clox X

Sketching   courses X

▷

INTRO VIDEO
AUTOSCROLL on finish

FORM   IDEATION   COMMmm

[Sketching]   courses ≡

LOGIN

REGISTER •

Li
NA

INTRO INFOGRAPH

① ~ ② ~~

LETS WATCH COURSES

INTRO VIDE

university Twente

courses ≡

Link +
NAME. studentdm

~ ③

ES NOW

copyright

NAME student   Sketching   courses ≡
yyyy

portfolio | Feedback | Help

My groups
group 6 +
utwente
group X

GROUP 6   Sketching   courses ≡

NEWEST | BEST work

portfolio
utwente
group a

NAM studm   sketching   courses ≡

COMMENTS ⤓ X

kubus ~~~~

COURSE NAME
Assignment
VIDEO
MATERIAL

cub

cube
psm

Sketching   courses X

BASIC

EXPERT

FORM   IDEATION   COMMmm   ANALOG
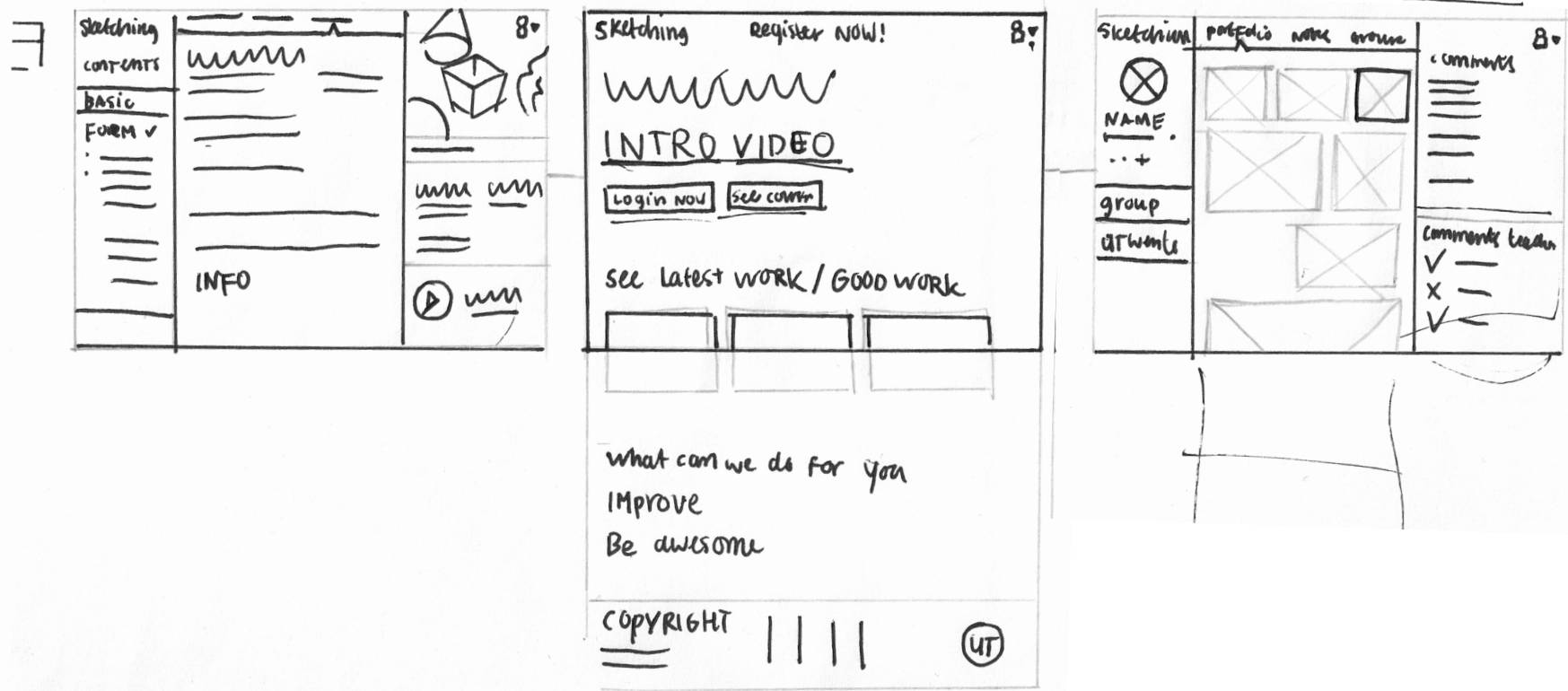
