MASTER THESIS

Improving the User Experience of a digital learning platform for learning and development in the workplace

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Abstract

The aim of the proposed research is to identify and address the key factors that can improve the design of contents for a digital learning platform for workplace learning. For the proposed case study, two different types of users were considered, managers and employees that work in the field of manufacturing industries. Managers' pain points and employees' motivation were investigated during the research in order to identify and meet their needs.

Evaluation was conducted with actual users from both target groups in different ways.

From the factors identified in the interviews' analysis, the research led to the design and implementation of an employee dashboard that allows managers to keep track of their employees' learning and development and a user profile that helps employees' boost their motivation while progressing in their learning journey.

Considering that managers want to check the progress of their employees during their learning and development training, the dashboard allows them to search and check for the progress made so far. As for the employees, being rewarded with badges and as top learner of the week, for example, employees feel their motivation boosted.

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Chapter 1 Introduction

Industry in Germany is undergoing a radical process of change. With the fast progress of society and the development of technology, companies need to adapt themselves to the new era of industry 4.0. An automated, intelligent industry where the machines communicate with each other and with the operators which fosters efficiency and flexibility.
One of the reasons why companies are still not able to use digital machines or new software is because employees are incapable to do so. Changes are coming faster and faster, shortage of skilled workers and demographic change contribute to the need to build up required competencies in-house [1]. To do so, companies need to further develop their employees regarding new technology that is brought in.

The research was conducted for 6 months, at Peers-Solutions, a SaaS startup based in Berlin. Most of the research part that involved real users was conducted online due to the pandemic situation faced during the development of the project.

1.1 Research Scope

The research investigated on improving the user experience of a digital learning platform for personal learning and development and its usability by identifying the key factors that can improve the platform by designing new interfaces features for the platform. As the learning platform is used by two types of users in companies, managers and employees, the design of the new features will focus on these two categories of users. The core of the research saw the implementation of new features integrated with new user interfaces to the existing platform. To do so, the research used a multi methodology approach including semi-structured user interviews, design of digital user-interfaces, product and usability testing. The first part of the research saw its focus on understanding the learning theory and learning models on which Peers developed their algorithm, along with familiarization of the product itself. Once the aim of the project was defined, the UX Research took place. Interviews were conducted to better understand potential customers and to find out what problems they currently face in their daily tasks at work, their pain-points and how the solution provided by

peers could help them to solve these problems. New design views of the existing platform were implemented for the introduction of new contents that improved the learning experience of the user. After the implementation of the new designs, testing was conducted with real users in order to gather quantitative data. The proposed research methodology has been inspired by "Understanding Yours Users" book [2] and detailed descriptions of each phase are provided in the body of the thesis.

1.2 Research questions

In order to achieve the goal of this research, two research questions have been formulated.

Current company information is spread in the platform over different pages and looks quite chaotic (see chapter 6). This can result in a considerable waste of time for managers when looking for particular information. This leads to the first research question.

RQ1 – *How to design a new visual dashboard that gives managers a complete overview of their employees' progress in the Peers learning platform?*

It seems that employees do not learn effectively when it comes to upgrade their working skills [3]. This leads to the second research question.

RQ2 – *What are the main factors that influence employees' motivation to engage in learning and personal development in the workplace?*

Findings from the conducted user interviews for the proposed research show that, one of the factors that can motivate employees to engage in learning and development at work is a "friendly" competition among employees in completing their learning journey. This leads to the third research question.

1.3 Thesis Overview

In order to achieve the desired goal, the thesis is structured as follows: the literature review (Chapter 2) focuses on explaining the meaning of learning and its different types, with a special focus on informal learning, which is the type of learning used by the selected users' group. Different learning models are also explained as are the core which Peers developed their product on. The meaning of dashboard and what to consider when designing one is also explained. The concept of gamification applied in learning is also discussed. An overview of the company, their vision and the platform they developed is given in Chapter 3. UX Research methodologies applied for the proposed research study are mentioned in Chapter 4. Findings from the interviews analysis and subsequent user testing are provided for the two types of users considered in the research, managers and employees and explained in chapter 5 & 6. A summary of the overall research with answers to the research questions, limitation and future works are provided in Chapter 7.

Chapter 2 – Literature Review

2.1 Introduction

The chapter provide an explanation of the core concept of learning and its different genres (2.2 – 2.3). Differences between formal and informal learning were discussed (2.4) with special focus is given in particular to informal learning (2.5) as it is the type of learning adopted by the selected users group in the context of the research. Learning models on which Peers has based their vision when developing their product are also discussed (2.6). Moreover, the meaning of dashboard (2.7) and the concept of gamification (2.8) in learning were also investigated in order to provide a preliminary understanding of the research conducted at later stage.

2.2 Learning

Learning is one of the fundamental psychological phenomena for the evolution that characterizes, not only humans, but also a variety species of animals and plants too. We speak of learning as the main factor in achieving a new form of personal growth in an individual. However, it is a never-ending process that continues in our life until death. It includes both conscious and unconscious attitudes. It first appears since the new-born starts to learn how to breathe then to walk and talk. While growing in age this learning process becomes mature, wider and more complex. It all happens so that we can live everyday with continuous personal growth as an individual [4].

The development and rise of the society are solely dependent on the development of people and are only possible by virtue of learning. In general, learning can be defined as a behavioural modification followed by an interaction with the environment and is the result of experiences that lead to the establishment of new configurations of response to external stimuli [5]. Learning has been studied for years and continues to be studied by ethology and psychological sciences, in its different forms, manifestations and applications. To completely understand and comprehend the concept of learning, recognized scholars of the world have given numerous definitions of it and a few are presented as follows. Smith [6] defines learning as gaining of new behaviours. According to Woodworth [7], learning is an activity that results

in the development of an individual in either a good or bad, that makes him change in another behaviour and experience different from previous one. Kingsley and Garry [8] claim that learning is a behaviour changing process by virtue of training or practice. From all these definitions it can be safely noticed that learning changes behaviour towards things in life by virtue of new information, practice and experience. It can also be said that over the time learning matures and so do the ways of learning.

2.3 Learning Types

There are basically three essential genres of learning contexts namely formal, informal and non-formal learning (*Figure 1*). *Formal* learning is defined as structured learning and is that type of learning that takes place in the education and training system, schools, universities or any high institutions. It is structured from learning objectives, time and supports and it ends with the achievement of a professional qualification, diploma or in any recognized certification [9]. *Informal* learning is that type of learning that takes place in the performance, from each individual, of activities in situations of daily life, within the context of work, family and leisure. It is implemented through self-education processes, which take place in immediate life situations, outside of educational institutions. This type of learning can also be called incidental or random learning [10]. *Non-formal* learning: it is a type of learning that is somewhat structured in terms of its objectives, time and supports, like formal learning but it does not lead to getting any certification. It is called intentional learning from the learner`s perspective.

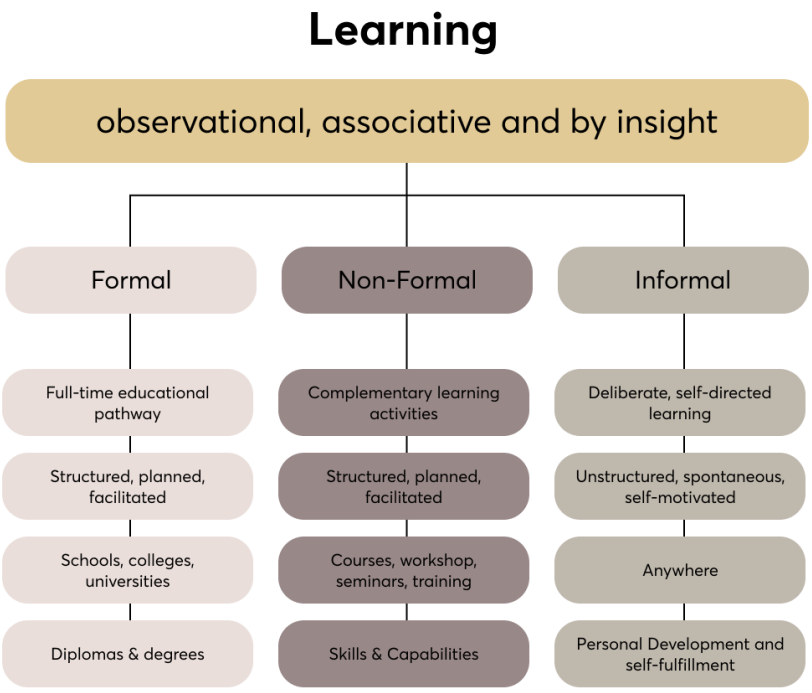

Figure 1 - Learning Genres

2.4 Difference between Formal and Informal Learning

It is well known that nowadays, learning is an element that occurs in an explicit social context [11]. Recent research has shown that there is a gap between the knowledge acquired throughout formal education and the knowledge required in the context of informal learning [12]. It is debated in fact, that academic knowledge developed during the learning in school, is not transferable for the workplace demand [13]. Thus, formal learning is different from informal learning (*Figure 2*).

One of the first scholars that investigated the difference between formal and informal learning was Lauren Resnick, an educational psychologist who supported the theory that there are four main differences [14] (*Figure 2*). Firstly, at school students are evaluated on individual assessment, while in the context of a workplace, it happens more in a social collaboration within your team, where the final assessment consists of a combination of individual skills. Secondly, part of the educational system insists on mental activities, learning is based on memory, whereas at work individuals use a variety of tools. Thirdly, the learning outcomes in formal education are intentional and predictable, while in the workplace they

are unintentional and less predictable. Finally, a major difference that finds support by many scholars is that students, in formal education, tend to learn more general skills and principles that can be applied in various situations, while in the context of the workplace, learning focuses on developing competencies in a specific situation for each individual.

Despite the differences cited between academic learning and non-academic, it has to be considered that occasionally, learning in the workplace happens in a context of formal training too [15].

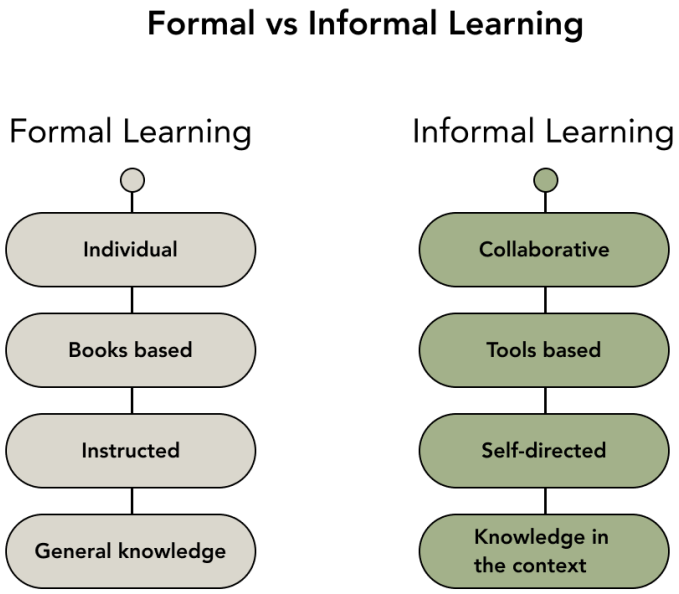

Figure 2 – Formal vs Informal learning

2.5 Learning in the workplace

When addressing the word “learning”, we usually refer to the concept of formal education, however in recent times it started to prevail also in the context of work. This is because, even after having completed a degree, when individuals start to work, they are not always able to perform their duties or get his tasks completed in the most efficient way as desired. Also, with the regular progress of society and the development and introduction of new technology, companies have been stimulated in developing their employees in terms of skills and required

competences needed to fulfil the new roles. Thus, the concept of learning in the workplace has slowly been introduced in workplace, so that the learning can remain constant and fulfil the demands of the time.

2.5.1 Definitions of learning in the workplace

As previously discussed, in the past, the concept of learning was associated with formal education only. The appearance of learning in the context of the workplace is a new idea that arose by the need of improving skills in at the workplace. This phenomenon has been expanding since the beginning of the 1990s [16]. Nowadays, the research in this area has reached its peaks and is both broad and interdisciplinary [17]. The advancement in ICT (information and communication technology), the excess of knowledge production in the economy, globalization of the world, and the fundamental changes in the structure regarding work both at individual and organizational level, have proposed a challenge for both educational institutions and work organizations to develop new methods to make sure of sufficient competency level at workplace [18], [19], [20], [21].

The study of the current literature regarding workplace learning shows that there is no single definition possible for this term and according to researchers there are two reasons for that [22]. Firstly, learning at work is a combination of different aspects such as development of the business itself within the development of individuals in terms of job competencies and as citizens in the society [23]. Secondly, workplace learning has been studied and analysed from several disciplinary backgrounds and various meanings have been attributed to it. [24].

In the past decades, different meanings have been linked to the term workplace learning.

Jacobs and Parks [25] sustain that learning in the workplace can be interpreted as the varied ways in which individuals learn in the context of a business organization in order to build those competencies that meet the organizational demands. Seng [26] defines learning in the workplace as an environment where people can expand their capacity to produce the desired results and develop new and broad thinking patterns by learning to learn together. Lastly, Lohman [27] defines it as a learning process initiated by the workers in the workplace involving the use of physical efforts, cognitive and emotional sense resulting in the acquisition and development of skills and knowledge regarding job tasks.

2.5.2 Learning in the workplace - Key factors

The capability to gain knowledge and apply it in an efficient and effective way is a key skill for the technological era we live in. When talking about learning and personal development there are several factors that could affect learning and need to be taken into consideration. The way how people perceive learning depends on factors such as age, cultural and educational background which affects their engagement to it. Learner's motivation and resources play an important role in learning, the rewards related to learning activities, the opportunities of suitable learning environments, individual support, timing and so on, are all fundamental aspects that need to be examined when designing a new learning environment [28].

Learning in an organization focuses on imparting knowledge at three basic levels, which are: organizational, group and individual level. The organizational learning puts emphasis on collective experience aiming to achieve the desired result by virtue of the influences put by the organization whereas group learning aims at achieving mutual construction of new knowledge resulting from the group participants` capacity for mutual actions. The individual learning aims at developing new skills in employees and helps them gain new knowledge by providing constant opportunity for learning and proper check and balance.

It is evident that the organization manages the context and conditions favourable for learning but, a reciprocal action between the individual and workplace is still needed to determine learning. Therefore, the efficiency of workplace learning is deeply rooted in the form of adopted learning [29] which is a combination of formal and informal learning [30] [31].

As previously mentioned, when speaking about formal learning we refer to that planned learning that happens in education settings. Similarly, formal learning in the workplace includes planned and structured learning activities with the goal to support employees developing specific knowledge and skills so that they can perform their job efficiently. This formal learning occurs in the form of courses and institutional programs sponsored and offered directly by organizations, which are usually away from the real work setting. On the other hand, informal learning involves activities such as mentoring, shadowing, coaching etc. [32] and it mainly occurs by the interaction with others or sometimes by initiation of self-motivated study.

2.6 Learning Models

The proposed research finds its focus in the design of a digital environment based on the development of an AI algorithm that generates tailored learning paths for individuals, in the metallurgic manufacturing industries. The algorithm creates personalised learning paths that fit the needs of employees in the context of the workplace. To do so, it relies upon the concept of adaptive learning and it is mainly based on the 70-20-10 learning model [33]. It also uses the Kirkpatrick 4-level model [34] to measure success of learning.

2.6.1 Adaptive Learning

Learning in the workplace is characterised by a considerable substantial pressure on how much time employees are willing to spend on learning and how much free time they can realistically dedicate on it during their working hours. This means that it is very important to be able to spend the limited amount of time that can be allocated for learning as precisely as possible [35].

Adaptive learning is a learning technique that provides the learners the opportunity to personalise their own learning path that best fit their needs based on their own unique strengths, weaknesses and end goals [36]. This methodology can also be adapted pretty much across the board regardless the job fields or functions. By providing individuals with the opportunity to personalize their own learning path, adaptive learning brings benefits to the learner in terms of engagement, time saving and the way how they master knowledge in topics they are interested in.

The way how it works can be simply explained as follows; adaptive learning tools, which in the case of the proposed research is an AI Algorithm (see next chapter for details), collect specific information about each individual employee by analysing the way how they answer a questionnaire or in some cases how they perform on required tasks that prove their skills. The algorithm then responds to each employee by creating a learning path (type of courses to follow in order to gain those new required knowledge) that suits the employees' needs.

Adaptive learning does not only bring benefits to the learner but also to the business. This is because, as employees focus only on those important skills required to complete job tasks, it reduces the amount of time that they spend on training which means that productive hours are given back to the business, which are then better spent doing real work tasks [37].

2.6.2 The 70-20-10 Model

It is well known that the human brain does not retain a lot of information in terms of memory. A research conducted in the 1885 by Hermann Ebbinghaus, a German psychologist, shows that humans forget about half of what they have been told within an hour, unless they have the opportunity to apply those words/concepts into practice. This phenomenon is known as the forgetting curve [38]. Teaching employees only through a formal structured class-based system can teach them the theory they need to know but they will soon forget it if they do not put it into practice first. Thus, it can be said that learning by theory must be followed by applying the knowledge into practice.

The first scholar that started to investigate this new concept of learning was Professor Allen Tough in 1968 [39]. Although he didn't directly refer to the 70-20-10 learning model, he stated that around the 70% of the learning among adults is planned by the learners themselves based on what makes them remember knowledge more efficiently [40]. Jay Cross, an American futurist, known as the pioneer of informal learning, was the first one to state that 80% of learning in an organization occurs by informal learning, and the remaining 20% by formal learning [41]. The credit for developing the final 70-20-10 concept as a learning model has to be attributed to Morgan McCall, Micheal Lombardo and Robert Eichinger that, in their 1961 publication, stated this model as a way in which people learn, for the first time [42].

As the name suggests, the 70-20-10 model is a learning model structured in three different parts. 70% of the learning occurs through experience and practice on the job, known as learning by doing. 20% occurs by watching with activities such as mentoring, shadowing or coaching, and 10% through formal learning with structured theoretical learning (*Figure 3*) [43]. Organizations nowadays expect the development of their employees to run at the speed of the business. One of the reasons why the 70-20-10 model has been taken up by so many organisations is that it overcomes two major problems, which are, costs and time. Researches have also shown that learning is all about context, and if you keep people in the workflow providing them with facilities and support for learning, the outcome is much more effective, it's faster and cost effective [33].

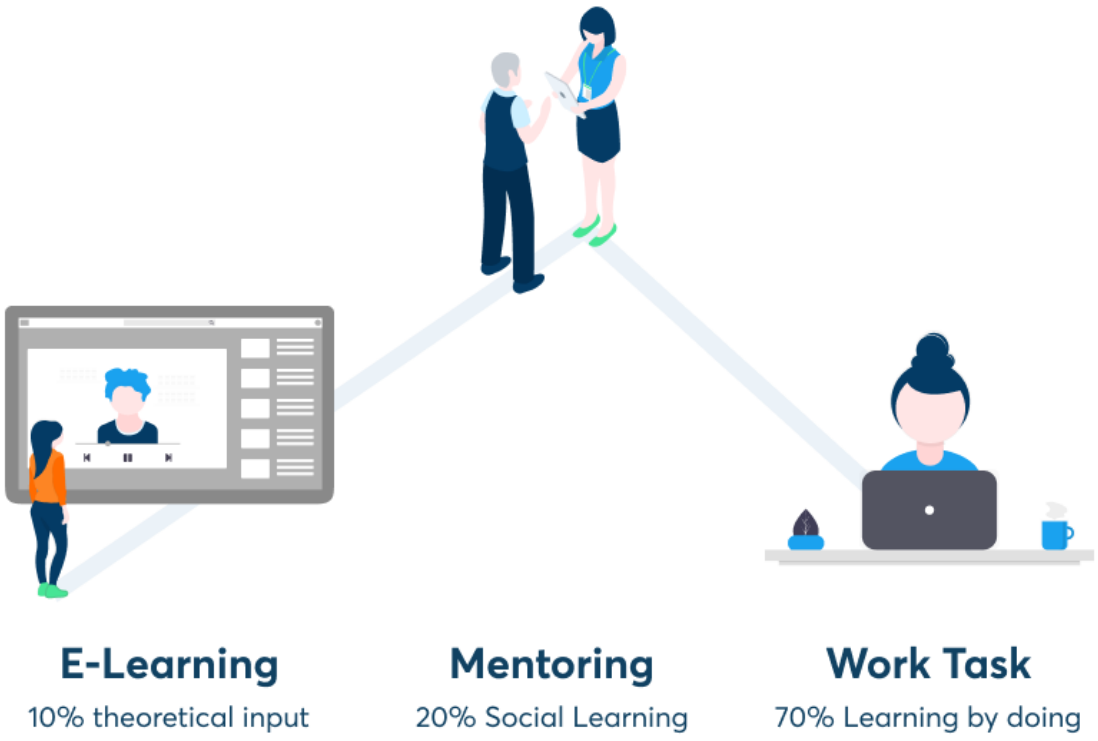

Figure 3 – 70-20-10 Model Example [43]

2.6.3 Evaluating the effectiveness of workplace learning

The four-level model evaluation was developed by Donald Kirkpatrick in 1954 (*Figure 4*). This model is a measure in assessing the effectiveness of training in business and industry. The model is based upon four-levels which are reaction, learning, behaviour and results [34].

At the *reaction* level the focus is on the reaction of the participants to the training or the learning experience. Here the aim is to determine to what degree the participants react favourably to the training event. Participants might be asked whether there is a feeling of satisfaction or whether they are feeling good about the training. This is important because at this level, evaluation comes in the form of feedback from participants.

At the *learning* level the focus moves to the new learning that results from the training.

The aim is to determine the degree to which participants have acquired the intended knowledge, skills and attitudes based on their participation in the learning event. The focus is on effective acquisition of the content. Evaluating the effectiveness of the learning at this

level is done through performance, demonstration or testing. This corresponds to a formative evaluation or informative assessment.

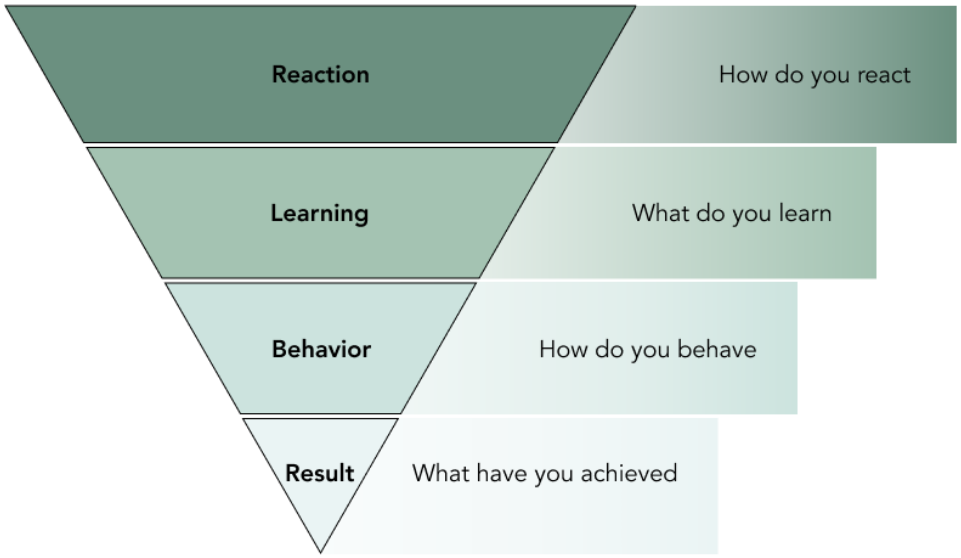

Figure 4 – The Kirkpatrick Model [34]

At the *behaviour* level the focus is on the transfer of learning. The intent is to determine to what extent participants can demonstrate transfer of learning in the workplace setting. At this level the aim is on finding evidence of change in job behaviour as a result of the training or the new learning. Evaluation at this level takes place post training, usually after three or six months after the training event has concluded, in the form of observation.