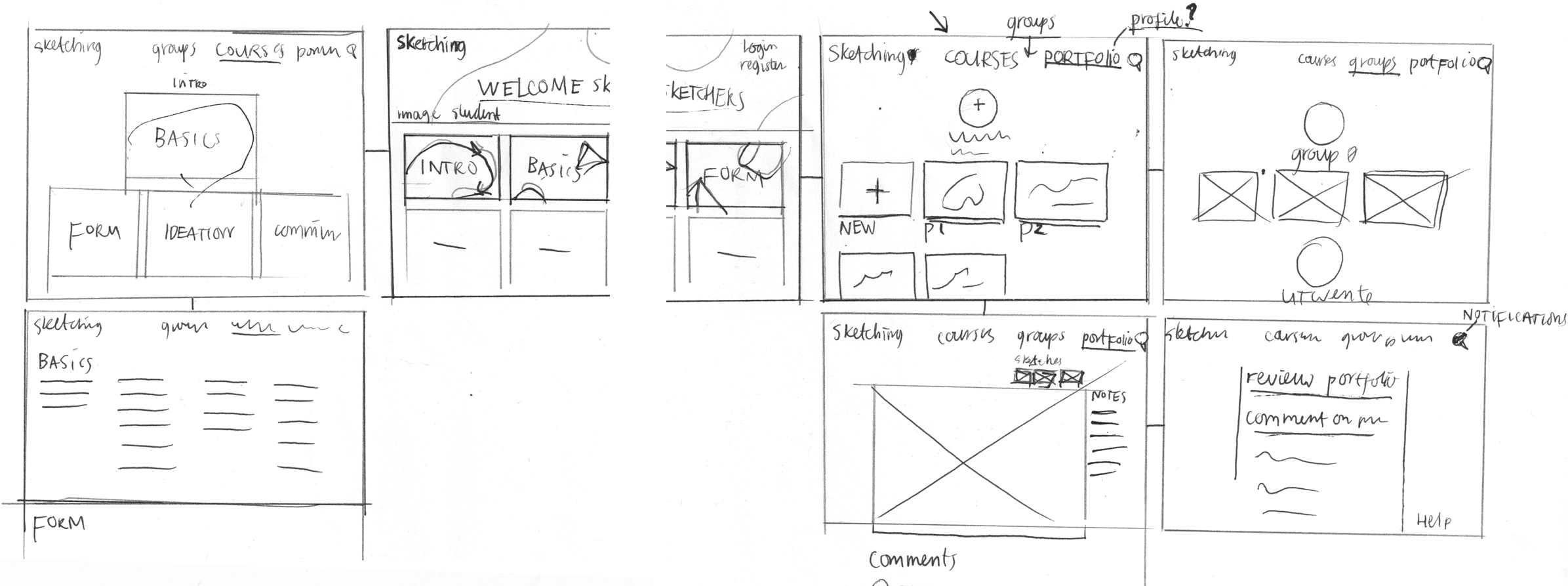Digital

The last part of the design appendix displays high fidelity
sketches that are used in the final part of the design
phase. The final concept wireframes are realistic fullpage
sketches. The final concept and the prototype were
based on these sketches.

3

SKETCHLAB

register | Sign In |

WELCOME TO SKETCHLAB!

Drawing techniques for designers

| PLAY introduction video |

| Start sketching for Free |

Go to my portfolio sign in

Take your classes online

Learn at your own pace

create a portfolio

give and get feedback

Get inspired

√200 x9

√300 x4

√50 x2

| GET STARTED NOW! | - free

WELCOME TO SKETCHLAB!

Drawing techniques for designers

login or register

NAME.