At the *results* level the focus is on the targeted outcomes that are expected as a result of the training. The intent is to determine to what degree targeted outcomes occur as a result of the learning event and subsequent reinforcement. The results level allows for the defining of specific measures that will be changed or improved as a result of the training intervention. Evaluation at this level focuses on specific outcomes that were targeted as a result of training [44].

2.7 Dashboards

A dashboard is a tool used to visualise and analyse key information and data. It is one of the most efficient ways to track multiple data simultaneously as it is a central location to monitor and analyse performance [45]. It retrieves information from APIs and after the data are gathered, data needs to be processed and visualised [46]. It displays all the data in the context of tables, charts and lists [47]. A Dashboard simplifies complex data providing awareness of current performance. It is a powerful tool that helps to save time to business as users do not need to look at different disconnected sources to track their data by providing grouped information accessible for everyone [48]. A dashboard can also be customized in order to meet user's requirements.

The use of dashboards in the context of learning are becoming more popular due to an increase of technologies usage [49] and are described as screens to visualize results of educational training [50]. Several definitions are attributed to the meaning of dashboards in recent literature. Stephen Few describes dashboard as a visualisation of key information, usually displayed in a single screen, with the aim of achieving objectives [51]. Brouns defines dashboards as a tool used to easily scan through graphical information in real time UI showing the current status allowing rapid decision about key performance [52]. A dashboard can also be seen as a container of information by researcher [53] or as management system used to monitor productivity [54].

In order to better understand the design of a dashboard and how to visualise data, the concept of information visualisation is first explained. Information visualization is that process of visualising data in a simple way so that the user can better understand the meaning of the shown data [55]. It allows users to discover insights from abstract data in a meaningful way turning them into actionable insights [56]. Dashboards are the most common examples of information visualization.

When designing a dashboard in the process of creating information visualization, the first step to consider is to define the purpose of the dashboard and the insights that need to be visualised. In general, there are two different types of dashboards, *operational* and *analytical* dashboards. The aim of *operational* dashboard is to provide quick critical information to users, as they are committed to time-sensitive tasks. The main goal is to visualise the current status

of information. On the other hand, *analytical* dashboards are less time-sensitive and provide users with information used for analysis and decision making. The main goal is to analyse trends and they are used for decision making [57]. Once the purpose is defined, the focus moves on data to include, which are the key for effective dashboards. Only the most important data needs to be included in the dashboard as information has to catch the user's attention at a glance. It is then in the mind of the designer to determine which type of data organizations is needed in order to allow users to achieve their goals. Adding extra information can divert the user's attention [58]. Information hierarchy is also an important factor to consider when designing a dashboard. Key information should be displayed top to bottom emphasizing the most important information with labels and symbols to help understanding the meaning of the metrics. Therefore, effective design is fundamental for dashboards. A great design of information will definitely help in communicating key information to the user [59].

2.8 Gamification

Nowadays games are being used in schools and work environments in order to provide students or employees a mean of training and learning using apps or programs [60]. It has been a slow revolution which started in the early 2000 and has seen the development of a new industry which aims at providing students and employees with a fun way of learning and improving their skills [61]. The Institute of Electrical and Electronics Engineers (IEEE) thinks that the concept of gamification will be part of more than 85% of daily tasks by 2020 [62]. This gamification process has as key points speeding the learning process in engaging ways so that the users interact with different difficulty levels with an avatar that represents themself and by assigning points, badges rewards and using leaderboards motivate the user to improve and apprehend more competences [63]. Gamification has the capacity to connect behaviours in the real world by rewarding or punishing the learning in a gamified, virtual environment [64]. More and more companies have adopted gamification as a way of training new employees or for adjournament courses as more direct and fun when compared to the otherwise boring old fashion meetings. Gamification platforms enable users to interact with the subject in fun ways and give a chance of constantly improving the final results by assigning prizes and scoring criteria. This stimulates competition within colleagues or students improving social skills and

social learning focusing also on teamwork. It creates a personal record showing strenghts and weaknesses which makes easier for the teacher/employer to spot and intervene where necessary. The benefits of gamification don't stop to school or work but they have also been used in social and health care where especially young people have a way of dealing with sometimes very difficult situations. The app Pain Squad [65] used by children with cancer is one example that uses games to allow children to quantify the level of pain they feels allowing nurses and doctors to plan and intervene with specific therapies. In Sweden gamification has been used to control the speed limit so drivers who drive below the speed limits get positive feedback and gain the chance of entering a lottery in which they can win the proceeds of those who are speeding [64]. Gamification has been introduced as a standard feature in hybrid or elecrtic cars as the drivers need to modify their driving behaviour to minimize the fuel consumption and car's manufacturer are using game based techinques to give feedback to the drivers on how their are doing and also connecting drivers to a community to see who is driving more and using less fuel [66]. The impact of gamification is global and seems to have no bounderies. Gamification is not only a technique but a mindset that can transform the way we work and learn through the challenge the game presents and the sense of achievement that we feel in completing a certain task, the pressure and competion experienced in playing with friends or collegues or simply the satisfaction of receiving positive feedbacks [67]. Gamification however is not a synonym of game design but it uses the elements of games and applies them to non-game contexts in order to solve specific problems or engage an audience. It is a tool to motivate people to change their behaviour through positive feedbacks and rewards incouraging creativity and teamwork improving productivity. Gamification is proving successfull especially in training new employees and sometimes the process is not even carried out via E-learning but with papers, cardboards and colours with employees divided into groups competing or collaborating with each other in order to achive a certain result or completing a task [68]. In the field of education a gamified approach has proven valid to improve motivation and engagement in classroom lectures, homework assignment and learning activities developing problem solving skillss through a system of rules that encourages exploration and discovery enhancing the whole learning process [60].

Although the concept of gamification has shown high potential to help learners when applied in educational context, recent literatures reveal that it is still unanswered question whether it actually provides the intended effect or not [69]. This is because so far, too little attention

has been devoted to the real effectiveness of gamification and potential dysfunctional side effects. An example of this concept is provided by Deterding [70], and the service of Akoha, a service that boost users to accomplish acts of kindness in the form of a “mission”. In order to complete the “mission” and be rewarded, the user has to simply invite a friend over for a coffee. However, it has be noticed that when the friend asks the reason why he or she was invited, the answer ruins the whole experience of kindness. Therefore, in the proposed case, the concept of gamification does not only fail but works counterproductive. The term counterproductive refers to the demotivation of positive or the motivation of negative behaviour, which in other words means the removal of the original expected goal. The side effects of counterproductivity in the concept of gamification are not being clarified yet and still under research studies [69].

2.9 Summary

As the topic of the research relies on the concept of knowledge acquisition and skills upgrade in the context of the workplace, the meaning of learning and its different genres were first discussed in the chapter in order to provide a basic understanding of the case study. Differences between formal and informal learning were examined, with a special focus given to informal learning.

Studies showed that there is a considerable need to upgrade working skills in organisations as new complex tasks are becoming more common [1]. In the proposed research study, informal learning is the type of learning that concerns the selected user group when it comes to upgrading their skills in digitalization [71].

Informal learning is the type of learning that occurs in the context of the workplace when individuals need to gain new competencies in order to improve the performance in their daily job duties as new business demands needs to be met [10]. The selected user group is mainly constituted by older employees with low technological skills who have been working in the manufacturing industry for decades and need to learn how to work with new tech machines that are brought in the field.

Before diving into the UX Research in order to understand the needs and pain-points of the selected user group, a preliminary research was conducted on the concept of different types of learning models including adaptive learning, the Kirkpatrick and the 70-20-10 model. The reason why the preliminary research took place is due to the fact that these models are the basis on which Peers developed their AI algorithm. Concepts of these learning models are used by the algorithm to generate tailored learning paths that fit employees' needs, later explained in Chapter 3. The upcoming UX Research and design needs to take this into consideration by developing features and UI elements that complement and augment these methodologies and the AI algorithm itself. Therefore, in order to better understand the core aim of the platform used for the research and the selected user group, a general understanding about learning theory in general and different learning models in particular was needed.

The results of the literature showed that the use of different types of learning models is paramount. Considering the 70-20-10 model, where the 70% of the upskilling and learning progress of an employee is given by informal learning, we consider of prime importance the benefits gained throughout this training.

The research focused on two type of users, managers and employees. Topics such as designing a dashboard and the concept of gamification applied to the learning environment were investigated as they were the core part of the research and the subsequent design, discussed in Chapter 5 & 6.

As findings from the analysis of the manager's interviews (Chapter 5) showed the need to have a central point to visualise employees' progress, the whole upgrading and learning process can be assisted by the design and implementation of a dashboard. Therefore, the meaning of dashboard, and considerations to keep in mind while designing it were stated.

Findings from the analysis of the employees' interviews (Chapter 6) showed the needs to enhance employees' engagement toward learning and development. It is also been proven that the adaptation of the concept of gamification and it utilize in work environment boosts employees' engagement toward learning and development. Therefore, the concept of gamification was introduced and discussed in this chapter.

Chapter 3 – About the Company and its Digital Platform

3.1 Introduction

Now that the relevant topics needed in the latter part of the thesis have been discussed, we look at how these topics play a role in Peers, in order to better develop a UX Research and design strategy that is tailored to the unique requirements of the Peers learning platform and its users. We also briefly examine the information available about the competition in order to position the Peers solution within the broader context of the market as a whole and ensure that the UX Research and design both highlights Peers' strengths and positions it as a relevant and unique player in the crowded learning and development market. Therefore, the chapter provides an overview about the startup examined for the proposed research study focusing on company vision and the digital learning platform they developed. Details of the core concept of the AI algorithm on which the platform is based on are also explained. As for the learning platform, a description is provided with the help of the platform' screenshots to understand how it works.

3.2 Peers Solution GmbH

Peers-Solution is a startup founded in March 2018, which came out from the incubator program of the TRUMPF GmbH, which is also the funder. Peers developed a cloud-based platform for online personnel development and AI based learning.

Industry in Germany is undergoing a radical process of change. The idea behind developing the platform came up realising that one of the reasons why companies are still not able to use digital machines or new software is because employees are incapable to do so. Digitalization, technological shifts and a shortage of skilled workers mean that well-trained employees are scarce, while existing knowledge and skills are being overtaken at a rapid pace [66].

Peers follows a business-to-business (B2B) customers approach, addressing small to medium size companies in the manufacturing sector. According to the MIT study [72], 90% of all companies are facing disruption and 70% do not have the skills to deal with it. This is especially true for the manufacturing sector: changes are coming faster and faster, shortage of skilled

workers and demographic change contribute to the need to build up required competencies in-house.

Peers offer AI based tailored learning paths for employees of manufacturing companies so that they can acquire the strategic skills necessary to succeed in the future and therefore give companies the opportunity to slowly start to introduce digitization and the use of innovative technologies within the field.

They provide the solution in three steps; first, they support their clients in defining those future skills based on industry best practice roles. Peers human resources department run a workshop to help the company creating employees' profiles by collecting all the needed information about the competences needed to upgrade them in their working life. This happens through questionnaires and tasks completion to tests specific skills.

Peers has developed together with Fraunhofer IAO relevant content for the metal industry. The content consists of a competence model, all current and future roles for the production department, including pre and post processes as well as a learning architecture and learning path. Second, their AI algorithm generates a learning path based on the 70-20-10 learning model, with learning contents such as training, e-learning, videos and learning by doing, provided by qualified learning partners. Lastly, on the platform the offer is bundled, the employee accomplishes the learning path and the client manages and measures the progress on the platform.

Regarding revenue streams, the startup generates income through commission, receiving a percentage from the learning partners as well as license fees for software usage from the customers.

3.3 AI Algorithm concept

Peers-solutions developed an artificial intelligence algorithm capable to generate tailored learning paths that fit individuals' needs. In the following paragraph, a comprehensive overview of the basic concepts the algorithm is built on is provided to better understand the steps it uses in order to generate tailored learning paths.

As previously discussed, the process how Peers provides the learning solution occurs in three steps. In the first step, through the help of a workshop, they find out current competencies that employees have and those that they need to fulfil a new role. Once all the competencies

are listed, they can be passed into the algorithm. Competencies are seen by the algorithm as vectors in an n-dimensional vector space, where n represents the number of all the competencies an employee should have in order to be able to cover a new role. In the binary vector space, when the employee data is put in the starting state consists of a string of "011101001", where 1 represent the missing competencies and 0 are those the employee already have (*Figure 5*). So, the end goal of each employee will be to have a string composed solely of 1s, which will result in him having all the needed competences for the new job role. Thus, the aim of the algorithm is to generate an optimal learning path, composed of several learning units.

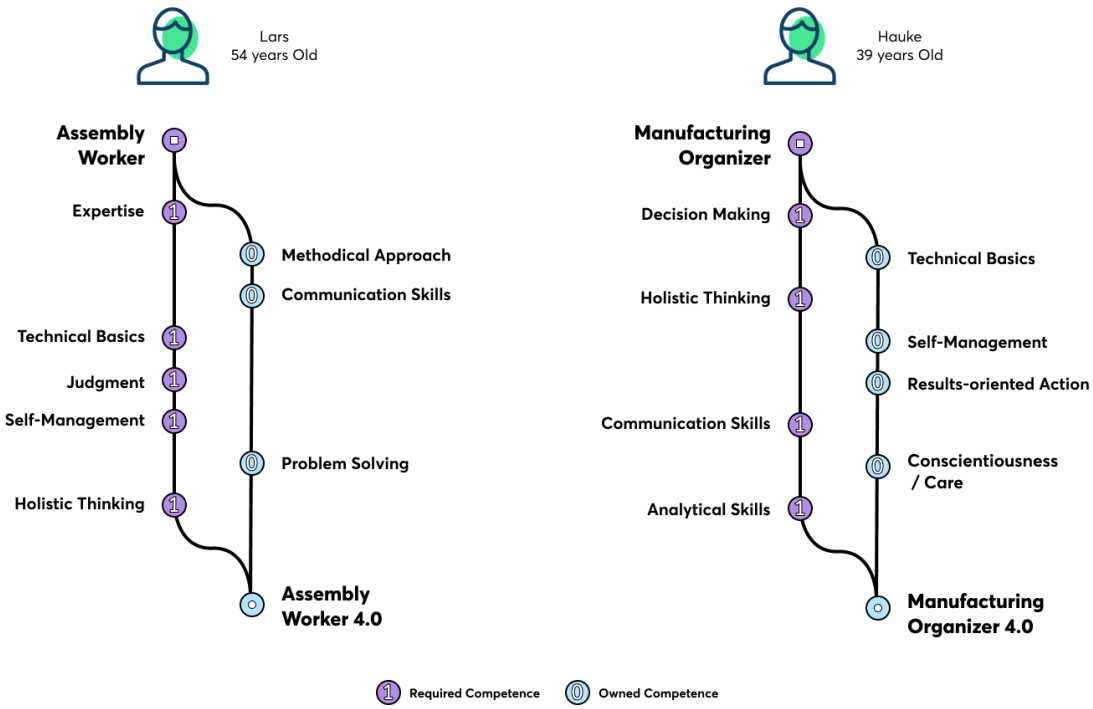

Figure 5 - competences they have / Competences needed

As the idea behind is based on the 70-20-1 learning model, the algorithm generates a combination of theoretical and practical units such as e-learning, shadowing, mentoring etc. These will take the employee status from 0 to 1 in the n-dimensional vector space. A list of all the possible learning units that an employee could require in order to develop a new role is stored within the algorithm. The algorithm is trained based on the following criteria: an

employee should not be working on more than 3 competencies at the same time and for more than 4 months on the same competence. He also has to learn via each of the parts from the 70-20-10 learning model one after another. The algorithm then analyses all the possible learning units based on three criteria: cost, quality and time. As the company tells Peers what they want to base their learning path on, the algorithm is set depending on their choice. For example, if a company is not concerned about costs but they care about the time that the whole process of learning and development takes, the algorithm will be set accordingly. What makes the generated learning path personalized for each employee is the way how the algorithm processes the input data. The data collected during the workshop includes, not only the required competencies and those the employee have, but also information about personality. This allows the algorithm to create a user profile with information such as if an individual is introvert or extrovert, visual or audio learner and so on, which will help to create an individual tailored learning path for each employee, as a suggestion (*Figure 6*).

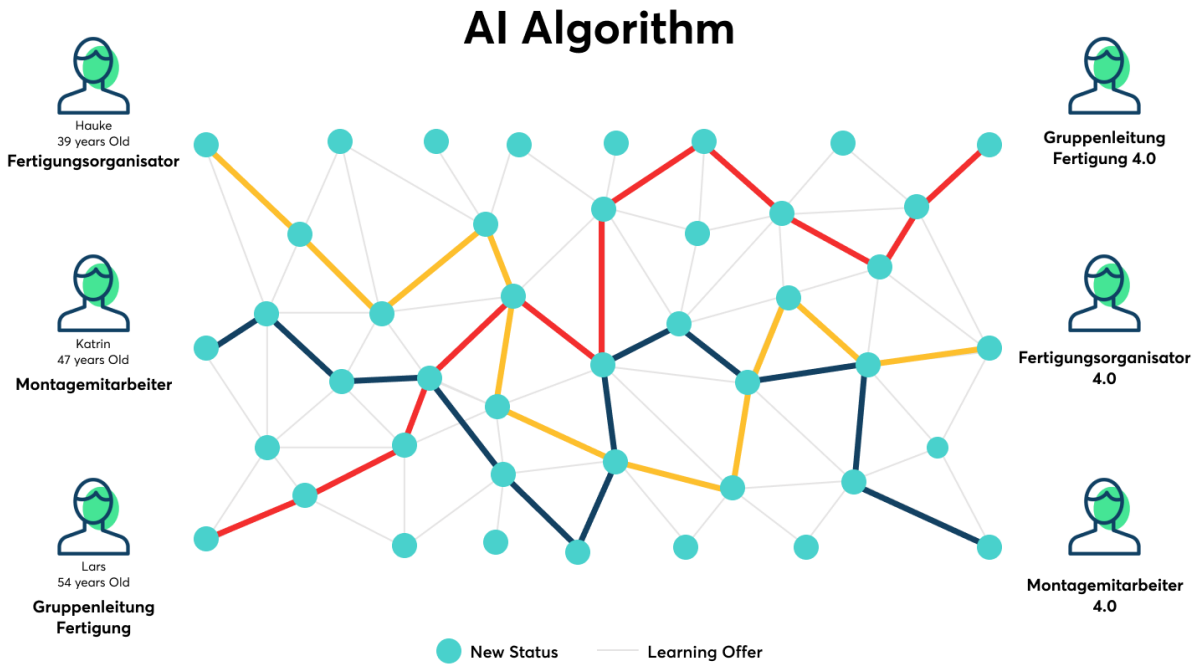

Figure 6 – The AI Algorithm

3.4 The Learning Platform

3.4.1 Introduction

Peers-solution developed a cloud-based platform for online personnel development built for employees working in the metallurgic manufacturing industries, their managers and CEO. The platform allows employees to access their roles, learning paths and to control their entire training, while managers can check the overall costs, company status and keep track of employees learning. An overview of the current version of the product, the Minimum Viable Product (MVP) is provided through screenshots and detailed observations. Due to the fact that the digital platform is still an MVP and still under development, many functionalities are still missing. The learning digital platform developed by Peers is built for employees and managers. The two type of users have access to two different portals independently from each other, unless a manager is a learner too, which sometimes can be the case.

The aim of the thesis project is to improve the current platform in terms of User Experience (UX) and User Interface (UI). This will be done by applying user experience research techniques. A new UI design concept will be prototyped, tested and implemented in the digital platform. Details about the methodologies applied are discussed in the next chapter.

3.4.2 The manager portal

In the manager portal, when the manager logs in (Image 1, Appendix A), he or she is directed to the company overview page showing the total budget of the company devoted in learning and development and the budget spent for the employees that are currently undertaking learning courses (*Figure 7*). On this view, the manager can also filter by team to check individual budget (Image 2, Appendix A).

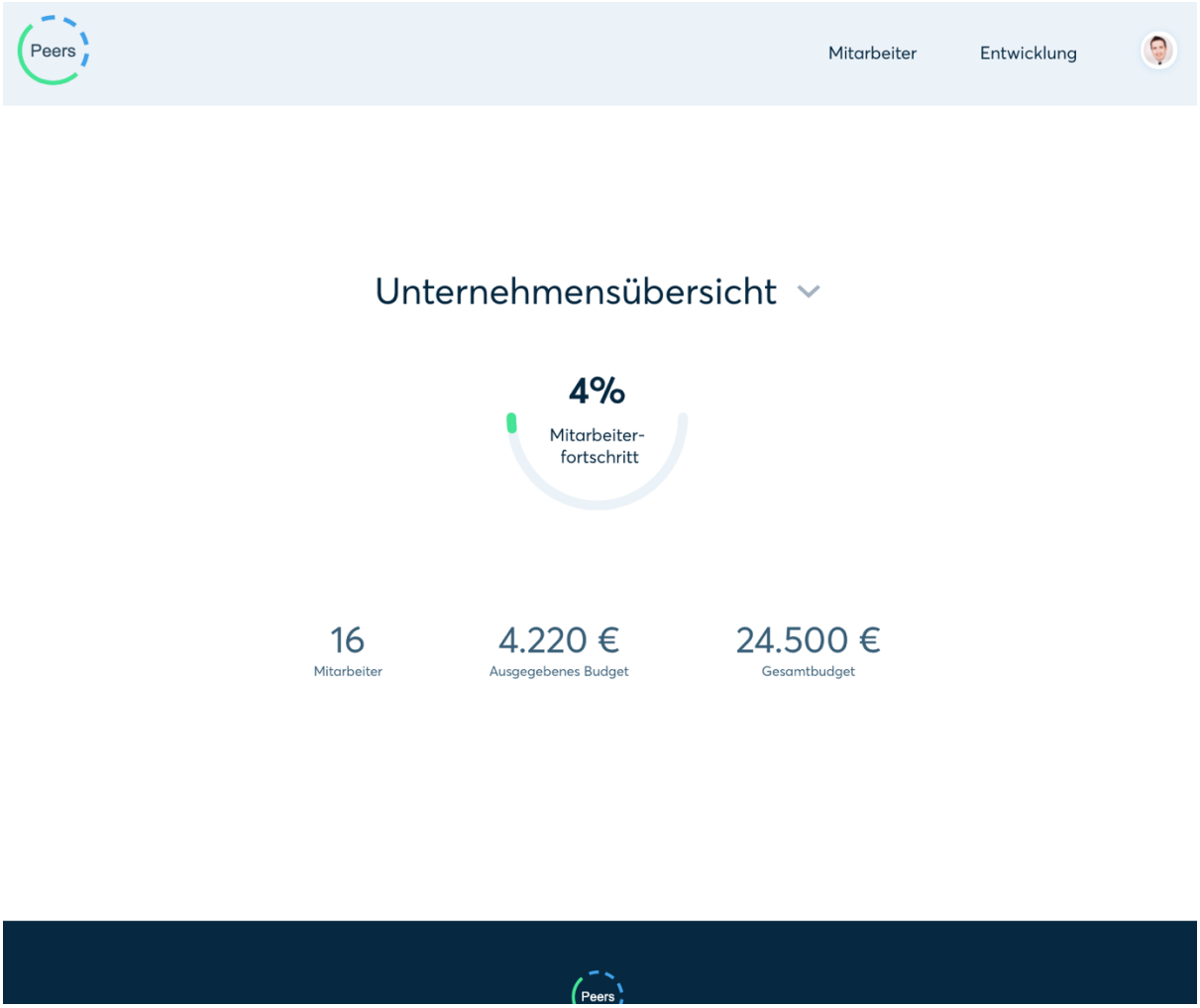

Figure 7 – Intro platform screen

Through a top navigation bar, the manager can navigate between two different pages, *Mitarbeiter* and *Entwicklung* which respectively mean *Employee* and *Development*.