Surname

E-mail address

Password 👁

automatic login   Forgot password

LOGIN

Login with Facebook

Login with twitter

Login with google+

by logging in you agree to sketchbabs

Terms of service and privacy policy

SKETCHLAB

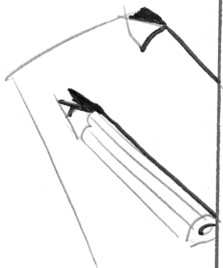# WELCOME TO SKETCHLAB!
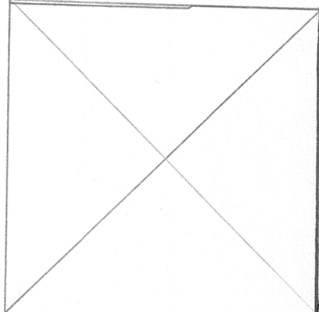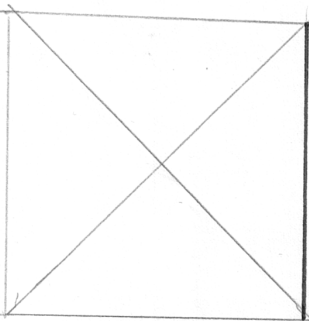
Learn for free or go premium to unlock full access.

Premium for a year

€200/year

billed annually — no automatic renewal

what is included : ?

4000 subjects . . . . ✓

Community . . . . ✓

official document ✓

SKETCHLAB

SKETCHLAB

Logout

Subjects ˅ LEARN?!
opening

Kevin v.d. Ven
student utwente

S1005707

MY GROUPS

GROUP 6 ˃
UTWENTE ˃
OTERIM ˃

Po Portfolio   WIP   NOTIFICATIONS

Name project — Basics — v0 x0 — L
Name — Form, expert — v2 x6 — L
Name — Form, expert — v20 x2 — L

Name project skills — v10 x10
Name skills — v40 x12
name skills — v9 X13

SKETCHLAB

Logout

subjects ˅

Kevin van Ven
student utwente

S1005409

MY Groups

GROUP 6 x
UTWENTE ˃
OTHER 0 ˃

in/but —

NOTIFICATIONS   NEW WORK   BEST WORK

THIS GROUP CLOSES ON June 13th 2016 x

Information about the group

Special occasions   DATA?

more projects

comments? review?

portfolio   WiP   NOTIFICATIONS

FINISH /UPLOAD PORTFOLIO beFore 20 june

Course name
✓ name surname
comment
2016
2015
✗ nam surm ...

COURSE name
✓ name
✓ name
✓ name

Logout

Subjects ✓

SKETCHLAB

portfolio > name project?

Name Project version 2
by Kevinvanderlen on Jun16, 2016

edit

✕

watch perspective

Left sketch
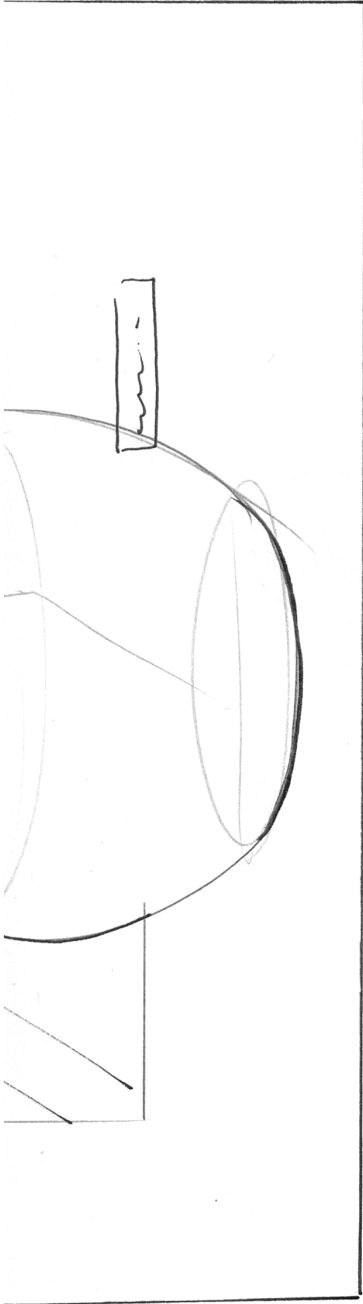
excercises
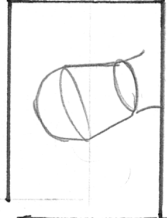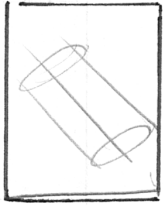
Evaluation