In the mitarbeiter section, the manager has the option to see two different screens. The first one under the "mitarbeiter" (*Figure 8*), where he can check the employees who are currently doing a learning path, and the second one under the "organigramm" (*Figure 9*), that allows him to see the company structure by its teams. All the data present in figures 8 and 9 (employees' photos and names) are fake representation of a real world scenario used to show the concept of the platform.

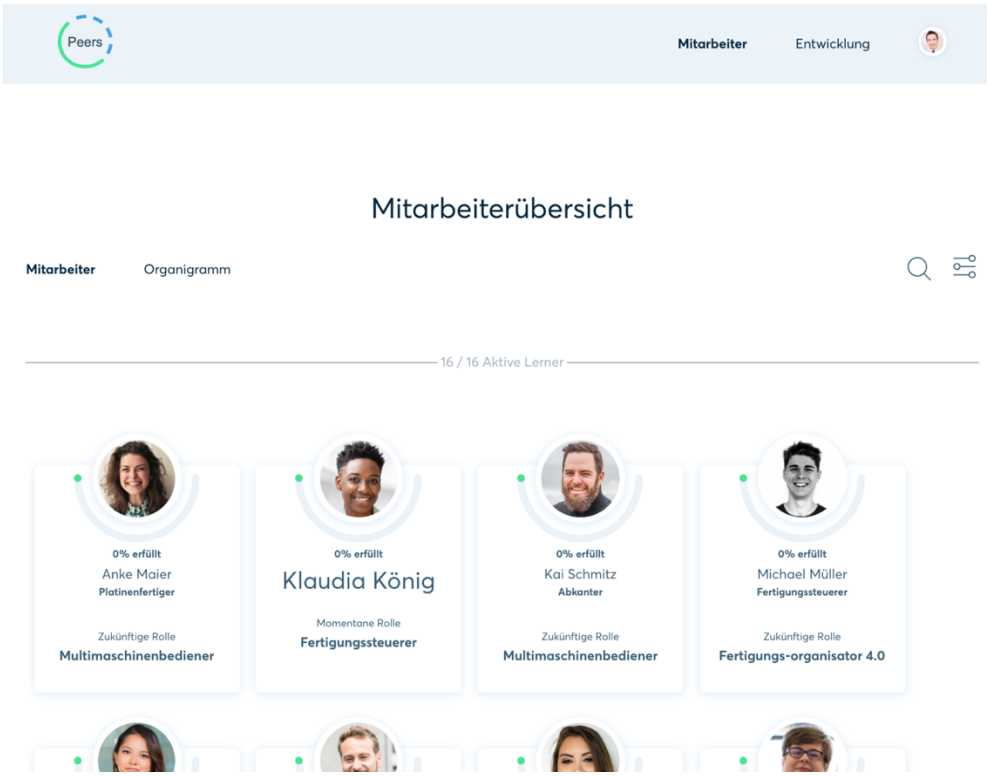

Figure 8 – Mitarbeiter view

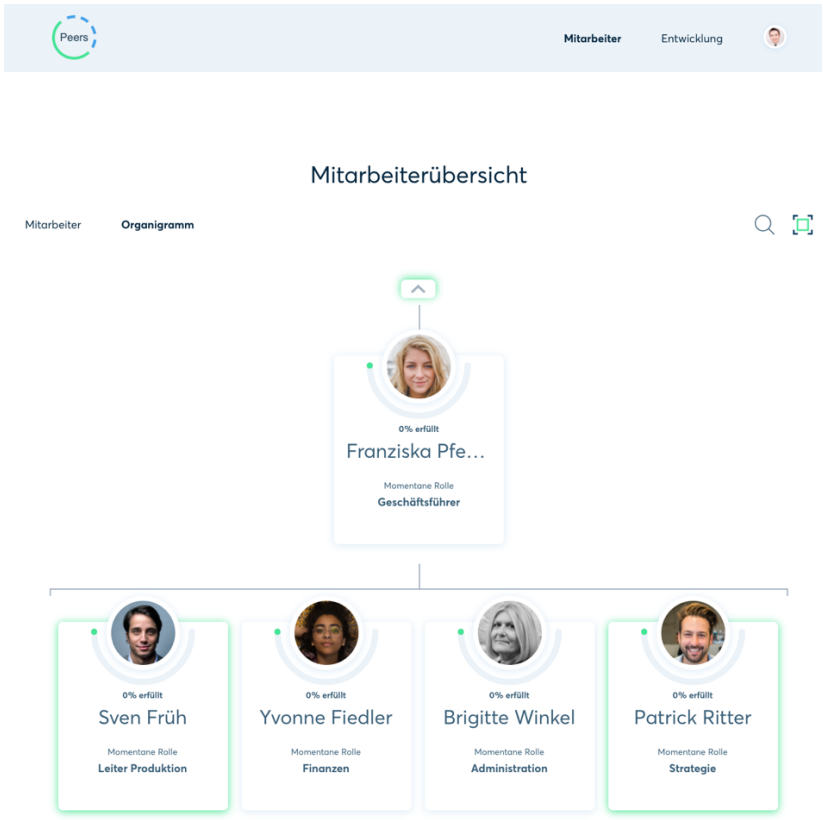

Figure 9 – Organigramm view

The e*ntwicklung* section shows the overview of all the learning paths. The manager can check and approve learning paths by clicking on the “In Bearbeitung” (*Figure 10*). Here, the learning paths are shown by roles type where detail about numbers of learning units, employee and costs are shown. When a learning path is approved by the manager it is automatically moved to the “Erfüllt” section (*Figure 11*).

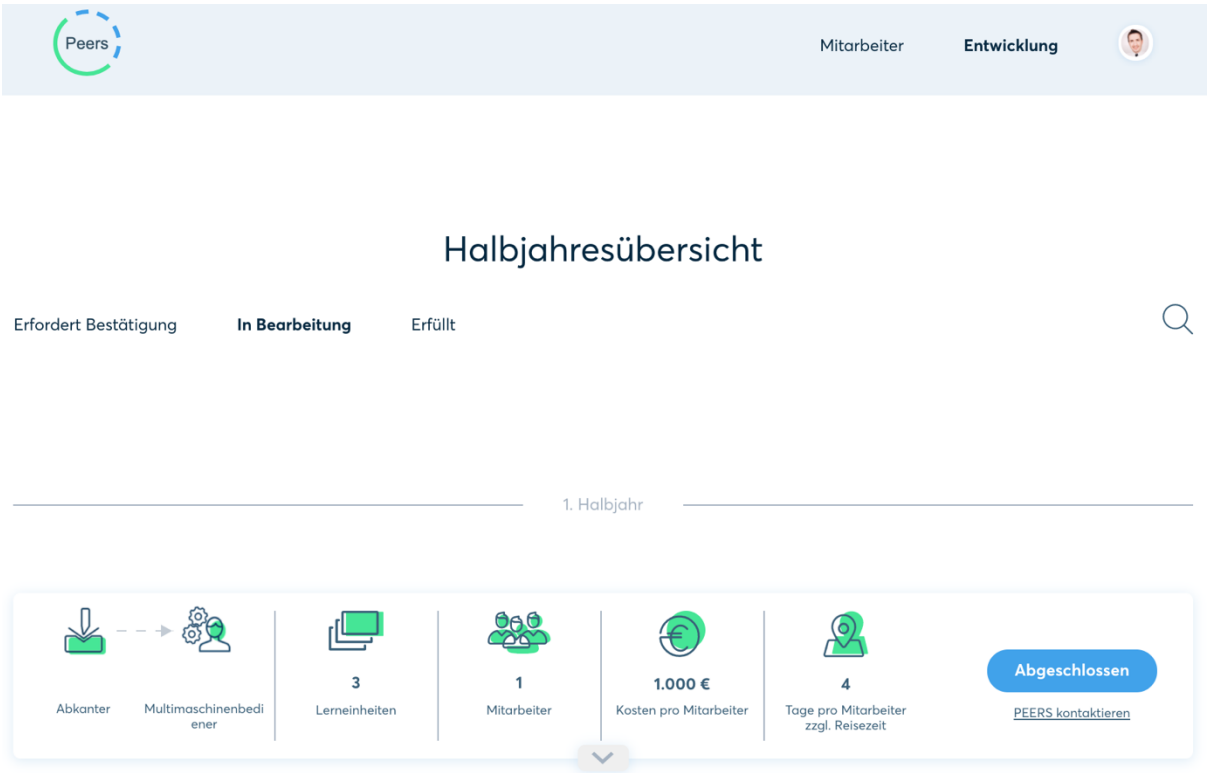

Figure 10 - Bearbeitung View

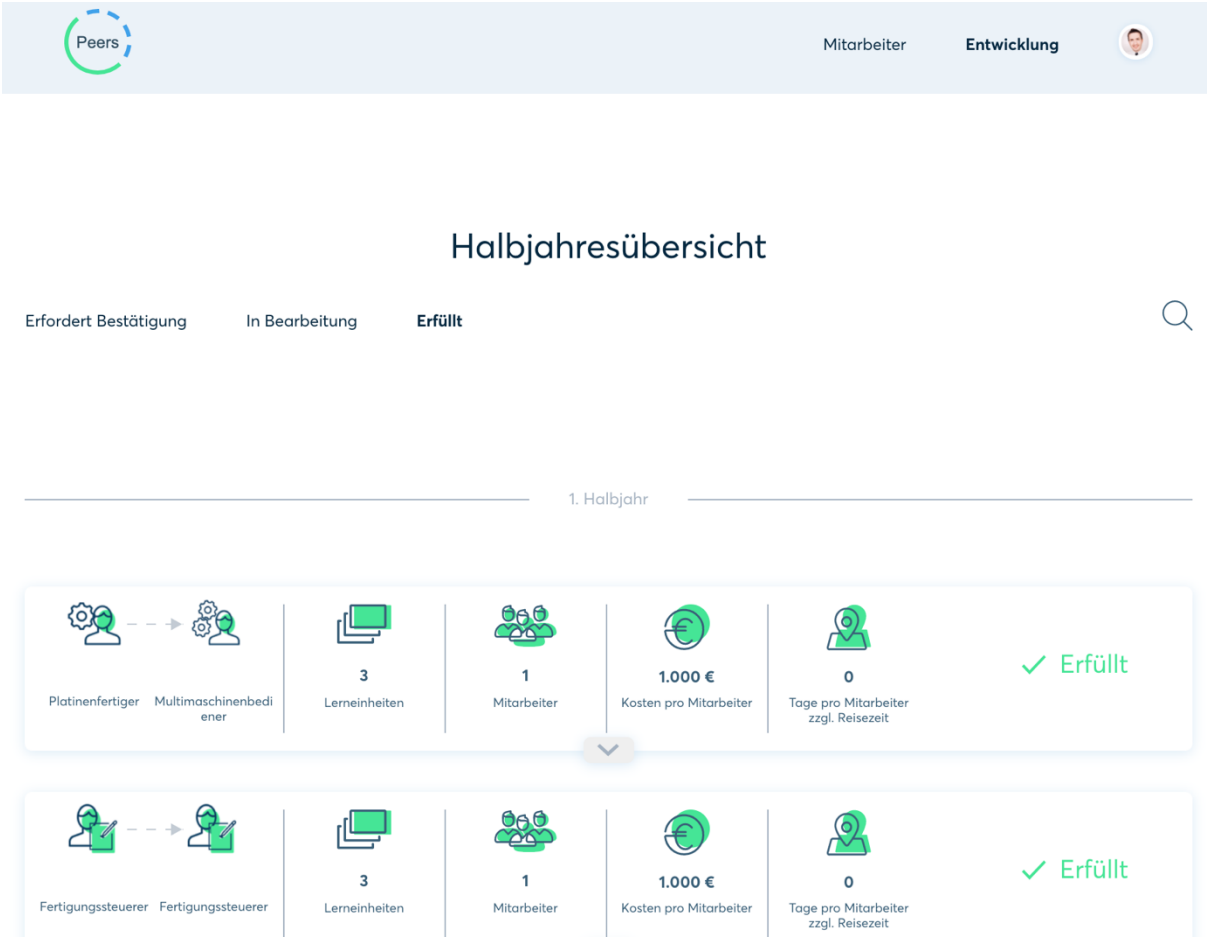

Figure 11 - Erfüllt View

3.4.3 The employee portal

In the employee portal, after the log-in, the employee is directed to his learning path overview page (*Figure 12*). Here, the employee can plan and access each individual learning course detail by clicking in one of the course's container. In the detail view of a learning course (*Figure 13*), the employee can review the course description, type and its duration. Once a learning course is completed the employee can also leave feedback.

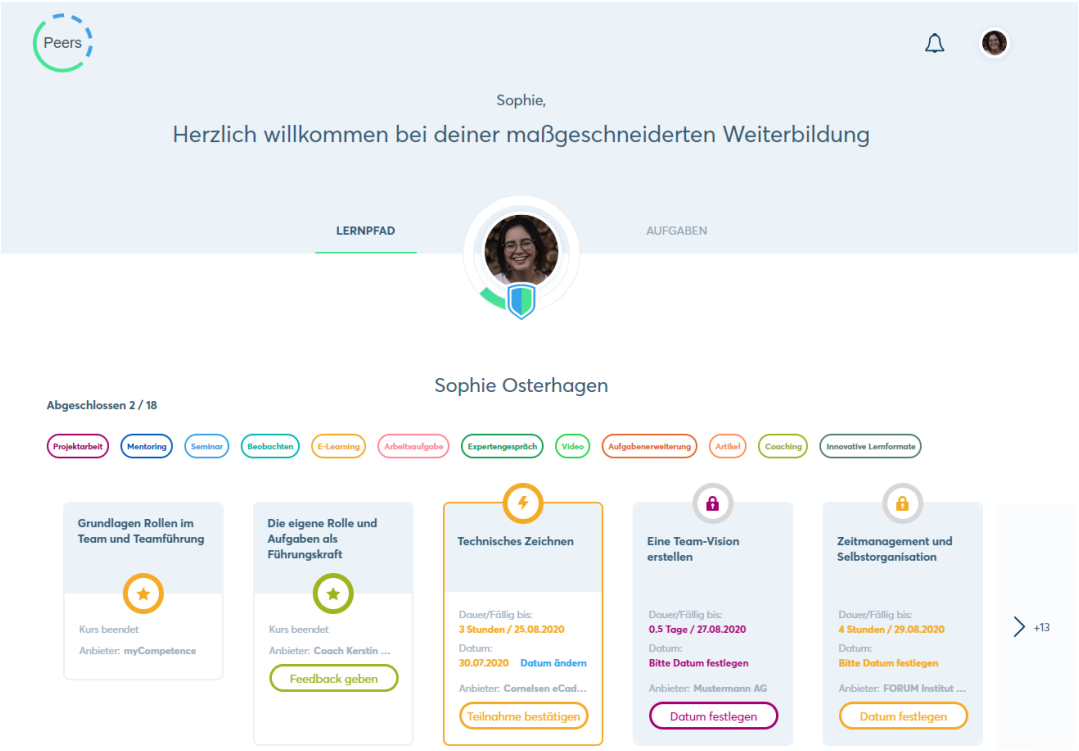

Figure 12 – Learning Path View

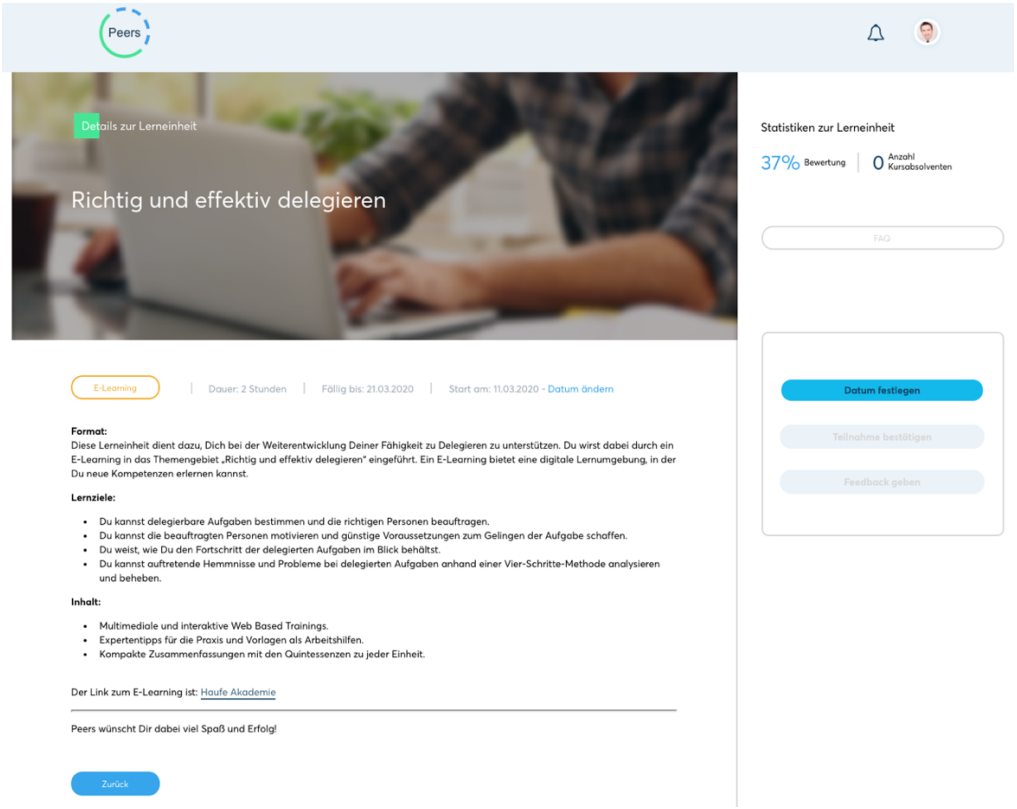

Figure 13 - Learning Unit Detail View

3.5 Other Educational and Workplace Learning Platforms

In recent years several startups have come out from incubators and accelerators ready to tackle the market of learning and development. Either with similar concept ideas as that one proposed from Peers or tackling the topic with analogous technical approach, the market is now filled with young companies competing with each other either in the national market, in Germany, or Europe. The following paragraphs describe the startups selected as closer competitors to Peers in terms of company vision and built technology.

3.5.1 Edyoucated

Edyoucated is a Munster (Germany) based startup founded in 2019. As it is a quite new-born startup, the company size is still in the range of 1-10 employees. In terms of the type of solution they offer, they are the closest competitor to Peers. This is because Edyoucated developed an AI algorithm that generates learning paths for digital learning skills for academics such us programming language, machine learning, data science and so on. Edyoucated, as Peers, have a digital platform to keep track and complete the learning units. Although the concept behind it is quite similar to that one proposed by Peers, which is tailored learning paths that fits individual's needs, Edyoucated tackle a different market segment. In their platform, Edyoucated presents a user profile for the employee to keep track of their development and see their achievements.

3.5.2 Sana Labs

Saba Labs is a Stockholm (Sweden) based startup founded in 2016. It is a well-known startup in the Swedish and European Market with a company size in the range of 11-50 employees. They use machine learning and Artificial Intelligence methods to create learning paths for students and companies' employees. Here, again the difference with Peers is mainly the market segment they tackle, as Sana Labs offers courses that focuses more on academic, formal learning, than learning in the workplace. Another difference is the way how they assess the needed skills, which they do it throughout quick pre-built standard questionnaires.

3.5.3 Innential

Innential is a Berlin (Germany) based startup founded in mid 2017. It is a small and still under development startup with a company size in a range of 1-10 employees. They developed a machine learning digital tool that provides personalized development plans for employees. Contrary to Peers, they do not generate learning paths, but the users can create their own learning path. They only provide recommendations on courses; thus, technology only focus on recommender engines, but leave the freedom of choice to customers. In terms of market channel, they target tech companies.

3.6 Summary

The company vision and an overview of the platform were provided in order to better understand the field and the purpose of the proposed research study. Startups with similar ideas to that one proposed by Peers in terms of vision and technologies were also mentioned. As all these startup are quite new on the market and still under development, information is kept confidential and only few data can be found on the internet in regard to their products.

Chapter 4 – UX Research and Methodologies applied in this Thesis

This chapter focuses on what User Research is and its methodologies. A brief explanation on the choice of methodologies to carry out and when it is best to apply them will be provided. In the case of this thesis project, as a working minimum viable product (MVP) has already been developed, the UX research approach and its methodologies have been chosen in order to improve its functionalities.

4.1 User Experience Research

User research is carried out to better understand the user's needs, their behaviours and motivation in order to solve their problems. In other words, it reveals valuable insight about users and their needs [73]. Conducting user research with the collaboration of the user makes the research user-centered design, fundamental to create a successful product for end users. The advantage in designing a product using a user-centered approach is that you ensure that you are building the right thing because you design the product with and for the user [74]. Receiving feedback from the user is quite crucial in human-centred design. Evaluating and testing designs directly with users allows researchers to improve the product based on users' feedback and it also minimizes the risk of developing a system that does not meet users' needs. Therefore, designing a product and testing it against "real world" scenarios at an early stage of the development cycle can also save time at later stage by avoiding designing unnecessary features that can then result in high repair costs (*Figure 14*).

When working in close collaboration with users, empathy is a fundamental element in the process of human-centred design [75]. Empathy is described as the ability to see the world through other people's eyes, in another words, the capability to understand experiences and feelings from the user point of view. While conducting a user research, a designer needs to develop a sense of empathy toward people he is designing for so that he can understand their needs [76]. The skill of a designer is to be able to empathize with the participant without introducing any bias.

Thus, user experience research plays an important role in order to design a valuable product.