Pepijn v. Passel
Commentary on the drawing and a grade

63.

do dont
✓ x

Comments (25)

Add constructive comentary...

Name Surname 2 weeks ago ✓
This is a constructive comment with a marking

Right sketch

Sketching

course subjects ▾

Log out

About

NAME PROJECT
by Kevin van der Ven on Jun 16 2016

edit
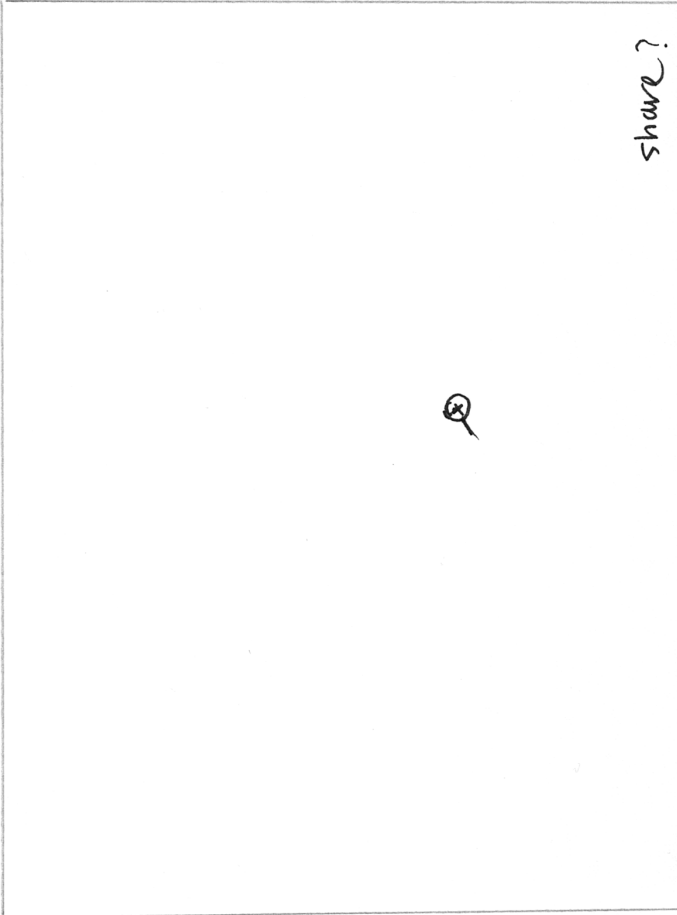
peers
x 30   ✓ 20

teacher commentary
✓   x   ✓   x

share?
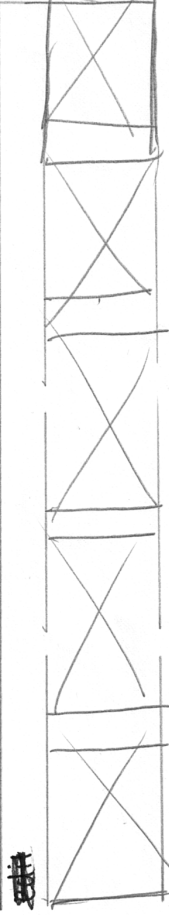
x 30   ✓ 50

sign in to comment

peer
3 COMMENTS
✓ Koala

X

Courses

Basic

Get up to speed with basic foundations

Line straight   Square   Circle

SKETCHLAB

Subjects v

Log out

sketching and Illustrating

INTRO   basics   Form   Exploration   Persuasion   Explanation   prescription

TOOLS
- Pens and pencil
- paper
- rulers

linework
+ Drawing habits
- Drawing straight Lines
- Drawing Fluid Lines
- Line weight
x Simplifying F

composition
vvisual measuring

sketchlink

log out x

course subjects v

CONTENTS
BASICS
INTRO
FORM
‿‿‿
‿‿‿
presentationskills

INTRO
ınfn unn i vnnn .u vı
‿‿‿‿‿‿‿

Basic

FORM

SKETCHLAB

Log out

subjects v

Contents
BASICS x
FORM >
EXPLORITIVE >
PERSUASIVE >
EXPLANATIVE >
PRESCRIPTIVE >

Basics
study the foundations by taking these basic courses

Tools
Pens and pencils
Paper
rulers
extra

linework
drawing habits
drawing straight lines
drawing fluid lines
line weight
simplifying

Composition
visual measuring

digital

Form

portfolio
extra
good work
needs work

sketching course subjects v log out

INTRO

< Back to BASICS ONDERWERP

- ◉ INTRO
- ◎ ASSIGNMENT open
- △ VIDEO pm toyou 0.13
- ⓘ TURN IN

🔒 Locked go premium
▲ Log in
video

ASSIGNMENT

SKETCHLAB

subjects v   Log out

Linework

< Back to contents
Linework

1. INTRO video
2. examples
3. exercise
4. Practice video
5. examples
5. final assignment
6. turn in

Class Projects

Help

SKETCHLAB

▷ 0:00 / 2:15

This is an introduction text
It explains the contents of the subject

examples

The final page of the appendix displays is a random display of graphical elements, like the logo, the icons and the slider.

SKETCHLAB

sketchlab

ske

sk:

! ICONS   NEW

design sketching?

Sketching. UTWENTE.NL

S

n g

sketching

300 reviews

Appendix
ABC

Bachelor assignment

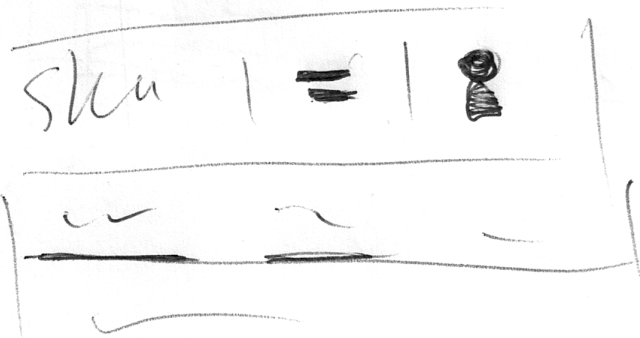Kevin van der Ven

2016

Appendix A
MoSCoW

Requirements digital learning platform Sketchlab

The main goal of the platform is to learn engineers how to sketch properly and how to use sketching as a design tool. At the end of the sketching course the students will have mastered the set goals at their own pace, managing their own time, and they are able to demonstrate their skills through a portfolio. It is possible to minimize the teacher workload and improve the design sketching quality by providing an e-learning environment that also focusses on the specified secondary learning skills.

Sketching content will be split up into several short audio visual narratives that explain and demonstrate design sketching skills. Every course subject will be pared with at least one exercise and a final assignment that will become part of the portfolio when completed. During the creation of the portfolio, students and student assistants will be able to provide each other with feedback on individual drawings. The combination of all the feedback will result in an overview where the student can evaluate his current progress. At the end of the course the teacher will evaluate a small part of the portfolio and provide the students with a final grade.

Student Skills

primary
- Design sketching
- Presenting work

Secondary
- Self-directed learning
- Self-evaluation
- Peer evaluation
- Motivating others

Tertiary
- Time management
- Project management

The requirements for the current portfolio system are classified using the MoSCoW method. This method is a prioritization technique that is used to reach a common understanding with stakeholders on the importance they place on the delivery of each requirement. For this project this method will only be used to distinguish and prioritize functionality.