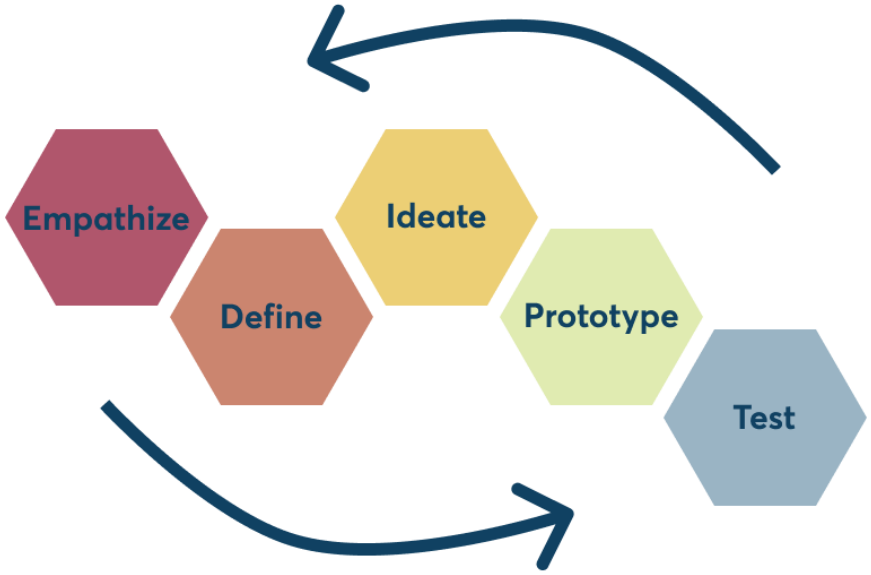

Figure 14 – UX Process [2]

4.2 User Experience Research Methodologies

There are different techniques available that can be used to carry out UX research. Although it is unrealistic to be able to apply all the different techniques in a single project, a research can certainly benefit from multiple methodologies combined together to discover useful insights.

The aim of the project was to improve the user experience of a learning platform for learning and development and its usability. To do so, a multi methodology approach was carried out. Techniques such as semi-structured user interviews, wireframing, high fidelity prototype, usability and user testing were carried out in order to improve the quality of the product. The core of the project saw the design of new features applied to the existing platform with a completely new UI design for it. Once the new UIs were implemented in the platform, users were given access to them. After few weeks from the implementation, users were asked to fill a questionnaire. A System Usability Scale (SUS), questionnaire was used to measure the usability and evaluate users' satisfaction.

The methodologies listed above were chosen specifically accordingly to the user needs. Interviews were conducted at that specific stage of the development cycle in order to gain

insights about what important features are still missing for the users in order to have the most optimal product that fits their needs. Then, the design implementation of the new user interface was done. The proposed research methodology has been inspired by the book "Understanding Your Users" [2] and detailed descriptions of each phase will be provided in the following chapters.

4.2.1 Interviews

User interview is a UX research method used to extract information from users. It discovers what they are trying to achieve and what problem they are facing. Interviews are techniques used to examine the user experience, the usability of a product or when done at the very early stage of the development cycle it helps to find out the optimal type of product for the user in the context [77]. Interviews are usually conducted by two people, the researcher and a note taker and they often get audio or video recorded. Generally, there are three types of interviews, structured, semi-structured and unstructured. Structured interviews present specific type of questions and are usually structured in a script. Semi-structured interviews usually have a topic to follow but the conversation is more open, while unstructured interviews are purely based on an open discussion with the user allowing different topics to be mentioned. The choice on which one to use can depend on the type of product you are developing or on the type of information you are trying to find out. Although it is an efficient and cheap method, interviews present some drawbacks too. Human memory cannot always remember detailed scenarios, and if these happened a while before, interviewees tend to tell a story the way they think it happened rather than how it happened.

4.2.2 Wireframe & Prototype

A wireframe is a low fidelity blueprint of a UI. It can be done on paper sketch or in a digital format using design tools. It shows the main information groups and it is used at the early stage of the development cycle to layout basic structure and contents of the graphical user interface. It provides the first visual design of the UI which helps to place the layout structure of the screen. This will later make easier to build individual parts of the UI. Wireframing in the UX research process has the advantage to be fast and cheap [78].

A prototype is defined as an early sample of a final product designed to simulate the interaction of the user interface by providing a user experience. Designing a click-through high-fidelity prototype helps to mimic a real user experience.

It allows researchers to test the product with real users in order to find out possible usability issues [79]. The importance of wireframe and prototype lies in the reasons mentioned in the above paragraph. Testing with users during the design process will ensure the development of a product that fits the users' needs. Wireframing first and prototyping after, will also make sure that users will not be frustrated by the final design of the user interface as they will be aware of the interactions needed to complete tasks by simulating the UI functionalities during these two design phases.

4.2.3 System Usability Scale (SUS) Questionnaire

The SUS questionnaire was created in 1986 by John Brooke [80]. It is a questionnaire that allows researchers to evaluate a variety of products, from website to mobile applications. Originally designed as a "quick and dirty" way to measure usability, it is a Likert scale questionnaire consisting of ten questions with five responses options from "Strongly disagree" to "Strongly agree". It allows users to evaluate their satisfaction about the product they have been interacting with [81]. The SUS questionnaire seems to be the most appropriate type of questionnaire to evaluate user's satisfaction as it can be used on a small group of participants bringing reliable results.

The statements used when conducting a SUS questionnaire are taken from the standard template and are as follows:

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.

7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

Interpreting the results of a SUS Questionnaire can be quite complicated. To calculate the SUS score, from the answers of all the odd numbered statements, one has to be subtracted, and for all the even numbered statements, the user responses has to be subtracted from 5. The sum of the score is then multiplied by 2.5 to obtain the overall value. The score has then a range of 0 to 100 [77]. Accordingly to Brooke [76] a threshold is set to evaluate the score from the questionnaire. Any score above 70 would be considered acceptable while anything below 70 is considered low in terms of acceptability.

Chapter 5 – The Manager Portal

This chapter focuses on the manager portal of the digital platform. The design process involved research methodologies such as interviews, wireframes, prototypes and testing of the new manager UI. Description and analysis of each step are provided as follow.

5.1 Interviews

As Peers GmbH has already a working MVP, interviews were conducted specifically with the aim of gaining insights on how to improve the manager section of the platform by developing new features. Thus, for the proposed research thesis, semi-structured interviews have been chosen as a type of interview (Appendix B). The reason behind is that the semi-structured interview ensures that the most important topics are discussed during the interviews while it keeps the freedom of an open discussion. Semi-structured interview consists of a script prepared to use as a reference with a set of questions to follow. The interviewer does not have to stick only with the script questions, but it can help him/her not to lose track of the topic in the discussion.

5.1.1 Interview Participants

All interviewees have been selected based on the need of the product. Thus, seven interviews have been conducted with four CEOs and three Managers of companies in the manufacturing industries. Also, it has to be mentioned that the interviewees work for companies that are already in the process of a negotiation to close a contract with Peers for the learning and development of their employees, therefore potential users of the platform. This ensured that the outcome is relevant to the product and its users. The seven interviewees were between 36 and 52 years old, two females and five males.

5.1.2 Interview Procedure

The interviews took place at the beginning of April, for approximately a week. A consent form was provided to the interviewees beforehand for them to read and sign, and they were asked to return it prior to the day of the interview (Appendix B). All the interviews were conducted

online using the tool Microsoft Teams[1], with the video functionality activated. With the consent of the participants, the interviews were also audio-recorded for future transcription. Prior to the interview, an overview of the project was given to the interviewees through an open discussion explaining the purpose of the interview. Not too many details were provided not to bias the interviewees' answers. All the interviews lasted roughly 60 to 90 minutes. Two people were present for each interview, a researcher and a note taker.

The first set of questions were about the participant's daily life and hobbies. Having an open discussion as intro allowed the interviewee to feel more comfortable and open with the discussion. During the core of the interview, interviewees were asked how learning and development work at their companies, what works well and what does not. The aim was to address the interviewees pain points when it comes to plan or keep track of their employees' learning and development.

5.1.3 Interview Analysis

After all the interviews were completed, a workshop day within the whole company team was conducted to analyse the interviews in order to better understand the pain points and needs of the user. Prior to the workshop, all the interviews notes were transcribed on a digital document, ready to be analysed. Miro Online Board[2] tool was used for the analysis of the interviews. The tool has been chosen as it allowed the whole team to work online remotely, an important advantage in pandemic time. In the Miro board, frames were created for each participant in order to gather all the findings from the interviews. The first step was to extract all the information from the transcribed interviews into post-its independently of the relevance within the context (Images 3 to 5, Appendix B). The first round of analysis saw the categorization of post-its from each interview (*Figure 15*). Three different categories were created. The first category concerned personal information of the participant such as gender, age, hobbies and the core of their daily duties at work. The second one was related to learning and development at the current company, including information of its efficiency in terms of

[1] https://www.microsoft.com/en/microsoft-365/microsoft-teams/group-chat-software

[2] https://miro.com/

structure. Last, all that information about the managers' expectation if the company would have signed a contract with Peers for their employees' learning and development.

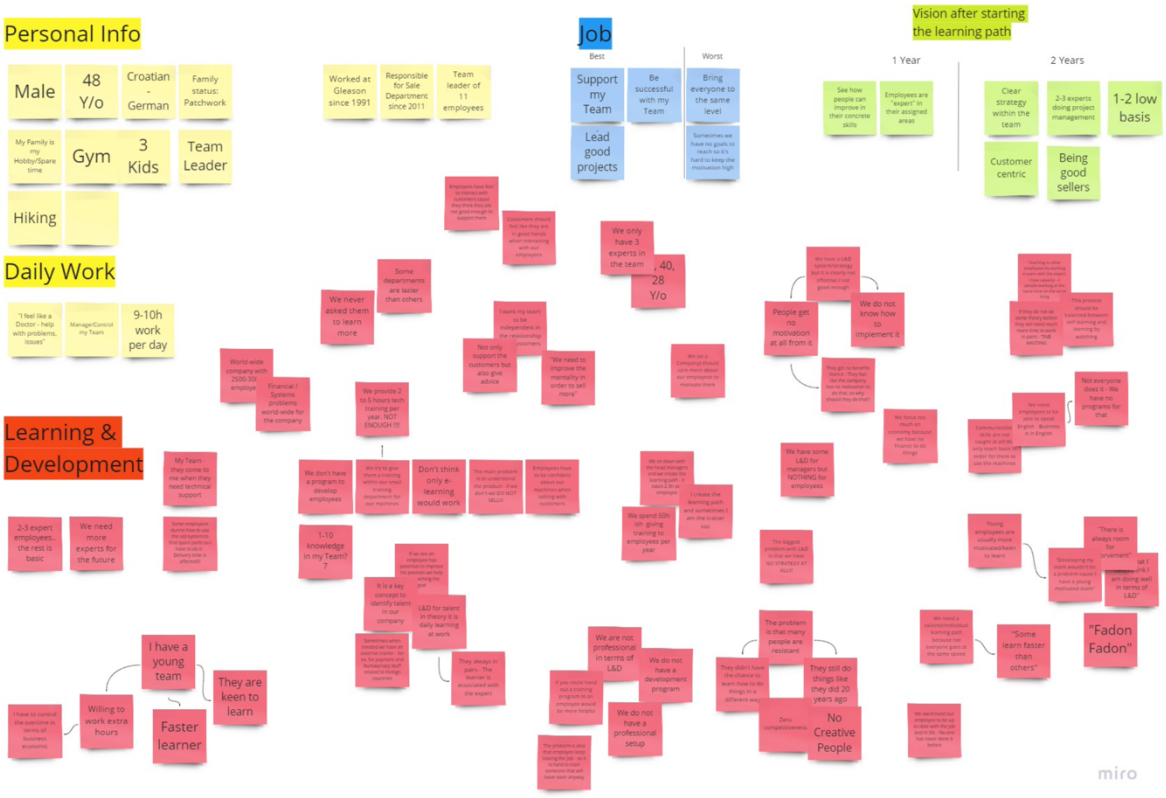

Figure 15 – Manager Interview analysis Miro Board

Then, an affinity map was created in order to gain insights from all the managers interviews. Affinity mapping is a technique used by UX researchers to analyse and synthesize findings by themes and categories by adding post-its on a visual board. This can be done on paper by using post-its or in a digital format, like in the case of the proposed research, using an online collaboration tool. All the post-its from each frame were first analysed in order to be able to discard all those containing irrelevant information and then they were grouped together into a new frame ready to proceed with the second and detailed round of analysis (*Figure 16*).

Figure 16 – Manager Affinity Map Miro Boar

At this stage, the focus of the analysis moved on to generate insights for the managers' needs. All the post-its with the label "learning and development" were discussed and common themes were identified as follows:

- Keep track of employees learning and development;
- Budget control;
- Employees motivation;
- Company mindset toward learning and development;
- Managers' pains;
- The need of a central point to check employees' progress

Relevant quotes were also underlined, and sentences were stated as follow:

- "I need a quick and easy way to constantly keep track of my employees' learning and development"
- "How can I check if my employees are following their classes?"
- "How do I know if an employee gets stuck in some course?"

In the last step, the customer pain points, needs and motivation were also analysed in order to check that overall, the purpose of the product was matching the customers' needs. The pain points were categorized into four different themes:

- Financial
- Process
- Productivity
- Support.

Categorizing pain points helped to evaluate the efficiency of the current MVP from a different perspective. In the financial theme, interview findings underlined how little time and money companies are willing to invest in learning and development. As for the process, it came out that companies have no plan and strategy for it. Also, several interviewees mentioned the difficulty of finding good learning contents that fit the employee's needs. In terms of productivity, managers were complaining of how often employees do not have the right skillset to keep up with digitalization and how this issue affect the overall company productivity. As for the support, topics such as employees' motivation were strongly highlighted by all the managers along with difficulty of keeping track on their progress during the development cycle as information about progresses of employees' learning and development are usually spread over different excel sheets and papers format.
After conducting the interview analysis, it can be said that the chosen method has brought key results to the development of the project. In general, it has been identified how the main purpose of the product matches the customers' needs. Insights showed the need of further development on how to give managers control on their employees learning and development. To do so, it has been decided to move on with the design of a new dashboard view in the managers section that will allow them to be updated about the overall status of their employee in regards with their learning and development.

5.1.4 Defining Dashboard Contents

To better understand how and what information to include in the manager dashboard, the ideation phase took place. Using the Miro Online Board, an "how might we . . ." map was generated to brainstorm ideas within the team. A list of possible features was proposed and

written down. The process of the brainstorm involved each member of the team to write down a sentence using the structure of “how might we . . .” followed by the proposed feature. A round of votes was completed to determine the relevance of information we wanted to show in the manager dashboard. Each member of the team voted by adding a coloured circle next to the proposed features he found relevant. (*Figure 17*).

Figure 17 – Interview analysis Miro Board

The outcome of the brainstorm showed key information that needed to be included in the employee’s dashboard.

After the analysis of the interviews and the brainstorming, with the unanimity of the team, the features to include in the UI were decided. The dashboard needed to provide managers the following:

- A complete list of the employees undertaking learning courses;
- Show total number of employees;
- Overall status of the learning path – including error messages when employees miss a course deadline;
- Possibility to search by name of employee;
- “Sort by” option;
- “Filter by” option:
    - By “Team”

    - By “Role”
    - By “Status”
    - By “Progress”
- Employee detail card showing:
    - Learning courses completed/ tot.;
    - Learning path completion date;
    - Employee Role;
    - Detail for each learning course including:
        - Dates;
        - Duration;
        - Learning Providers;
        - Course type;

Based on the outcome, the next step in the development cycle was the implementation of paper sketches and wireframe.

5.2 Design

5.2.1 Sketching

Once the team chose the features to implement in the new employees’ dashboard, the visual design of the interface could start its development. A process of idea generation started from paper sketches. The reason behind this choice lies to the fact that paper sketches are a simple, cheap and useful approach to gather a first understanding of the way to provide the first structure to the UI. The intention was to create several sketches in order to have a first visualization of the core concept, having different options regarding the positioning of the features within the frame.

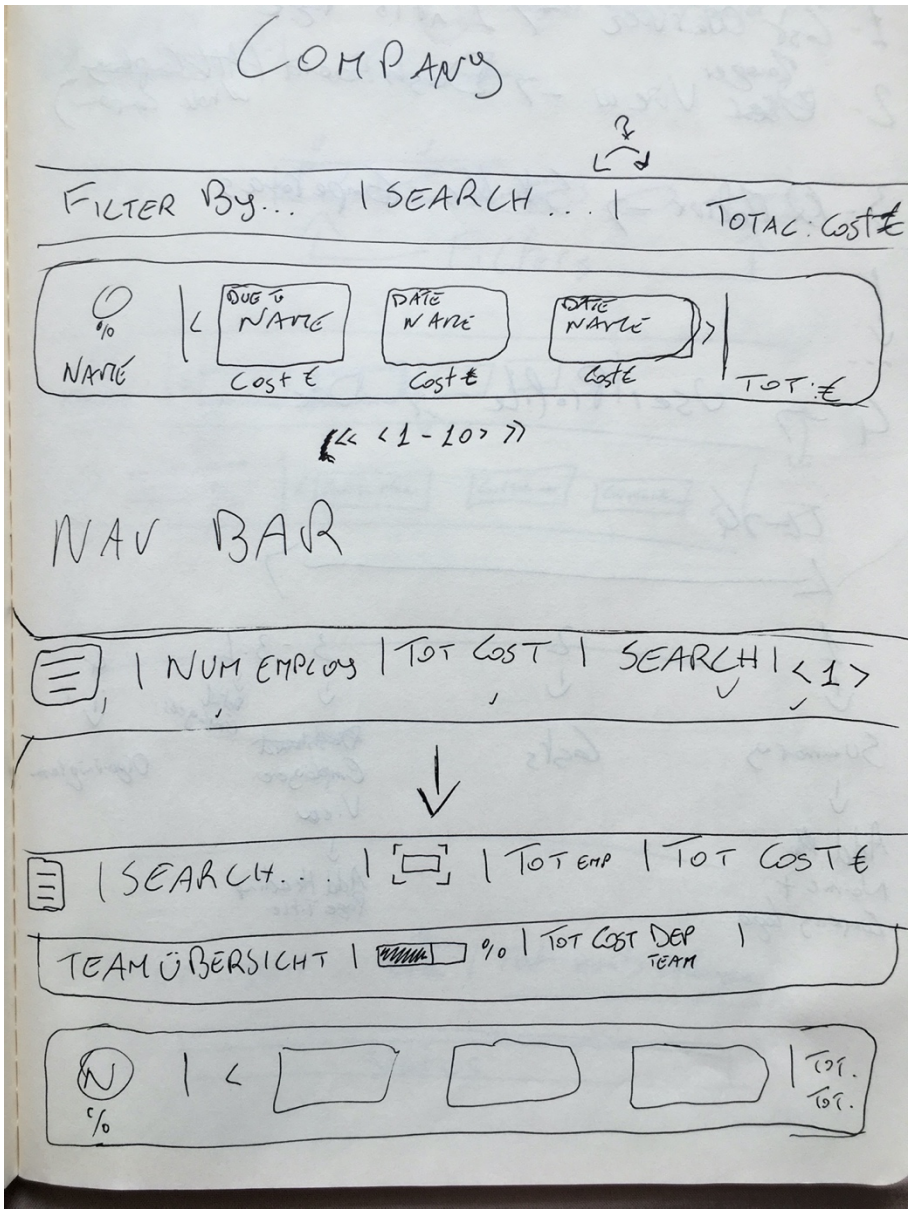

Figure 18 – Navigation Bar Paper Sketch

Many ideas came out during the paper sketching phase. For the first screen of the manager overview, the employees list, the focus was to understand how to best design the navigation bar that will help the managers find key information about their employees. Figure 18 shows different potential ideas for the navigation bar. Here the challenge was to not overload the navigation bar with extra information in order not to affect the user experience and the interaction with the UI. The other key information was how to design the rows of each employee and what information to include (*Figure 19*) (Image 4, Appendix B).

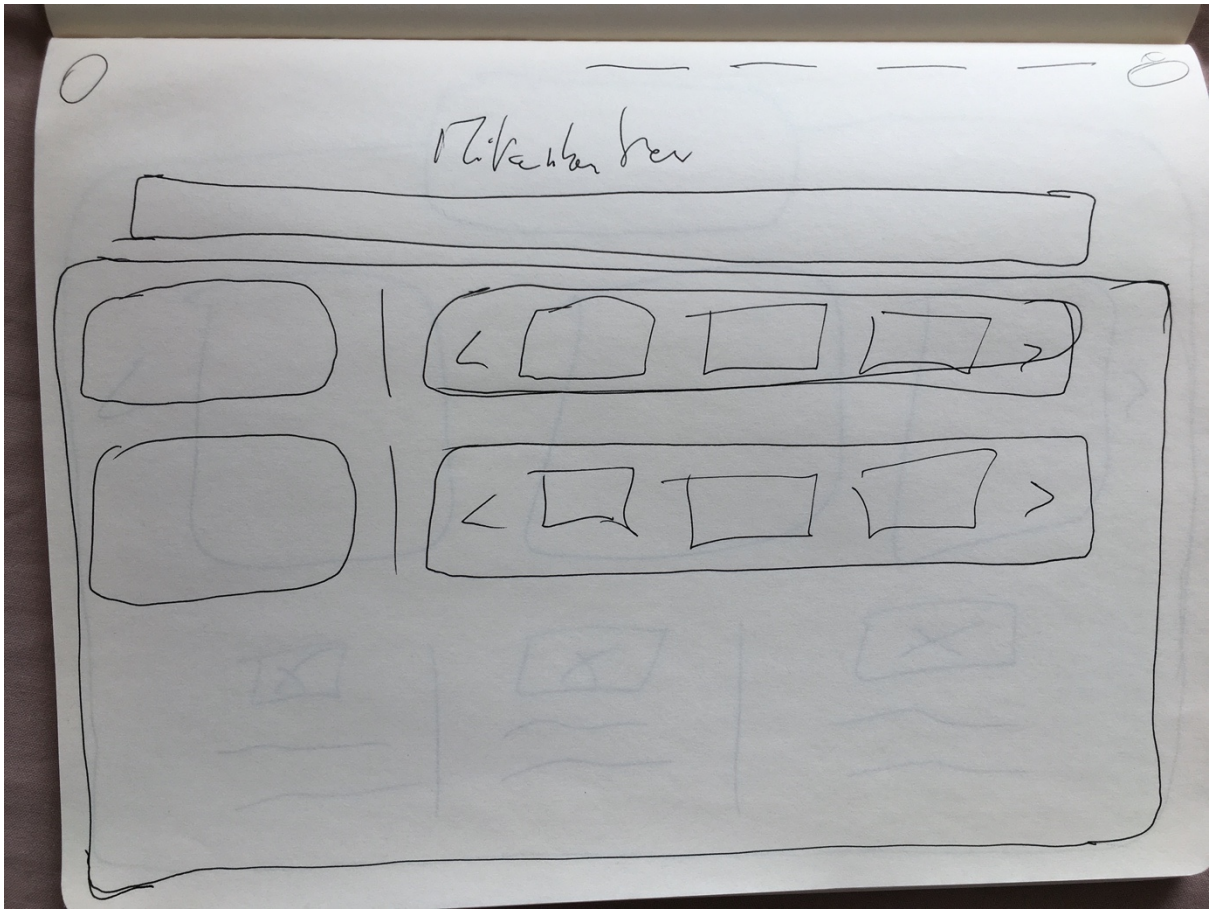

Figure 19 – Dashboard Paper Sketch

Regarding the employee detail view, the focus was on understanding how to best show all the needed information within the employee card without overloading the user with extra non-primary information (*Figure 20*). Paper sketches also helped to have a better visualization of the structure of the card and whether we wanted to show a single big card or give the visual effect of two cards combined together when a detail employee view was opened.