Social networking websites

Social networking websites	Pros	Cons
	It is free to use	Not able to provide a custom learning experience
	It is easy to use	Not able to redistribute a custom experience for profit
	Very big user base	Lacks privacy
	Accustomed users	Exposes users to government and corporate intrusions
	Facilitates interaction between "strangers"	Social networking sites entice people to procrastinate
	Fastest way to spread information	Social networking sites harm productivity
	Administration possibilities	Hard to regulate your user base
	Easy media distribution and editing	Loss of intellectual property
	Commenting systems	Vulnerable to security hacks, identity theft and viruses
	Social interaction capabilities since induction	The market is oversaturated
Facebook	No hosting costs / Grouping capabilities / Blogging capabilities / IM capabilities / Multiple moderators / Supports multiple media (video, pictures etc)	hardly used by the new generations
Google +	Grouping capabilities / Blogging capabilities / Multiple moderators / IM capabilities / Supports multiple media (video, pictures etc)	Not widely used
linkedIn	Supports multiple media (video, pictures etc) / Currently used for "sketchlab" / Multiple moderators / IM capabilities / Blogging capabilities / Grouping capabilities	Focus on business relations and CV(curriculum vitae) building
Twitter	To the point / Blogpost capabilities / Blogging capabilities	Short message sharing (max amount of content)
Youtube	Supports multiple media (video, pictures etc)	Only Videos (static and livestreams)
Instagram		Only video and pictures

Content management systems

Content management systems	Pros	Cons
	Working website with management functionality	Bloated code (added to the size of the programs)
	Fast development process	Too much functions or not the right functions
	Good documentation and support	Creating a custom look takes more time (templating)
	Editing separated from design	Added functionality might add cost
	Easy to use for non-coders	Open source software (easy to hack)
	Easy user and group management	Management system adjustments needed
	Modular and extensible	Longer than usual loading times (serverside)
	Rapid/frequent content updating and editing	
	SEO (search engine optimization) friendly	
	Minimal server requirements	
	It is free to use and redistribute	
Wordpress (PHP)	Long lifespan / Easy to learn / Easy to use / Biggest CMS / Most templates available	Harder to customize your site heavily / Frequent CMS core updates / Plugins may break after CMS update
Drupal (PHP)	Free modules / Modules by professional developers / All the functionality of a framework	Steep learning curve (difficult)
Joomla (PHP)	Easy to use for managing big amounts of content / Powerful admin interface	Most hacked content management system / Not as easy to use as Wordpress / Not as customizable as Drupal / Hard to find plugins / Hard to maintain plugins
Various (JAVA, RUBY, PERL)		Not enough development to make it viable

M- Must haves
These requirements need to be met. Without this functionality the product is not usable.

S-Should haves
These requirements can be just as important as a must but they are not necessary for a working product.

C-could haves
These requirements need to be met if there is enough time and budget to meet them.

W- Won't haves
These requirements won't be added to the current project. They are usually part of the recommendations.

The development team will follow the provided MoSCoW guidelines during the development process. The development team will start with the following Must haves

nr	MSCW	Requirement
1	M	The landing page introduction is available for everyone.
2	M	Students and Teachers are able to log in with university credentials.
3	M	Course subjects are readily available to everyone that visits the website.
4	M	Students are able to upload completed assignments to their portfolio.
5	M	The teacher is able to create and edit user groups.
6	M	The teacher is able to create and edit course content.
7	M	Students are able to provide peers in the same group with a rating and feedback on their assignments.
8	M	Teachers are able to provide students with an evaluation and a grade.

Roughly four important users for the platform can be classified

Teacher

The teacher will be both a coordinator and a reviewer. The teacher coordinates user groups and course materials and is thus able to edit and create these user groups and user content. The teacher can also provide important information to either everyone, a group or an individual.