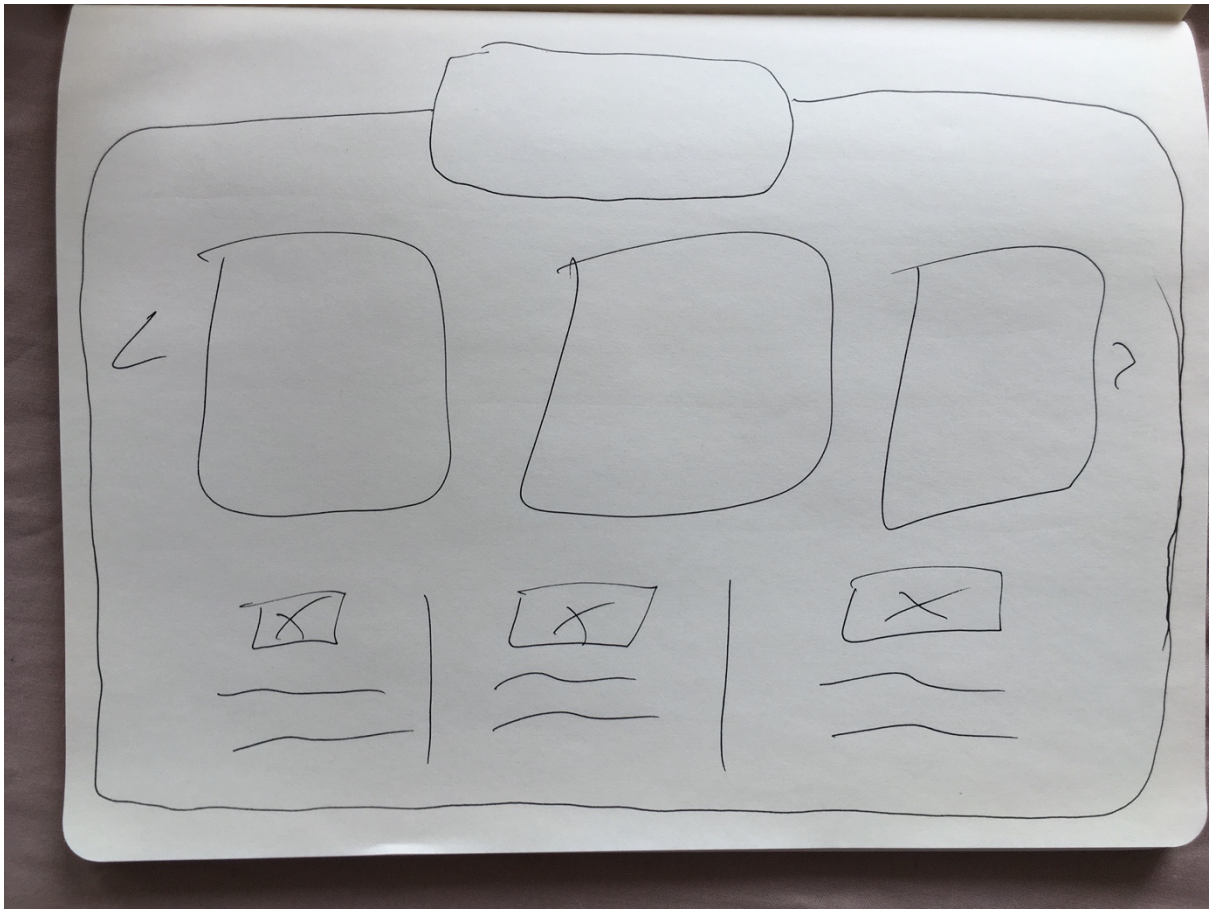

Figure 20 – Employee Detail View Paper Sketch

5.2.2 Wireframing

After a better understanding of the visual design was gained from the paper sketches, wireframing was the next step in order to move the generated ideas from sketches to a digital version. At this stage, mockups needed to be created. Different design tools are available in the internet to create wireframes. Figma[3] was chosen as design tool for the development of the whole project. It is a powerful tool that allows designing from wireframes to high fidelity prototypes and UI. The development of the new UI dashboard was based on a set of design principles that needed to be followed [82] in order to ensure the new design was usable for the selected type of users. A list of the selected principles is listed as follows:

[3] https://www.figma.com/

- Keep user informed of system status
- Set information in a logical, natural order
- Ensure users can easily undo/redo actions
- Design with aesthetics and minimalism in mind
    - Match the UI design with the platform style in terms of colours, figures etc.
    - Navigation through the dashboard has to be quick and easy for a fast overview check.

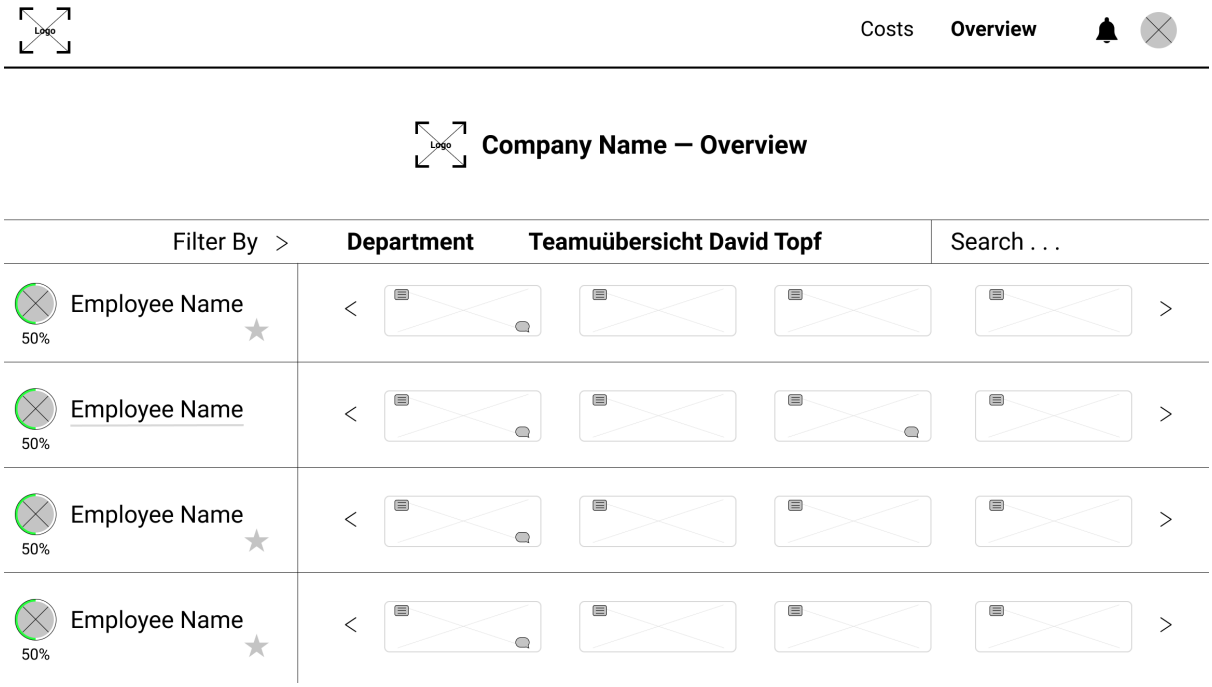

Figure 21 – Dashboard Wireframe

Several design iterations were conducted during the wireframes phase (Images 6 to 11, Appendix B), where each iteration was followed by a brainstorm session within the team to agree on the positioning of features and small changes before moving into the next stage.

The first idea that came up during the first brainstorm session was to split the manager profile into different pages. This would help to not overload the dashboard with too many information. *Figure 21* shows the first wireframe and the top menu bar of the screen with the option to navigate through two different pages. These included the current page, the

dashboard overview, and the costs view page to show the company summary in terms of budget spent for their employee learning and development. The wireframe presented a navigation bar with the option to “filter by” followed by a “search” bar. A list of the employees and the learning courses they have to complete was the core of the dashboard. In the first iteration the team thought about including two clickable icons inside the learning courses containers. One would have shown details of the course and the other one allowed managers to send feedback to their employees. After days of design, a final version of the wireframe, including some feature’s updates, was presented to the team.

Figure 22 shows the final wireframe of the employee dashboard, with each row displaying the learning paths of employees. Here some final changes have been made after several feedback session with the team. It has been chosen to apply “tiles” to allow managers to filter the employees list depending on their needs. The manager can click on the tile to filter the needed parameters he is interested to look at. A “search” bar allows also a specific employee research. At the bottom of the screen, a “legend status” is provided to track employees’ progress. The total number of employees and the page number is also shown.

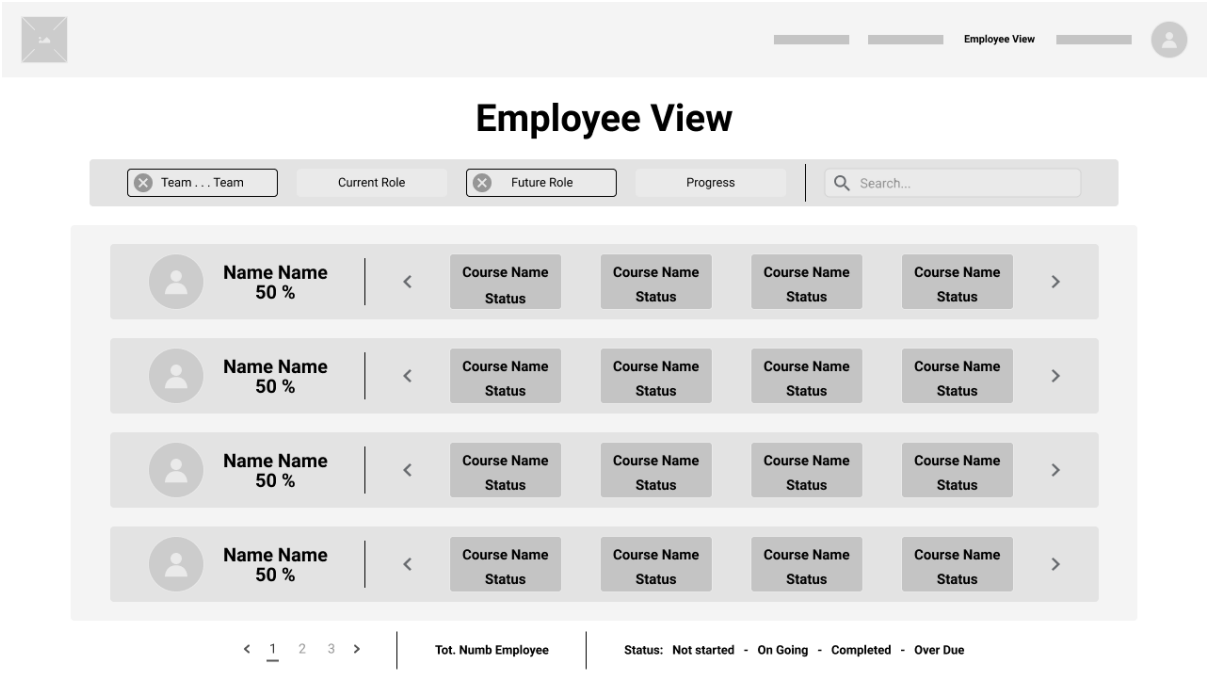

Figure 22 – Final Dashboard Wireframe

Figure 23 represent the detail card view of each individual employee. The access to this view is given by simply clicking in one of the employees' rows. Here the aim is to show all the employee details that a manager needs to check. These include details of the learning path the employee is undertaking such as role job, number of completed courses, current status and the learning and development completion date.

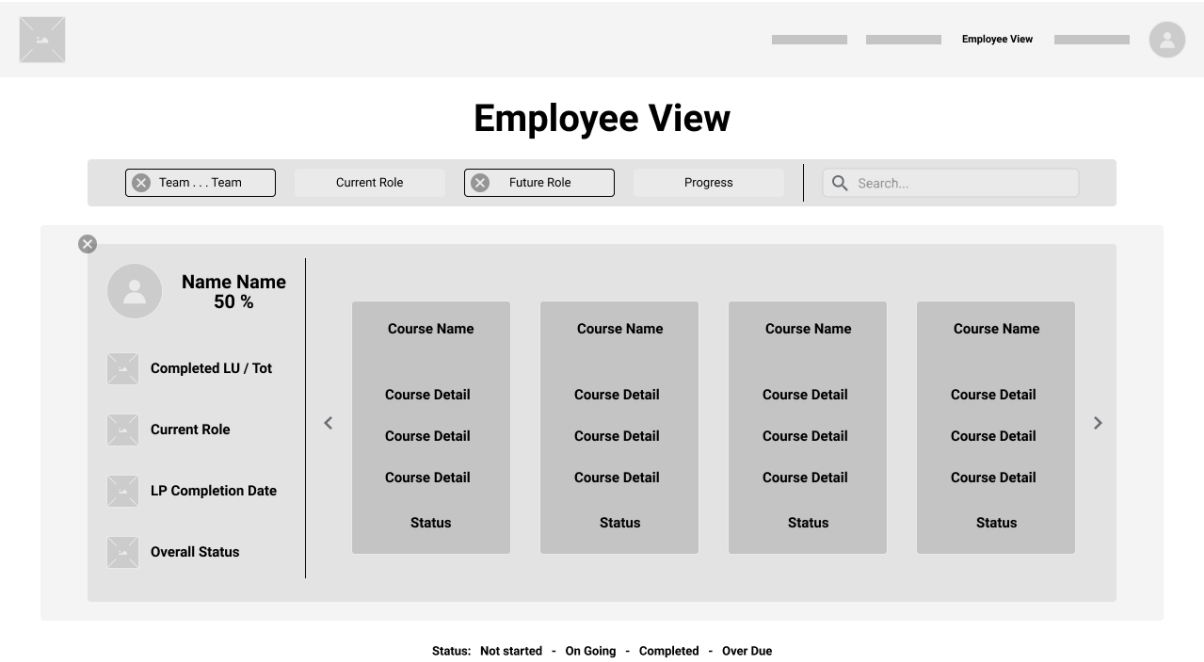

Figure 23 – Dashboard Wireframe

5.2.3 Prototyping

After the development of wireframes and the agreement from the team on what features to include, the next step was to design a high-fidelity prototype. Creating a high-fidelity prototype for the proposed project brought two advantages for the final development of the dashboard. The first one was the benefit of having a first UI visualisation of the dashboard, which helped to understand if the chosen style matched with the general platform style. The second advantage was related to the subsequent user testing planned as a final step for the development of the dashboard. Letting users interact with a high-fidelity prototype helps to gather qualitative feedback and test the usability of the UI.

Figure 24 and *Figure 25* show the final prototype version of the dashboard and the employee detail view designed to subsequently conduct usability and user testing with real users. More images of the full UI interactions and the different design interactions can be found in Appendix B (Images 12 to 16).

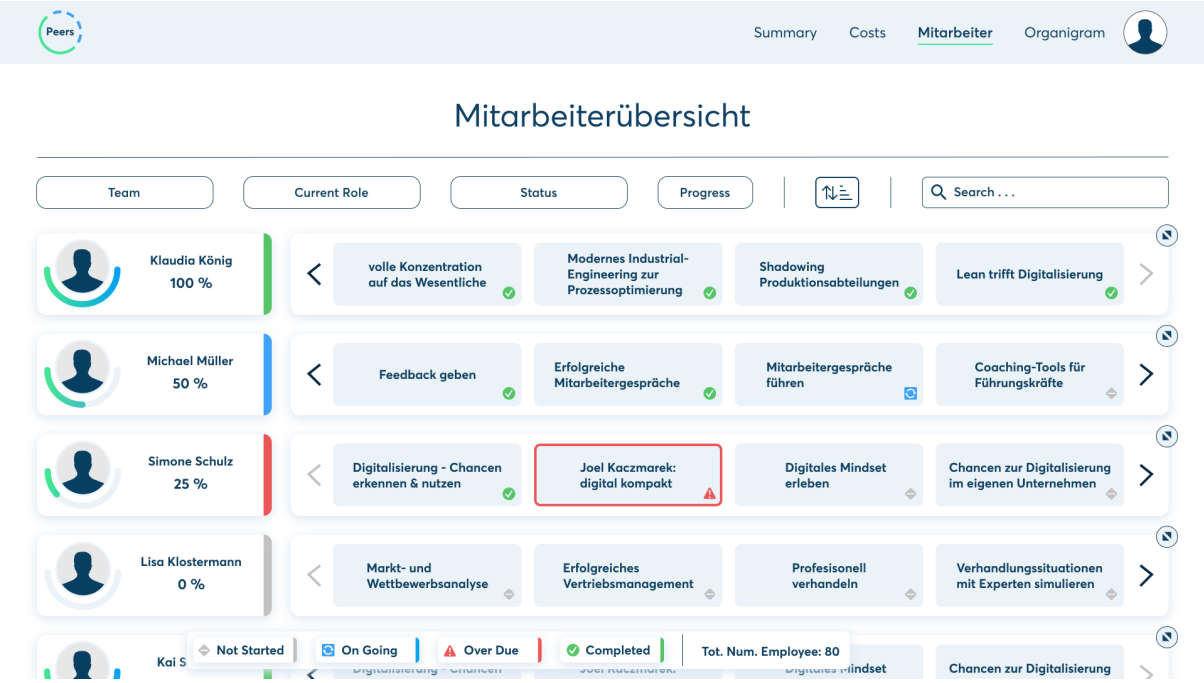

Figure 24 – Employee Dashboard

Figure 25 – Employee Detail View

5.3 Usability Testing

The final step of the development of the dashboard was to conduct usability testing. The seven managers who took part for the interviews at the early stage of the development of the project were also selected to evaluate the prototype. The testing was conducted online via Microsoft Teams with the screensharing functionality activated. Each testing lasted roughly 30 to 40 minutes. The participants were first asked to open the prototype by the provided link on a browser and take a couple of minutes looking around expressing their feeling, concerns and opinion. This technique is called think aloud and allows to gather qualitative feedback from user while interacting with the prototype. Adopting the same technique, participants were then instructed to complete few simple tasks, where the aim was to examine the interaction flow with the dashboard. The testing was prepared following a specific structure and was applied in the same way for each participant. In the prototype, the tasks to perform were given as follow:

- Filter the employees by team “David Topf”;
- Filter the employees’ list by “Abkanter role”;
- Filter the employees’ list by “Inaktiv Status”;
- Filter the employees’ list by “25%-50% Fortschritt”;
- Open the detail view for the employee “Michael Müller”;

5.3.1 Testing Analysis

The testing focused on the functionalities included in the prototype. Based on the tasks completed by the users an acceptance criteria list was created to evaluate the usability of the new UIs. This helped to understand whether the UIs were enough self-explanatory for the participants to navigate through without any prior explanation to the test. The two tables below represent the list of criteria for the general employee dashboard screen and the employee detail view. Based on the majority of the responses obtained, “met/not met” was assigned for each criterion to analyse the transparency of the features presented in the UIs. The results were gathered and noted down on the table based on the responses obtained from the participants’ reaction while completing the tasks.

Employee dashboard:

Acceptance Criteria	Met/Not Met	Explanation
Understanding "Legend Status Bar" at the bottom	Not Met	The bar is not visible at first sight due to employee row underneath
Understanding the meaning of "Tiles	Not met	Confusion on the interaction with the tiles. Not sure if clickable
Understanding meaning "Overall Percentage Status"	Met	Recognition in the connection between courses and progress percentage
Understanding meaning of "Sorting Button"	Not Met	Confusion on button's meaning. Managers do not need a sorting option
Understanding "Search Bar" meaning	Met	Clarity on how to research for a specific employee
Understanding "Status Bar" next to employee name	Not Met	Uncertainty on what the coloured status bar refers to
Understanding Coloured Progress" half circle under employee picture	Not Met	Confusion on colours (green to blue). Users thought half circle had a connection with status bar
Understanding the "Scroll" between learning courses	Met	Understanding how to scroll between learning courses
Understanding "Detail view Button"	Not Met	The button meaning has been mistaken. Users thought it was a button to mover employees rows up/down
Understanding "Symbol Status"	Met	Understanding symbols matching with status colour

Employee detail view:

Acceptance Criteria	Met/Not Met	Explanation
Understanding "Dates" on completed single learning course	Not Met	Too many dates are shown on completed courses. Only completion date is needed
Understanding "Learning Course Provider"	Met	Understanding who the course provider is
Understanding "Close detail view button" meaning	Not Met	Symbol on closing button is not recognisable

Understanding meaning of "Images representing Course Type"	Met	Understanding the matching between course type and images
Info details on left card	Met	Information details are understandable
Understanding meaning of "Learning Units not started yet"	Not Met	Combination of colours - blue and greyed out, confuse the user whether the learning unit is completed or not

Based on the feedback and evaluation identified from the above tables, some adjustments were made to the UI before passing the design file to the developer. The final design was implemented in German as it is the main language of the platform and all the right texts needed to be centered within the screen. The aim of the new features in the UI is that the screen has to be as much self-explanatory as possible.

For the main screen (*Figure 26*), several changes needed to be made. A white container was added behind the bottom the status bar and the scroll between rows was limited within the space. This helped to make the bar more visible not having an overlap between rows and the bar itself. In the tiles, small arrows were added to make clearer that they are clickable, and filter can be chosen. The sorting button was removed, as managers feedback showed they do not need this option. The button was replaced by the total number of employees. The coloured half circle progress was removed as testing showed confusion on its meaning. Symbols were also added between the status bar and the employee name for a better understanding of the current employee status. The symbol in the button to open a detail employee view was replaced by a facing down arrow to make its meaning clearer. A "contact us" option was also added as managers express the desire to have a quick way to get in touch with Peers if anything was needed. The reward badges were also added under the employee name which are linked to the employee profile explained in the next chapter.