The teacher knows his students and is able to see all the portfolios and provide feedback on assignments. The teacher reviews the portfolio of his students in the end (after the completion of the portfolio), by looking at a list of specific assignments which will result in one final grade.

nr	MSCW	Requirement
1	M	The teacher can log in with his university credentials
2	M	The teacher can add and edit course materials.
3	C	The teacher can add and edit a rating rubix to a course subject pre-specified list of critiquing points on a course subject, used for rating portfolios
4	M	The teacher is able to create and edit user groups.
5	S	The teacher can post important announcements to each group.
6	M	The teacher has an overview of all the groups and students
7	C	The teacher can do a search for a student
8	M	The teacher has an overview of finished assignments
9	M	The teacher has an overview of graded assignments
10	C	The teacher can evaluate important portfolio pieces with a rubix
11	S	The teacher can grade a portfolio from the inbox
12	C	The teacher can edit the landing page

Student

The student is able to follow course subjects and complete assignments. The course structure will provide an overview of course subjects. Assignments, when completed, will go into the student his portfolio. The completed assignments will be automatically shared with the student his groups.

nr	MSCW	Requirement
13	M	The student can log in with his university credentials
14	C	The student can log in with a new account payment upfront (non-university)
15	S	The student can see who his teacher is
16	M	The student has an overview of course subjects suggested courses, finished courses, read courses
17	M	The student can read all the course subjects
18	M	The student can do all the course assignments and exercises
19	S	The student can download tools and templates from each exercise (tracing sheets etc.)
20	C	The student can ask a question about the course materials at the bottom of each exercise. Goes to inbox teacher, student assistant, become FAQ if not tossed.
21	M	The student can upload the course assignments and exercises to his portfolio when logged in. A3/A4 images at 300 dpi important portfolio pieces will be sent to the according teacher
22	S	The student can specifically ask for feedback on an assignment from his groups
23	M	The student can delete and edit assignments until someone has commented on it
24	S	The student can upload a new version of the assignment after the reviews
25	M	The portfolio will at least stay available during the bachelor
26	C	The student is able to download his portfolio

White label networking websites

	Pros	Cons
White label networking websites	Easy to deploy; Administration possibilities; Easy media distribution and editing; Commenting systems; Social interaction capabilities since Induction; Blogging; Microblogging; File creation; Grouping; Activity streams; Custom features to suit the user base; Provides detailed information to the admin	High startup costs; Not able to redistribute a custom user experience for profit; Not able to provide a custom learning experience; Too many constraints to the layout; Too much standard functionality; Maintaining a social network is time consuming (administration time); Focused on mimicking existing social networks (hard to customize to needs); No custom backend
Kickapps (PHP)	Hosted (Included in the cost); Basic social networking options (user profiles)	Monthly subscription; Limited pageviews; Crowded non-intuitive interface; Expensive plugins that still need configuring; No private groups; Focused on high paying customers
Social engine (PHP)	Very user friendly; Easy to theme and easy to customize; Plethora of social media features; You own the PHP sourcecode; Not hosted PHP or hosted cloud options; Drag and drop interface	Hefty startup price; Paid plugins
Elgg (PHP)	Free; Functional, easy to understand admin interface; Vast collection of widgets; Fast performance compared to other CMSes	Editor might be overwhelming; Lots of customization needed
Kliqqi(PHP)	Free; Good SEO	Overwhelming theming/templating structure; Target for spambots

E-learning platforms

	Pros	Cons
Kliqqi(PHP)	Free; Good SEO; Fast performance compared to other CMSes	Overwhelming theming/templating structure; Target for spambots
Ning (PHP, Java)	Hosted	Monthly subscriptions
Buddpress (PHP)	Free	Unsuccessfully used in a previous version of "sketchlab"
E-learning platforms	Working website with management functionality; Fast development process; Good documentation and support; Editing separated from design; Easy to use for non-coders; Easy user and group management; Modular and extensible; Rapid/frequent content updating and editing; SEO (search engine optimization) friendly; Minimal server requirements; It is free to use and redistribute; Long lifespan	Bloated code (added to the size of the programs); Too much functions or not the right functions; Creating a custom look takes more time (templating); Added functionality might add cost; Open source software (easy to hack); Management system adjustments needed; Longer than usual loading times (serverside)

Appendix B
Platform Comparison

Evaluator
The evaluator will be either a teacher, a peer, a student assistant or an external expert.
The evaluator will give constructive feedback and a rating on completed assignments during the creation of the portfolio.