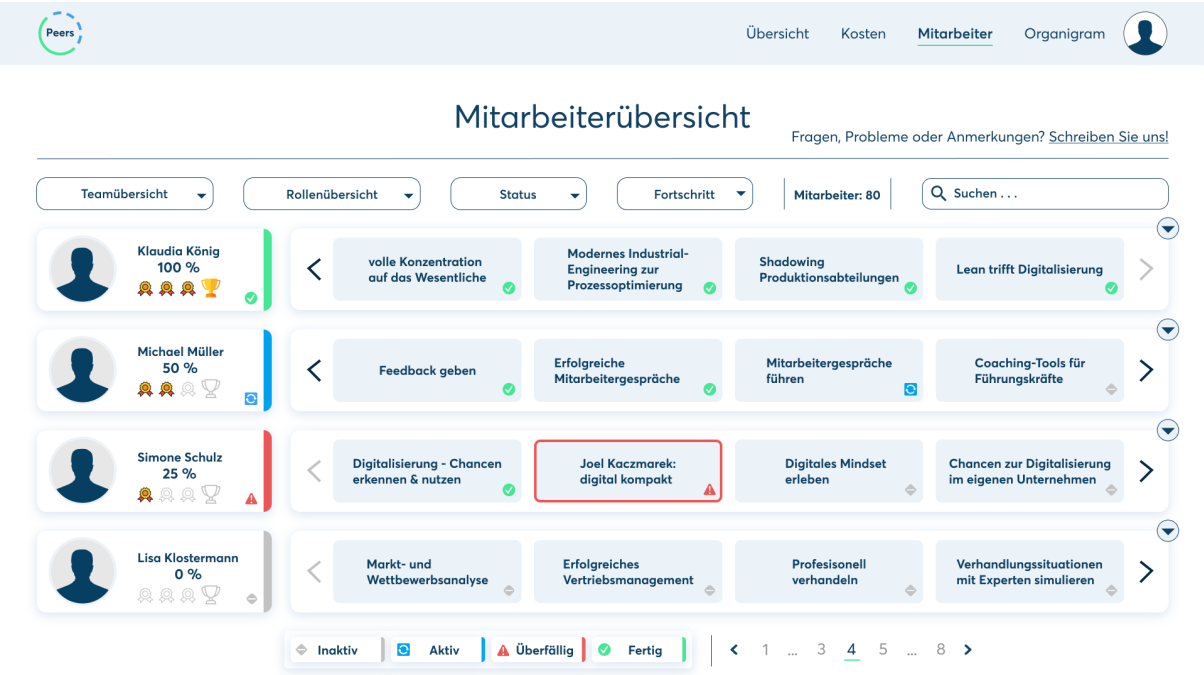

Figure 26 – Dashboard Final UI

For the employee detail view (*Figure 27*), minor changes needed to be made. The closing button was redesigned to improve its meaning. When a learning course was completed, only the completion date was shown and the employee feedback on the course was added instead of the image related to the course type. This helped not to overload the learning course container with too many information. If a learning unit is not started yet, its whole container is greyed out to show that the specific course was not unlocked yet. Based on participants' desire during the evaluation process, two buttons were added to give managers the opportunity to congratulate employees if a course was completed or send them a reminder in case a course was overdue.

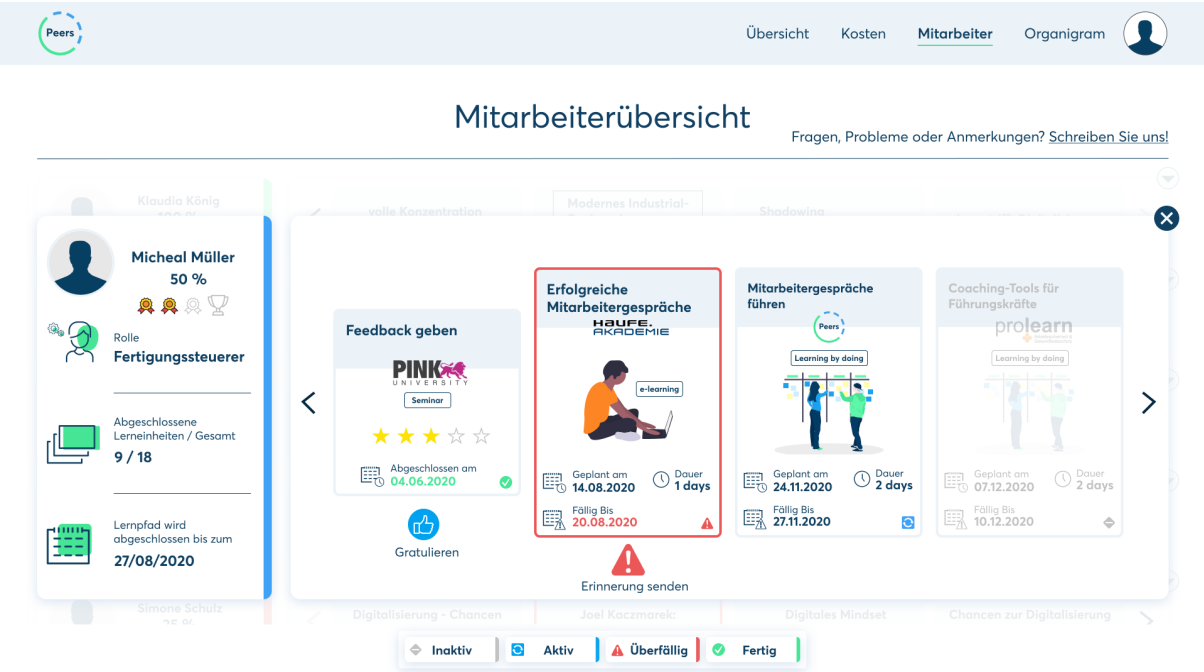

Figure 27 – Employee Detail View Final UI

5.4 Usability Field Test

5.4.1 Method

Once the design process of the dashboard was completed, it was handed-in to the developers' team who implemented it into the platform.

A SUS Questionnaire was used to evaluate the efficiency of the new dashboard used by managers at work. The SUS questionnaire is used to evaluate user satisfactions and it consists of 10 pre-built questions. In order to collect online response, the questionnaire was created using Survey Monkey[4] online tool and was sent out by sharing a link (Link in Appendix B) with the seven managers who took part of the usability testing conducted during the dashboard development process. The questionnaire was sent two weeks after the deployment of the dashboard into the platform. It has to be mentioned that the dashboard was not meant to be used by the managers every day at work, but once, twice per week, usually toward the end of the week. Thus, the responses collected are based on a short period time usage of the dashboard.

[4] https://www.surveymonkey.com/

5.4.2 Results

Figure 28 represents the scores of the SUS questionnaire filled by the managers after using the dashboard. Accordingly to Bangor [83], in order to consider a system satisfactory, the minimum threshold has to pass the 70/100. All the scores of the seven managers were equal or higher than 75, with an AVG = 82.15/100 and SD = 5.48. Thus, the implemented dashboard can be considered acceptable. According to the measurement scale proposed by Bangor *Figure 29*, the user satisfaction can be considered as "Acceptable".

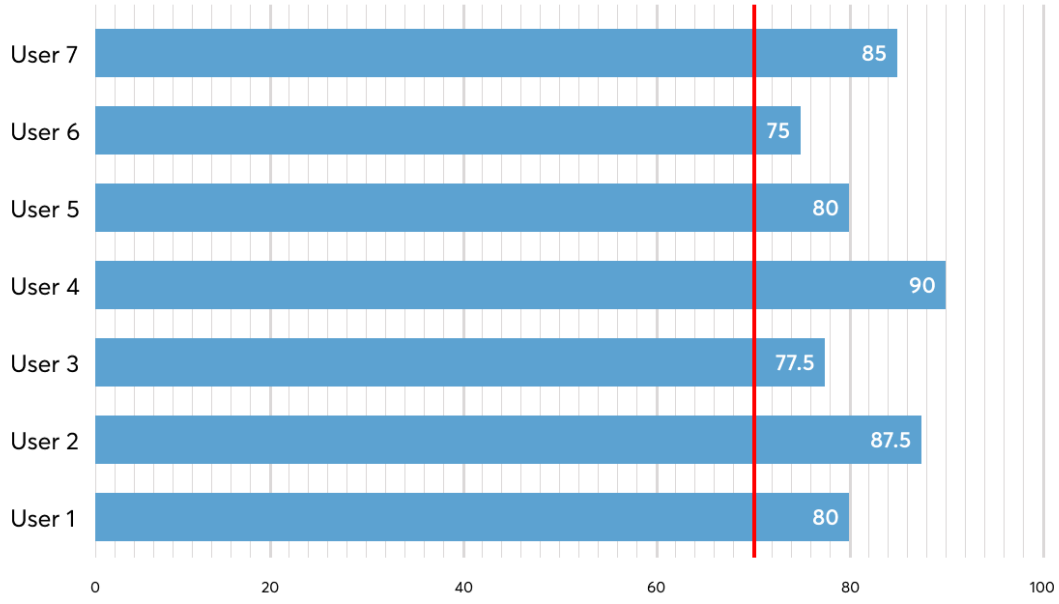

Figure 28 – SUS Questionnaire scores

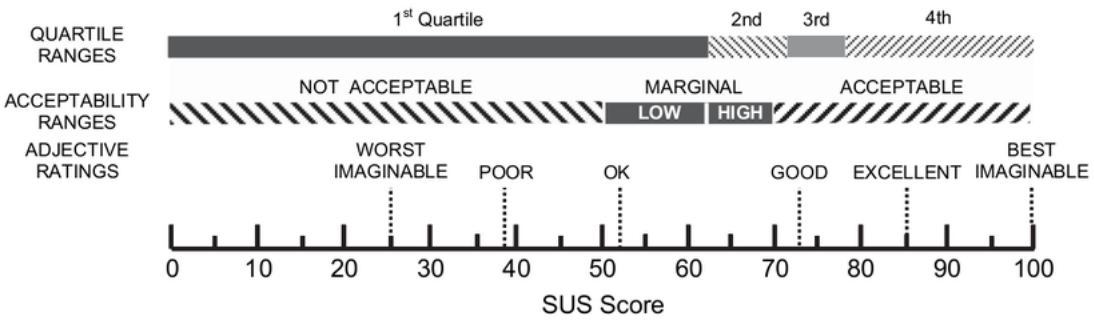

Figure 29 – SUS Measurement Scale [79]

5.5 Summary

The chapter investigated managers' needs and pain-points related to the learning and development process that happens inside companies. The outcome of the research analysis showed the need of a central point for managers to keep track of their employees' learning and development progress. Thus, an employee dashboard was designed and implemented into the platform. Two tests were conducted after the implementation of the dashboard to evaluate its efficiency. Positive results came out from the usability testing and the SUS questionnaire proving how the new design matched the managers needs and requirements.

Chapter 6 – The Employee Portal

The chapter focuses on the employee section of the platform and the design of new UIs. Currently, the platform allows employees to only plan and see detail about their learning courses. The aim of the project is to improve the platform and the users' interaction with it. Thus, the research focused on the creation of a user profile that improved the users' interaction with the platform.

Research methodologies such as interviews, wireframing, prototyping and user testing were applied for the design development of the platform. Description and analysis of each step with a special focus on key findings are provided below.

6.1 Interviews

In order to improve the employee section of the digital platform, interviews were conducted as a first step. Here, as in the previous chapter, interviews were conducted with the specific aim of gaining insights on new features that were needed in order to improve the user experience of employees when interacting with the platform. Semi-structured interviews were chosen as a type of interviews to conduct within the context (Appendix C). This helped to direct the interviews in a more open conversation to discover the pain points and need of the users.

6.1.1 Interview Participants

Seven interviewees were selected for the case study. All the participants were employees in the manufacturing industries who started already their process of learning and development internally at their company through the digital platform offered by Peers. Conducting interviews with users who were already using the platform helped to improve the product based on their needs. The seven interviewees were between 41 and 54 years old, six males and one female.

6.1.2 Interview Procedure

The interviews took place in May, for approximately a week. As in the case of the interviews conducted with managers, a consent form was provided to the participants beforehand for them to read and sign, and they were asked to return it prior to the day of the interview. All the interviews were conducted online using the Microsoft Teams tool. With the consent of the participants, during the interviews the video functionality was activated, and they were also audio-recorded for future transcription.

Each interview lasted between 60 to 90 minutes. Two people were present for each interview, a researcher and a note taker. The interviews started with a set of questions related to interviewees' personal information, including job duties and hobbies. This helped participants to feel more comfortable and open with the discussion. The following se of questions focused on how learning and development works at their company and how they had been facing situations at work where they were not able to complete a task due to a lack of expertise.

The goal of the interviews was to identify what was still missing in the platform to grant the most optimal user experience of employees who were undertaking their development process.

6.1.3 Interview Analysis

After all the interviews were conducted, were transcribed in a digital format, ready to be analysed. The same process was applied as for the managers' interviews analysis. A workshop day within the team was conducted to analyse the interviews' findings in order to better understand the customers' pain points and needs. The Miro Online Board tool was used, again, for the analysis of the interviews. The first step was to gather all the key findings from the transcribed notes. Thus, frames for each participant were created on Miro, information was extracted from the transcribed interviews and post-its were placed independently of the relevance within the context(Images 17,18, Appendix B). Once all the post-its were placed on each frame, categorization by group took place (*Figure 30*). Three different categories were created. The first category was about participants' personal information including gender, age and job role. The second one was related to learning and development with a special focus on whether employees are given a possibility to learn at work. The last one was about their daily duties at work and possible faced problems.

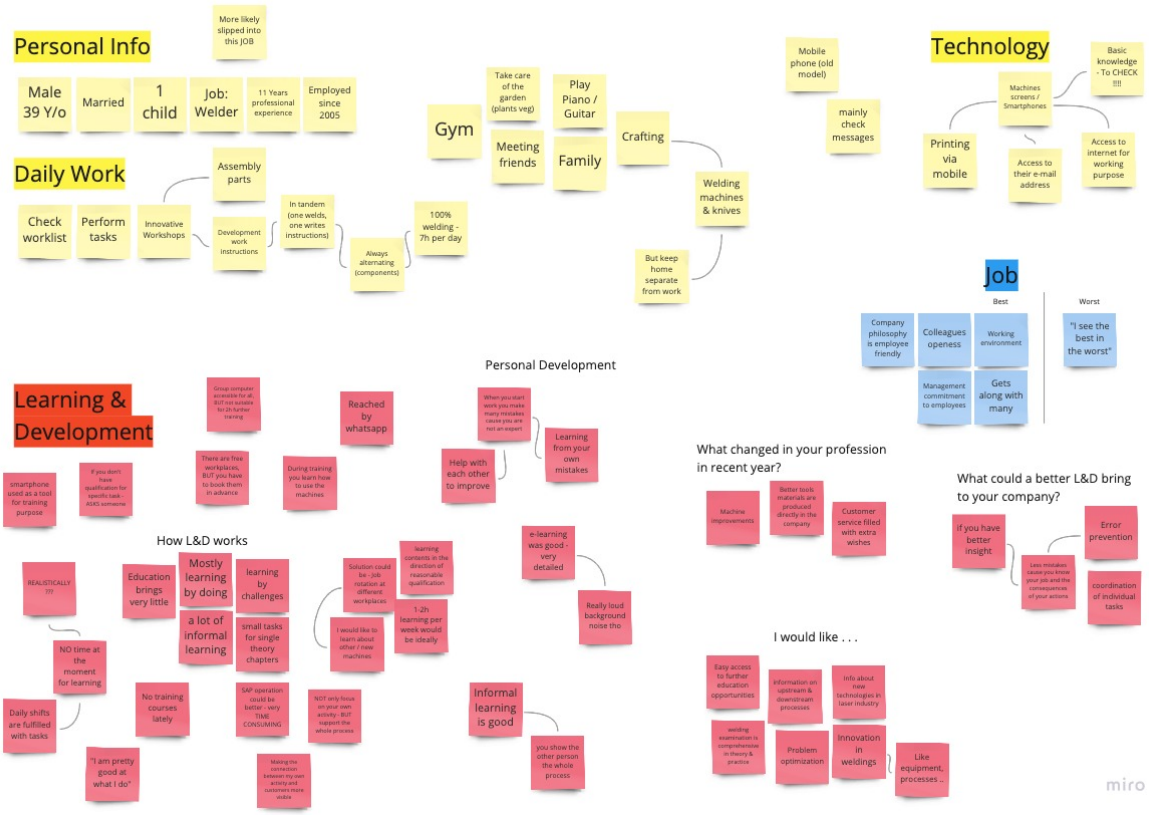

Figure 30 – Employee Interview Analysis Miro Board

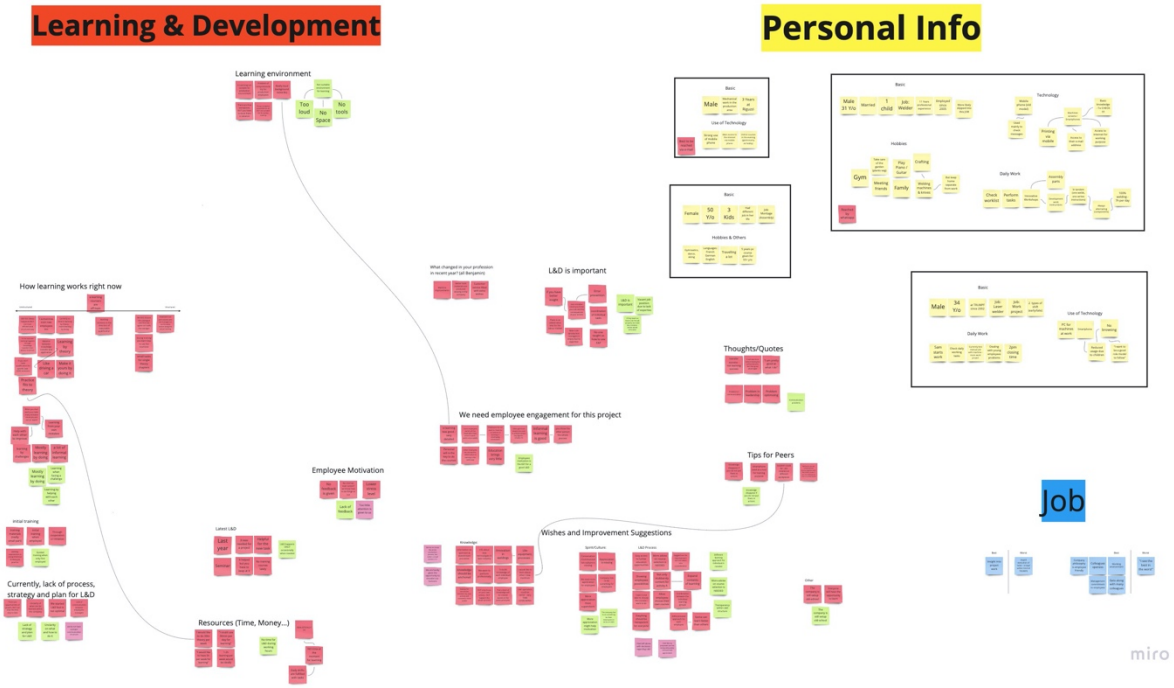

Figure 31 – Employee Affinity Map Miro Board

An affinity map was then created in order to gain insight from all the employees' interviews. To do so, a second round of analysis was conducted to gather all the relevant post-it into a new big frame discarding all the irrelevant information (*Figure 31*). The analysis was then conducted by the team in order to generate insights for the employee's needs. The most relevant post-its were discussed and common themes were identified as follows:

- The feeling of appreciation while undertaking a learning path;
- Managers gratification toward employees;
- Rewards when completing a learning unit;
- Transparency on learning and development structure;
- Boost employees' motivation;

Key quotes from the interviews were also highlighted to better understanding the employees' needs. These are stated as follow:

- "I feel like managers do not even check whether I have learned something new or not"
- "More appreciation from the managers might help my motivation on doing the courses"
- "A friendly competition with my colleagues would definitely boost my motivation"

The analysis of the interviews has delivered the following key results to the development of the research. Insights showed the need for boosting employees' motivation and the feeling of appreciation during their process of learning and development. After the analysis of the interviews, a brainstorm session was held within the team to figure out how to best tackle this issue. It came out that designing and implementing a user profile in the platform would have helped users to feel more motivated about their learning by rewarding them with badges after completing each learning course.

6.1.4 Defining Employee Profile Contents

Once the analysis was completed and insights were discovered, the next step was to understand how to structure the employee profile. Thus, the team started a process of ideation and the ''how might we . . ." map was generated to brainstorm ideas. Once the

possible features were listed, the whole team voted to choose the best ideas by adding a circle next to the features they found interesting (*Figure 32*).

Figure 32 – Interview analysis Miro Board

Interesting combination of ideas to include in the employee profile came out from the brainstorm activity. The features needed for the development of the dashboard were identified as follows:

- Introduction of rewards in the form of badges to boost employees' motivation;
- Tasks employees are able to do after completing learning courses;
- Overall status of the learning path;
- Competencies gained when completing learning courses;
- Show manager's gratification;
- Time spent on learning;
- Top ranking learners;
- Certificates earned during the learning path;
- Employee information regarding the learning path
    - Learning courses completed out of a total;
    - Learning path completion date;
    - Employee role;

Once the features to include in the employee profile were defined, the process could move on with the implementation of the user profile.

The development cycle of the employee profile included paper sketches, wireframes and prototypes. Two iteration cycles were carried out during the whole development of the design and high-fidelity prototypes were also tested with real users at each iteration.

6.2 First Iteration

The first iteration of the design of the employee profile included paper, sketches, wireframes and high-fidelity prototypes subsequently tested with real users.

6.2.1 Paper Sketches

Paper sketching was the first step toward the development of the employee profile. Thus, the ideation phase took place. The idea was to understand how to design the structure of the profile within the frame. *Figure 33* shows the skeleton of the profile with a focus on the left sidebar. Information such as role, badges and completed learning units were shown in the sidebar.

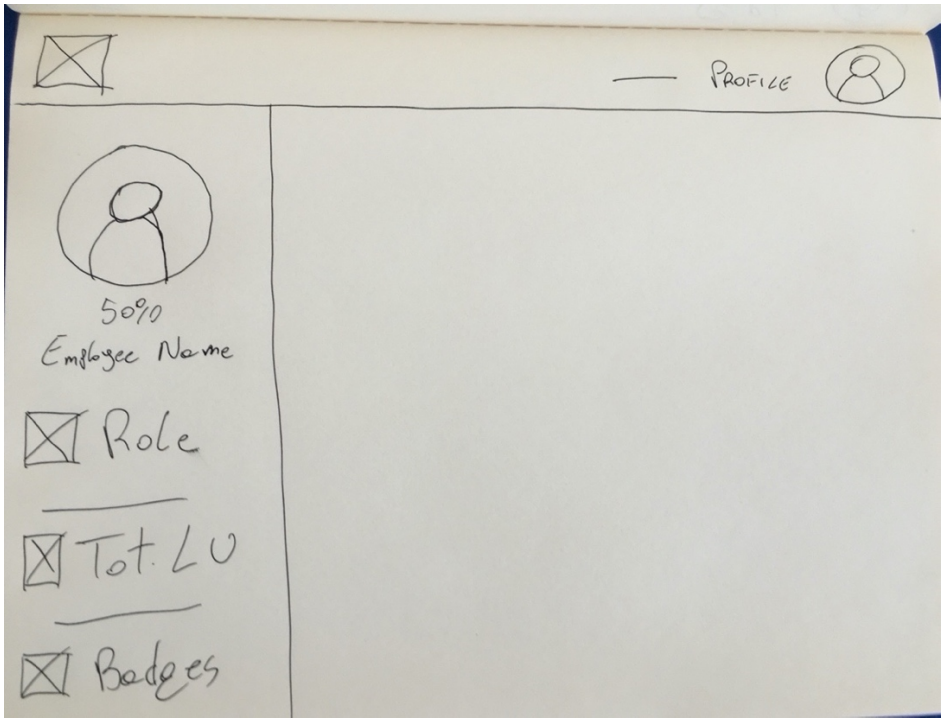

Figure 33 – User Profile Sidebar

The two images below show the sketches related to the contents of the center of the page. The side bare shown in *figure 33* is also visible while the contents in the center changes. Here the idea was to allow to scroll between different contents keeping the left sidebar always visible. *Figure 34* represent the status content. The learning path timeline is shown with the courses' name.

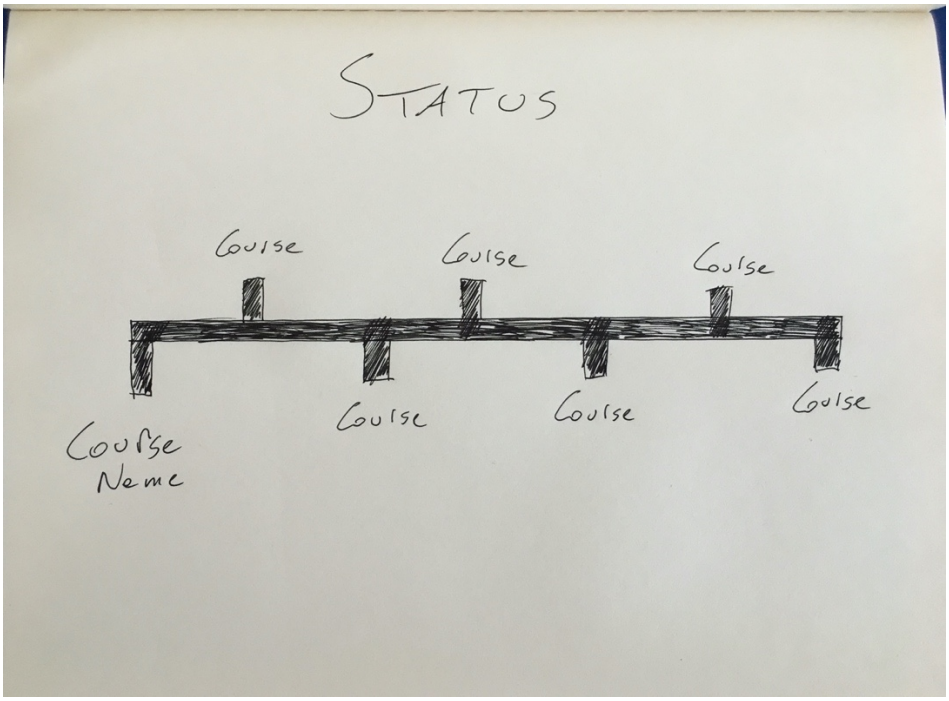

Figure 34 – Status content

Figure 35 represents the contents related to statistics, tasks and certificates. Here the aim was to understand how to structure the position of the contents within the frame. The structure of the frame had a heading representing a sentence that explains the contents in question.

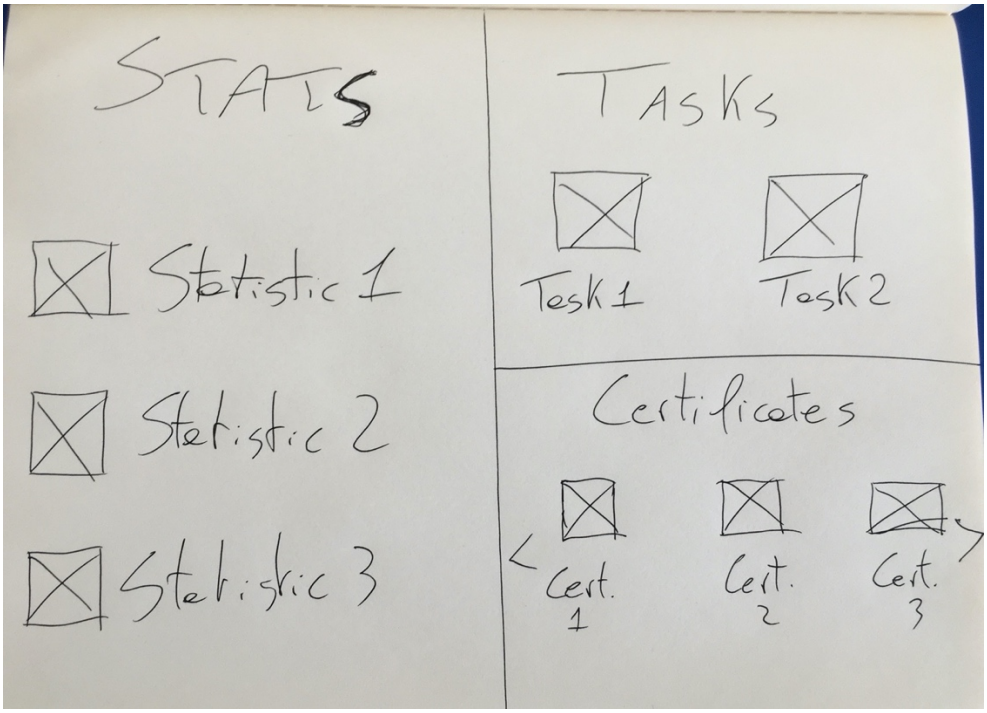

Figure 35 – Statistics/Achievements content

6.2.2 Wireframes

Once the skeleton of the employee profile was defined, wireframes were needed for a better visualization of the design. Details of ideas gathered from the paper sketching needed to be designed in a frame. Thus, mockups needed to be created. The Figma design tool was used at this stage.

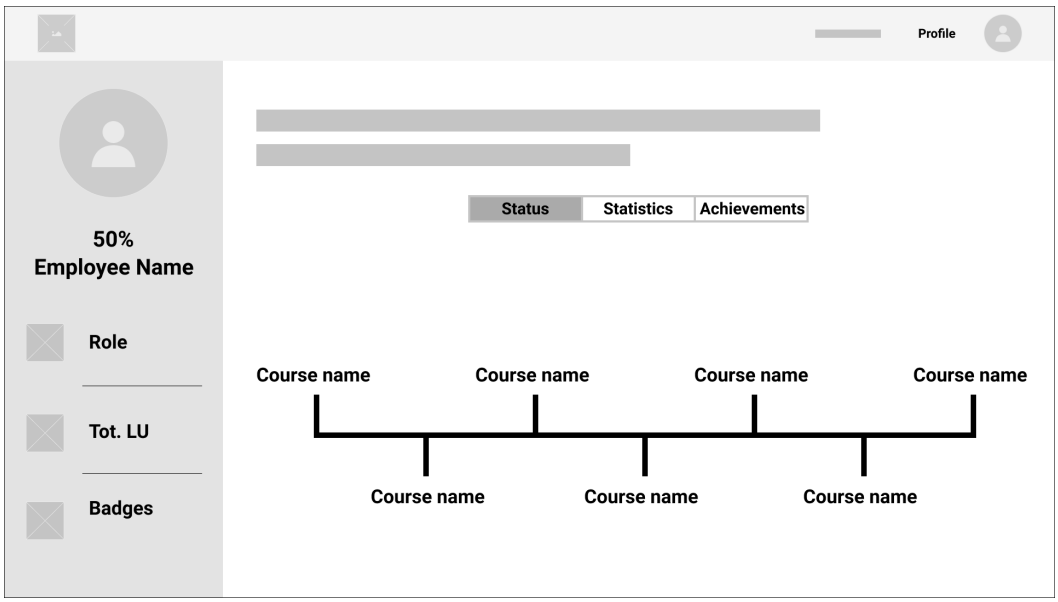

Figure 36 – Wireframe - Status content

A brainstorm session was held within the team to agree on the positioning of the elements in the frame. *Figure 36* shows the first view of the profile. This is what the user would first see when entering in his profile. At the top of the screen, the navigation bar allows users to switch between the current view and the learning path (showed in chapter 3). The sidebar shows employee's information such as a role, number of learning units completed and badges. A small navigation bar is placed in the center of the screen to allow the navigation between different contents' view. The current one shows the status of the learning path in the form of a timeline. Space for an introduction sentence is given between the platform navigation bar (top of the screen) and the profile navigation bar.

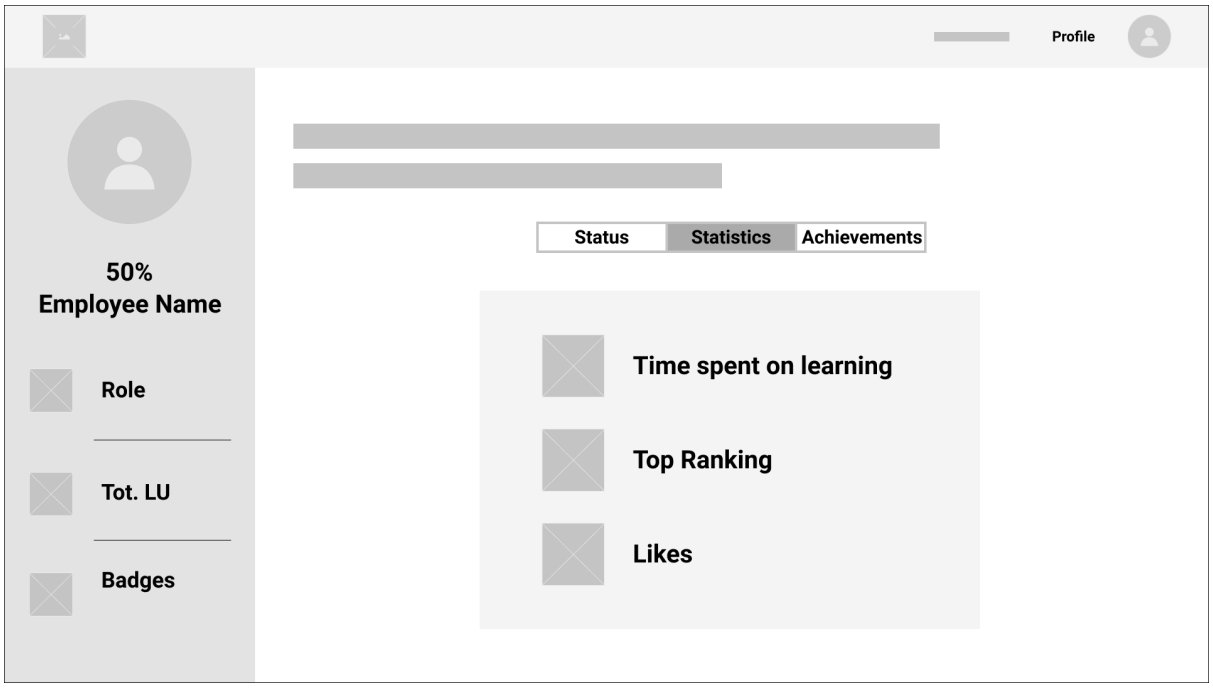

Figure 37 – Wireframe - Statistics content

Figure 37 shows the statistics content view. Here the focus was on the gratification of the employee. In order to provide so, a container was placed in the center of the screen to include sentences related to the top learner, likes received by the manager for the completion of learning courses and progress of the overall learning path.

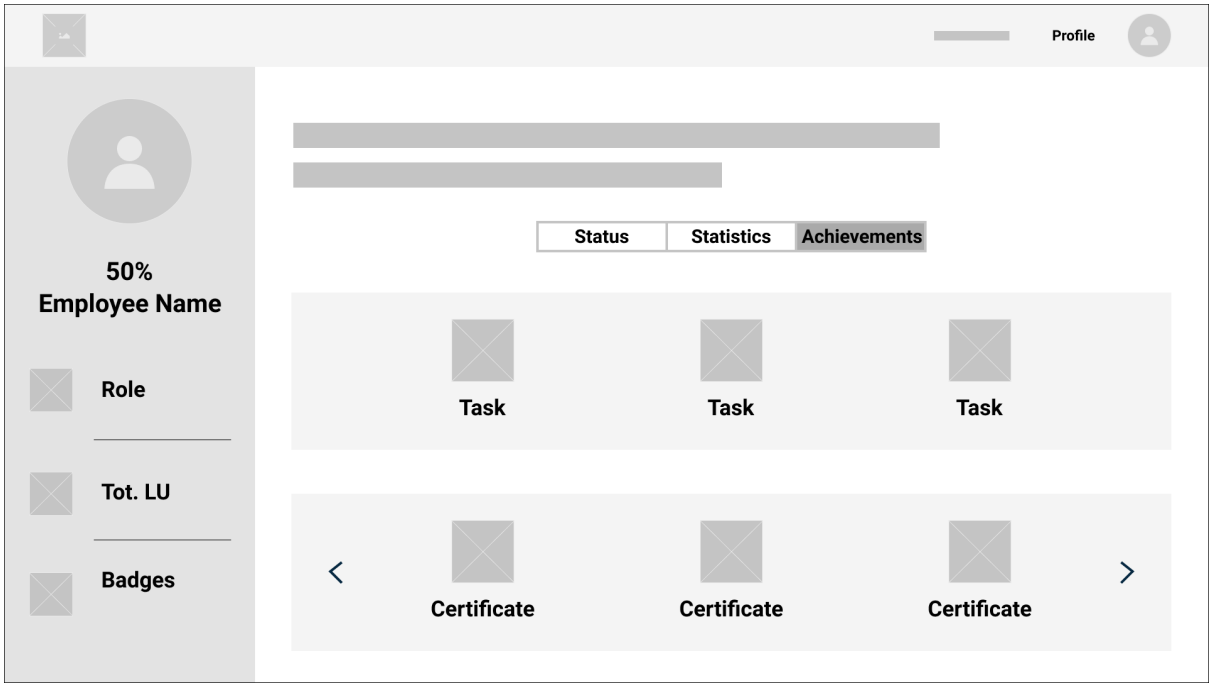

Figure 38 – Wireframe - Achievements content

In order to provide more gratification to the employees in terms of visualisation of achievements, *Figure 38* was designed as last view of the employee profile. The screen shows two types information independent from each other. The first one displays the tasks that an employee will be able to perform at work after completing the learning path. The second one shows certificates gained by the employees when completing learning courses with the possibility to scroll between various certificates.

6.2.3 Prototype

Once the features to include in the employee profile were defined and wireframes were designed, high-fidelity prototypes were required as the next step in the development process. Designing high-fidelity prototypes was an important step toward the completion of the first iteration cycle. A sample representation of the UI in terms of details shown and functionality was needed in order to conduct testing with real users.

A week of prototype design took place and the images below represent the final version of the high-fidelity prototypes.

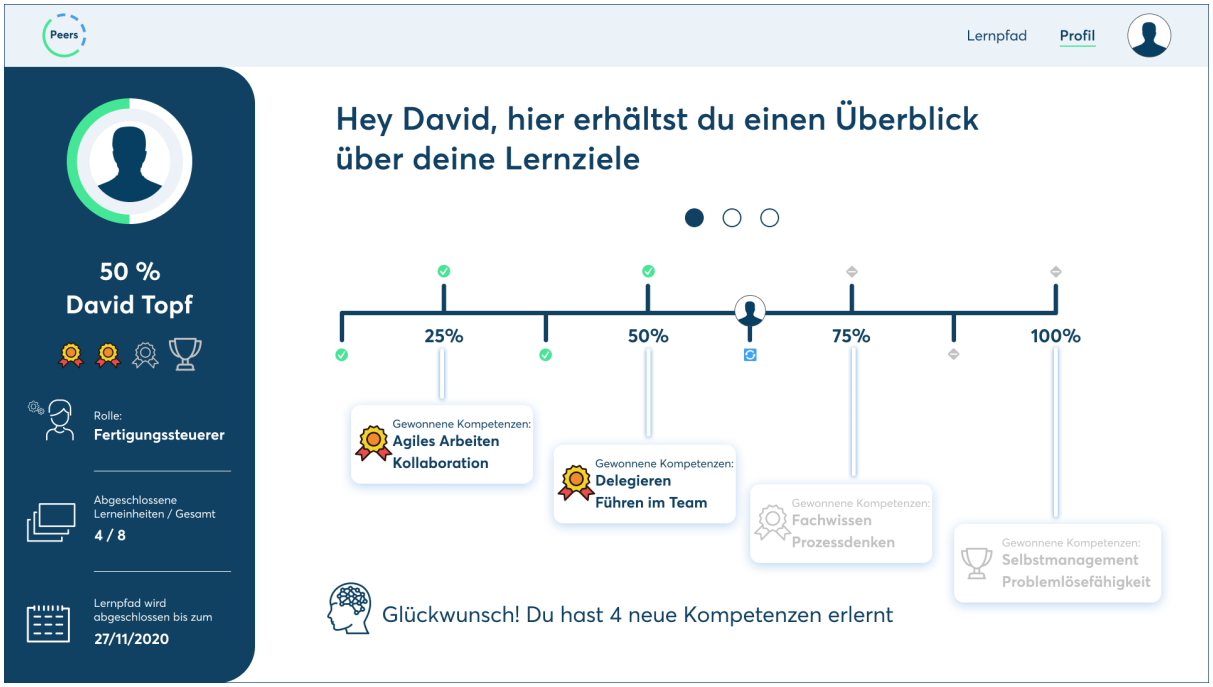

Figure 39 – Employee Profile – Status contents

While designing a prototype (*Figure 39)*, a few changes were made to the timeline in the UI. The courses' name was replaced by the symbols representing the progress of the courses. Containers were added below the timeline to show the competencies gained at each step of the learning path completion (25%-50%-75%-100%) with those yet to gain greyed out. The purpose of it was to give a visual meaning of the badges and an understanding on how to collect them. At the bottom of the page a sentence was added to congratulate the employee for the competencies already gained. The navigation bar in the middle of the screen was replaced by a carousel. A carousel is a slider that allows users to navigate between visual contents on the screen. The reason behind this choice was to give a feeling to the user that the profile is built on a single page and contents are within that page.

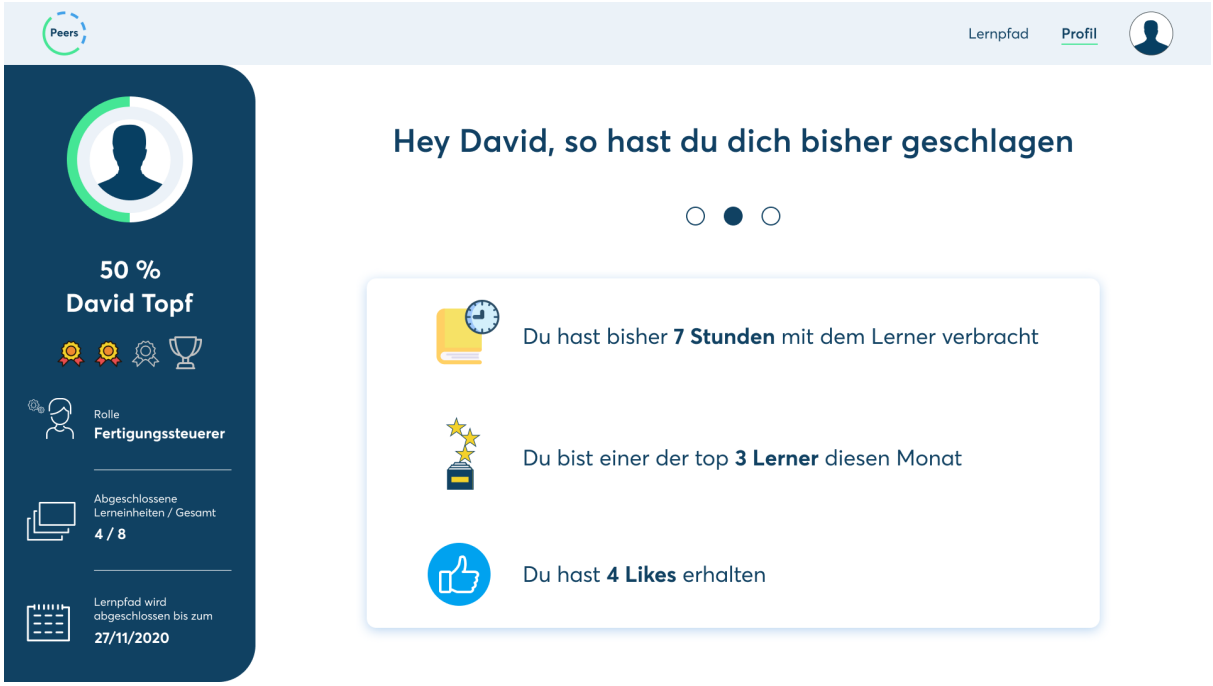

Figure 40 – Employee Profile – Statistics contents

As for the statistics contents (*Figure 40)*, the focus was on letting the employee feel motivated to keep working on their learning and development process. To do so, gratifications sentences such as “you are in the top 3 learners of the month” in terms of speed and performance, and “you have been liked 4 times by your manager” were placed within the frame. Lastly, the time spent on learning was also shown.

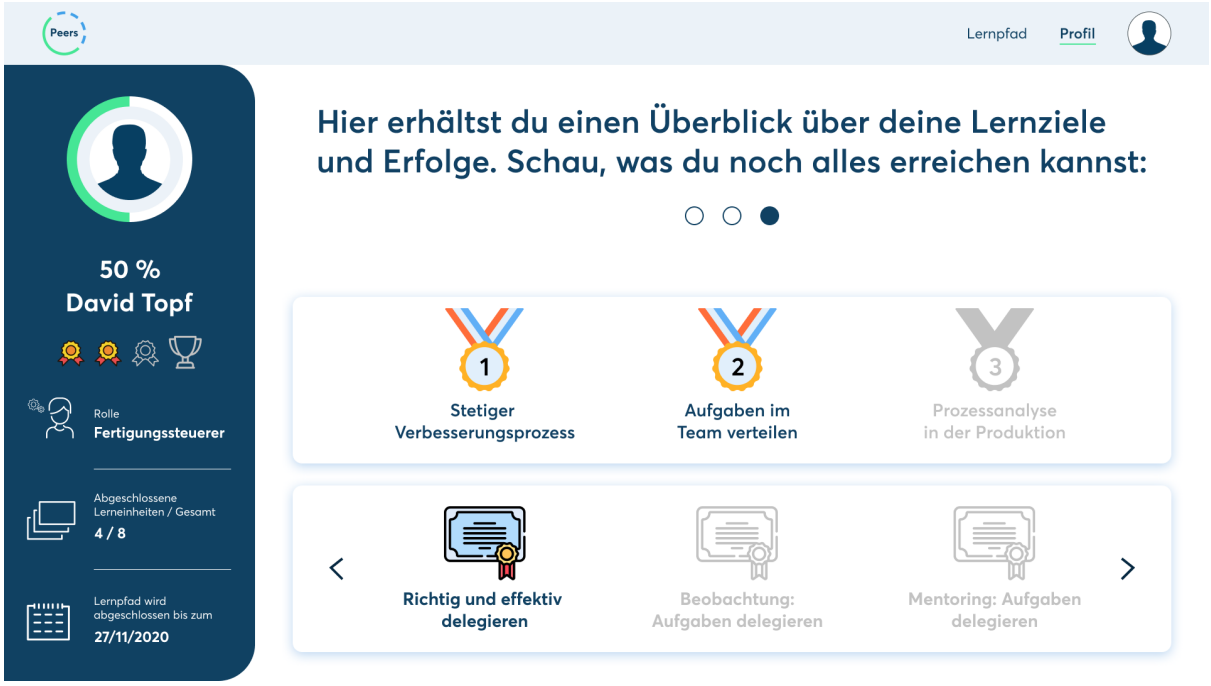

Figure 41 – Employee Profile – Achievements contents

Regarding the achievement's contents view (*Figure 41*), the structure remained pretty the same as the wireframe. New medals icons were introduced to represent the tasks that an employee will be capable to do after completing the learning path. Those yet to obtain, were greyed out. Same applied for the certificates.