nr	MSCW	Requirement
27	M	The evaluator can give feedback on all the work in his groups
28	S	The evaluator gets a message when someone in his group is asking for specific feedback
29	S	The evaluator can rate a drawing from 0-100 with or without giving constructive feedback

Prospect
A prospect is able to see the course subjects. The prospect has to subscribe to the platform to become a student and use the rest of the functionality.

nr	MSCW	Requirement
30	M	The prospector can read all the course subjects
31	S	The prospector can do all the course assignments and exercises
32	C	The prospector can register and become a student

Content management systems

	Pros	Cons
Content management systems	Working website with management functionality	Bloated code (added to the size of the programs)
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	Editing separated from design	Added functionality might add cost
	Easy to use for non-coders	Open source software (easy to hack)
	Easy user and group management	Management system adjustments needed
	Modular and extensible	Longer than usual loading times (serverside)
	Rapid/frequent content updating and editing	
	SEO (search engine optimization) friendly	
	Minimal server requirements	
	It is free to use and redistribute	
	Long lifespan	
Wordpress (PHP)	Easy to learn	Harder to customize your site heavily
	Easy to use	Frequent CMS core updates
	Biggest CMS	Plugins may break after CMS update
	Most plugins available	
Drupal (PHP)	Free modules	Steep learning curve (difficult)
	Modules by professional developers	
	All the functionality of a framework	
Joomla (PHP)	Easy to use for managing big amounts of content	Most hacked content management system
	Powerful admin interface	Not as easy to use as Wordpress
		Not as customizable as Drupal
		Hard to maintain plugins
		Hard to find plugins
Various (JAVA, RUBY, PERL)		Not enough development to make it viable

Social networking websites

	Pros	Cons
Social networking websites	It is free to use	Not able to provide a custom learning experience
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	Blogging capabilities	
	IM capabilities	
	Multiple moderators	
	Supports multiple media (video, pictures etc)	
Google +	Grouping capabilities	Not widely used
	Blogging capabilities	
	IM capabilities	
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	Currently used for "sketchlab"	
	Supports multiple media (video, pictures etc)	
LinkedIn	Blogging capabilities	Focus on business relations and CV(curriculum vitae) building
	Blogpost capabilities	
Twitter	To the point	Short message sharing (max amount of content)
Youtube	Supports multiple media (video, pictures etc)	Only Videos (static and livestreams)
Instagram		Only video and pictures

Content Management System

A content management system (CMS) is a computer application that supports the creation and modification of digital content using a common interface and thus usually supporting multiple users working in a collaborative environment. Most CMSes include web-based publishing, format management, edit history and version control, indexing, search and retrieval .

By their nature, content management systems support the separation of content and presentation. A CMS typically has a content management application (CMA), that allows the front-end user to add modify and remove content without the need of a webmaster and a content delivery application (CDA) that compiles the information and updates the website.

Social Networking Website

A social networking website is an online platform that allows users to create a public profile and interact with other users on the website. Social networking websites usually have a new user input a list of people with whom they share a connection and then allow the people on the list to confirm or deny the connection.

After connections are established, the new user can search the networks of his connections to make more connections. A social networking site may also be known as a social website or a social networking website.

White Label Network

A white label product or service is a product or service produced by one company (the producer) that other companies (the marketers) rebrand to make it appear as if they had made it.

Backend web framework

A web framework (WF) or web application framework (WAF) is a software framework that is designed to support the development of web applications including web services, web resources and web APIs.

Web frameworks aim to alleviate the overhead associated with common activities performed in web development. For example, many web frameworks provide libraries for database access, templating frameworks and session management, and they often promote code reuse. Though they often target development of dynamic websites they are also applicable to static websites.

E-learning platforms

The functionality of e-learning platforms typically includes access to learning content and tests, communication and collaboration tools for students, and course management and assessment facilities for instructors. E-learning platforms may also include administrative functionality or interfaces to administrative systems for managing student admissions and enrollment.

Numerous e-learning platforms are available today. Some of today's most popular platforms are the commercial systems Blackboard, Clix, and Desire2Learn, and the open-source platforms ILIAS, Moodle, OLAT, and Sakai.4