6.2.4 User Testing

The final step of the development of the employee profile was the user testing. Differently to the manager dashboard, where usability tests were conducted, for the employee profile the focus of the testing was on the user visual understanding. This is due to the fact that the profile was meant more to convey visual information rather than having tasks to perform by clicking on the screen. The testing was conducted with the same participants who took part for the interviews. Microsoft Teams was used to run the test, with the screensharing functionality activated. Each testing lasted roughly 20 to 30 minutes. The participants were given the credentials to login into the prototype. The think aloud technique was applied, participants were given the time to focus on the visualization of contents in the prototype expressing their feelings, concerns and understanding. When it comes to visual

understanding, the think aloud technique is one of the most appropriate UX research technique to gather qualitative feedback as the participants talk while interacting with the prototype.

6.2.5 Testing Analysis

The testing focused on the visual understanding of the user when looking at the prototype. Based on the understanding and feedback gathered from the participants an acceptance criteria list was created to evaluate the understanding of the contents of the new UIs. This helped understanding whether the UIs were self-explanatory enough for the participants. Based on the majority of responses obtained, "met/not met" was assigned for each criterion to analyse the transparency of the contents presented in the UIs. The table below represents the list of criteria for the three content views of the user profile.

Acceptance Criteria	Met/Not Met	Explanation
Symbols showing status of course on timeline - status	Not Met	The symbols representing the progress of each course were not introduced before in the employee section. Confusion understanding their meaning
Competencies gained/percentage on timeline – Status	Not Met	Difficulty understanding what the competencies refers to what course. Unclear what courses belong to what percentage
Badges and percentages	Not Met	Repetition of information. Badges and percentage are repeated on both side bar and status content
Carousel	Not Met	Problem understanding carousel meaning. Not able to scroll between contents
Gratification sentences – Statistics	Met	Understanding sentences meaning + icons
Tasks – Achievements	Not Met	Confusion on medals. Thought medals referred to badges = same meaning
Certificates - Achievements	Met	Understanding certificates gained/not gained

Icons/Text	Not Met	Icons are too big compared to font size

The results gathered from the table above shows that there was a clear misunderstanding and confusion about the contents of the employee profile. The results show how the majority of information were not met and participants found complicated the interaction with the prototype, probably due to the fact that participant have low technological expertise. Adjustments needed to be made in the UIs and therefore a second iteration cycle needed to be conducted by the team.

6.3 Second Iteration

As most of the contents of the employee profile were not met, during the second iteration cycle, paper sketches, wireframes and high-fidelity prototype were re-designed in order to improve the quality of the UIs who previously failed to pass the testing.

6.3.1 Paper Sketches

As the employee profile was poor at conveying information, a new brainstorm session was held to re-define the structure of the profile. A process of idea generation started from the paper sketches.

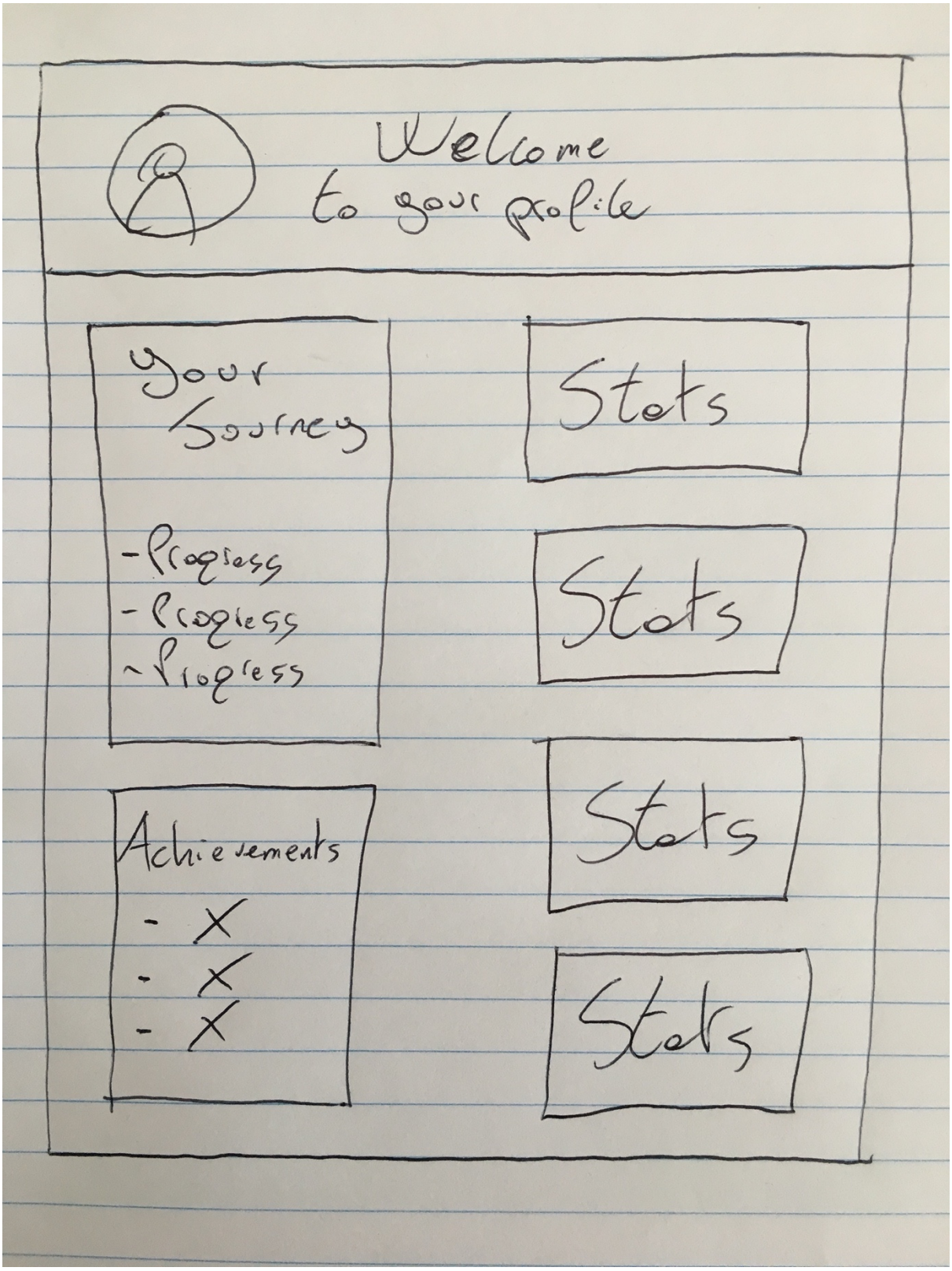

Figure 42 – Sketch – Final employee profile

The team brainstorm outcome resulted in the suggestion of a structure change for the profile (*Figure 42*). As the focus of the employee profile is to convey visual information about the learning and development progress, show gratification and provide the feeling of satisfaction to employees toward their learning journey, the team came up with the idea to design the profile in a single page.

6.3.2 Wireframes

Once the new structure of the employee profile was designed, wireframes were needed again to better understanding how to position the information contents within the page.
Same design principles applied for the UI of the dashboard were applied for the design of the employee profile. The UI of the profile should:

- keep the user informed of the system status;
- set information in a logical, natural order;
- Design with aesthetics and minimalism in mind;

A particular attention to the visualisation of information was kept in mind while designing the new UI. This is because it had to be considered that most of platform's users, the employees, are adult people (generally over 40 y/o) with low technology expertise. Hence, information had to be conveyed in a clear and simple way.

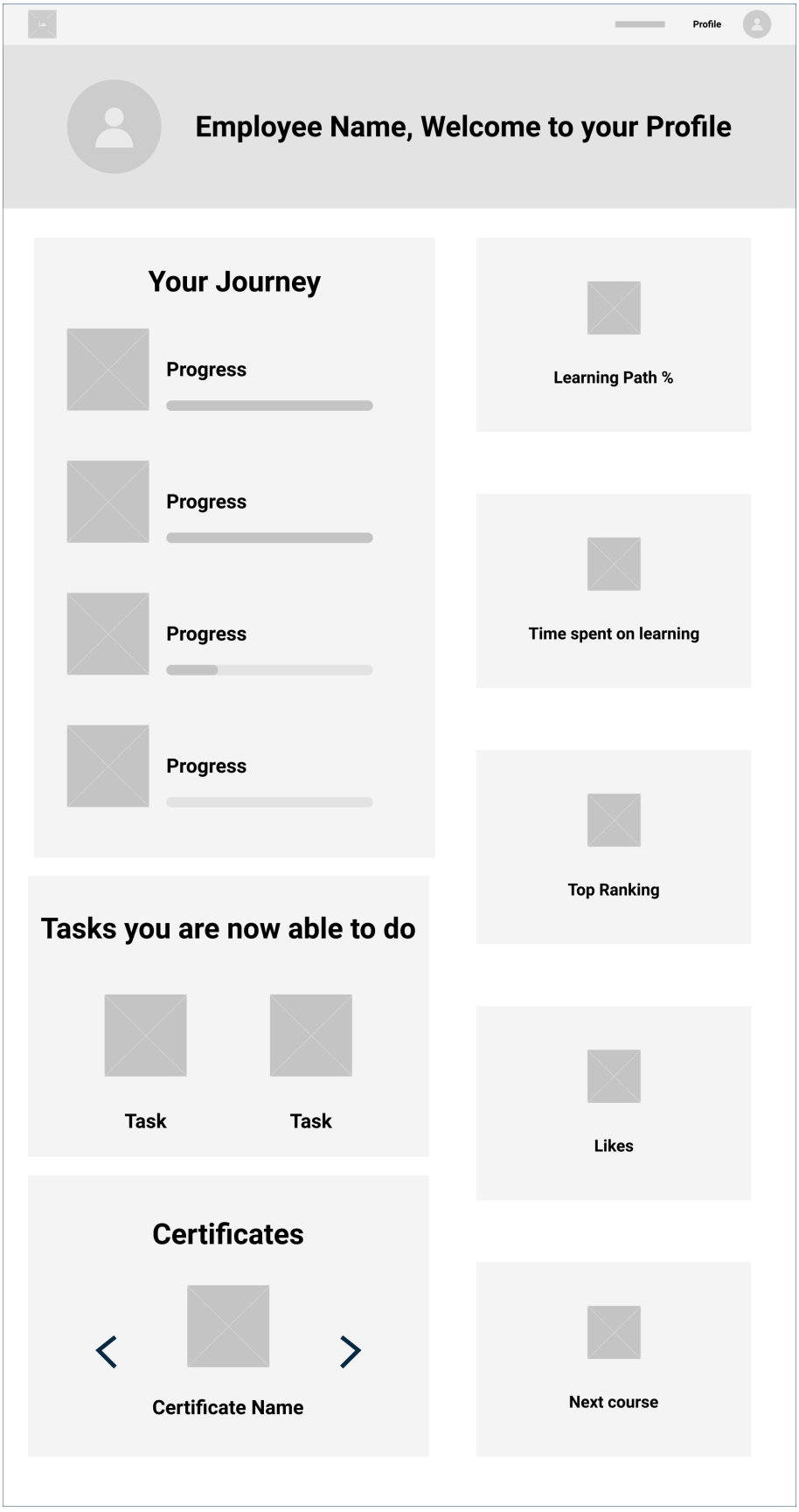

Figure 43 – Wireframe – Final employee profile

Figure 43 shows the new wireframe designed for the profile. Although the whole screen is shown, when deployed into the platform, half of it will be visible when entering into the employee profile and the other half will be visible by scrolling down as the design is meant to be for PCs. Thus, at this stage, the focus moved on the information hierarchy. Information such as “Your Journey” needed to be prioritized as it was the main information to show to the user. Blocks on the right-hand side of the frame were designed to show information from the most to the least relevant to see in the following order:

- Learning path percentage;
- Time spent on learning so far;
- Top ranking learner;
- Likes received by the manager;
- Next course;

Under the “Journey so far” container, tasks that the employee will be capable to do once he completes the learning path are shown and certificates gained under them. The next course to attend is also visible under the statistics contents.

The order of the list of information contents to show came up based on the following assumption: when the employee access his profile, the first information to see is his learning progress, reason why the emphasis was put mainly on the “Journey so” far container. Then statistics contents have to catch the user attention as they are constantly updated. Tasks and certificates were placed at the bottom of frame as these contents will be updated when reaching a certain stage of the learning path, usually toward the end.

6.3.3 Prototype

After completing the wireframe, a new version of the high-fidelity prototype was designed. *Figure 44* shows the final prototype version used to run the second round of testing with users. All the text of the frame was translated in German. In the “Dein bisheriger Weg” (The Journey so far) container, a status bar for each badge corresponding to the number of competencies gained was listed and numbered accordingly to their meaning. The containers on the left-hand side showing statistics information were merged together. The medal icons related to the tasks were replaced in order to provide a better understanding of the content’s meaning. As for the certificate’s contents, one certificate was displayed per time with the option to navigate between them using the side arrows and to click on them to open the related pdf. The next course available was also shown. The name of the course was made clickable to give direct access to the course description directly from the user profile.

Figure 44 – High-Fidelity Prototype – Employee Profile

6.3.4 Visual Design Testing

The final step to do of the development of the employee profile was to conduct another round of user testing to investigate whether the new changes would have met the minimum requirements by the users. The testing was conducted with the same participants who took place to the user testing during the first iteration cycle. Same procedure and same methodology were applied to it.

6.3.4.1 Testing Analysis

The testing focused on understanding whether the new proposed UI would have solved the issues faced on the testing conducted during the first iteration cycle. Same process was applied for the second testing to analyse the results. The table below shows the results gathered from the testing.

Acceptance Criteria	Met/Not Met	Explanation
The "Journey so far" container	Met	Easy to understand progress and competencies gained
Statistics contents	Met	Understanding sentences meaning + icons
Tasks contents	Met	New icons match contents
Certificates contents	Met	Understood the certificates are clickable
Next course	Met	Understood the course is clickable
Icons/Text	Met	Easy to read the text in contrast with the icons

Based on the results gathered from the above table, it can be said that in the second round of testing the meaning of all information are met and the contents match the minimum user requirements. Thus, the final version of the employee profile could be implemented into the platform.

6.4 Usability Field Study

6.4.1 Method

Meanwhile the employee profile was implemented on the platform, Peers onboarded 15 new employees from a company to start their learning and development program. As a part of a deal with the company and to let also the employees get familiar with the platform and the concept of learning by doing online courses, Peers agreed to provide a standard free learning path for the duration of a week with the topic of “changes at work due to COVID-19”. The research benefitted from this opportunity it as the new employee profile was evaluated by 15 new participants who did not take part in the interviews and visual testing. This made the evaluation more unbiased as the users did not previously interact with the platform.

The new participants were machines’ workers of a manufacturing company in the metallurgic field, all aged over 40, from Germany and with low technological expertise. After the employees completed the learning path and used the platform every day for a whole week, a SUS Questionnaire was then conducted to evaluate the efficiency of the new employee profile and users’ satisfaction. The questionnaire was created using Survey Monkeys online tool and was sent out via an online link (Link in Appendix C).

6.4.2 Results

Figure 45 represent the scores of the SUS Questionnaire filled by the employees after using the employee profile. All the employees’ scores were equal or higher than 77.5, with an AVG = 85/100 and SD = 5.67. Thus, the implemented employee profile can be considered acceptable. More in details, accordingly to the measurement scale in *Figure 46*, the employee satisfaction can be considered as “Excellent”.

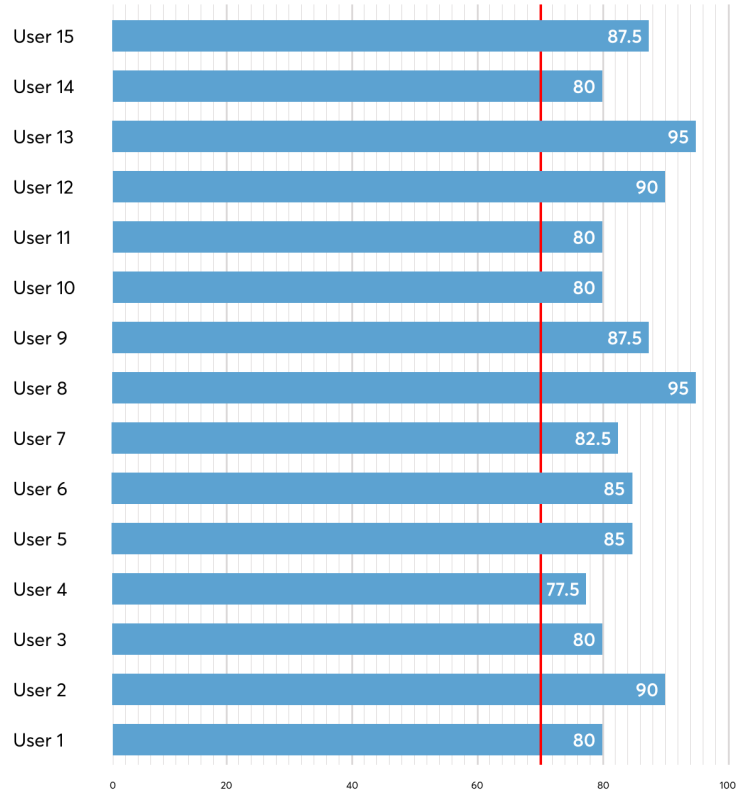

Figure 45 – High-Fidelity Prototype – Employee Profile

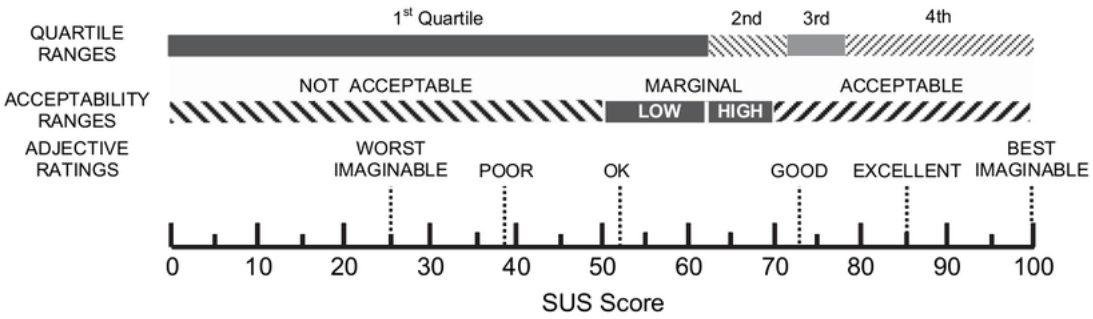

Figure 46 – SUS Measurement Scale [79]

6.5 Summary

The chapter investigated employees needs and pain-points in regard to their learning and development process in the workplace. Insights from the analysis of the interviews showed the need to boost employees' motivation and engagement toward learning and development along with that feeling of gratitude provided by their managers after completing a learning and development process. An employee profile was then designed and implemented in the platform to meet employees' needs. While completing learning courses employees would be rewarded with badges and trophy to keep high their engagement toward learning while managers could thumb-up their employees to show their gratitude.

Two iterations cycles took place during the design of the employee profile as the results from the first test were not positive. The participants who took part of the test did not understand the meaning of many contents included in the UI, probably due to the low technological expertise they had. Therefore, a second iteration was conducted to make some adjustments in the design. Although the second round of test showed positive results, it has to be considered that the test was run with the same participants who took part in the first test and therefore they might have been biased as they knew already what the aim of the profile was about. After the employee profile was implemented into the platform, a SUS questionnaire was also conducted with 15 new participants after completing a small learning path for a whole week. Positive results came out from the questionnaire showing how the profile was considered excellent from the participants.

Chapter 7 – Conclusion

7.1 Summary

In summary, the goal of the research was to identify the key factors that can improve the design of contents for a digital learning platform. The research focused on improving the user experience of a learning platform for personnel learning and development and its usability.
In chapter 2 the meaning of learning and its various genres were discussed focusing on the importance of informal learning, which is the type of learning that happens in the workplace, and how different learning models can be applied to it. The literature showed how learning models such as the 70-20-10 can effectively impact in the learning and development of employees as it focuses more on the learning by doing rather than the learning by memorizing. Findings from the analysis of the employees' interviews showed the needs to boost employees' engagement toward learning and development. It has also been proven that the adaptation of the concept of gamification utilizing in the work environment boosts employees' engagement toward learning and development. Therefore, the concept of gamification was introduced and discussed.
UX Research and its methodologies were also described. The research used a multi methodology approach including semi-structured user interview, design of UIs, user testing and questionnaires. The applied methodology was inspired by "Understanding Your Users" book [2].
The results collected from the analysis of the research resulted in the implementation of design solutions to include on the platform developed by Peers-Solutions.

Manager

The goal to identify and address managers' pain points and needs was met. A dashboard was designed and implemented to the platform in order to provide managers with the possibility to keep track of their employees learning and development. Weeks after the implementation of the dashboard, a SUS questionnaire was conducted to analyse the efficiency of the new dashboard and managers' satisfaction. Positive results were collected from the questionnaire showing a high users' satisfaction.

Employees

The second goal of the research was to understand what factors can boost employees' motivation when it comes to upgrade their working skills. Insights from the interviews have shown that the concept of gamification in learning increases employees' engagement toward learning and development. Thus, an employee profile was implemented in the platform allowing employees to keep track of their achievements, accumulate points and be rewarded by the collection of badges and trophy cups when completing learning courses. In order to evaluate the efficiency of the new user profile in the employees learning and development process and employees' satisfaction, a SUS questionnaire was conducted with those employees who completed the short week learning path discussed in the results of chapter 6. Although the test was conducted after a short period of time from the implementation of the user profile on the platform, the results emerged from the questionnaires shows that the employees' satisfaction was quite high. Employees mentioned to their managers how engaged the new learning methodology was. They mention how the collection of points and trophy cups helped to keep their motivation high toward the completion of the learning path. Thus, it can be said that the second goal of the research was met.

7.2 Answering the Research Questions

Two research questions were formulated at the beginning of the research. The development of the design led to answer the research questions as follows:

RQ1 – *How to design a new visual dashboard that gives managers a complete overview of their employees' progress in the Peers learning platform?*

When employees undertake learning and development courses to upgrade their working skills, managers need to keep track and being constantly up to date to their employees' progress in order to take actions if something does not go as planned. Interviews findings

showed how companies have information about their employees, in particular in regard to their learning and development spread over excel sheets and papers format, which looks quite chaotic. This can also result in a considerable waste of time for managers when looking for a particular information about their employees learning and development.
The interviews and the subsequent analysis revealed that, in order to solve this issue, managers needed a view where all the information about their employees' learning and development were gathered together. The solution to the issue saw the design of a dashboard that allows managers to keep track of their employees learning and development. In the dashboard, managers can filter their employees based on specific information they need to check such as role job, team members, percentage of the overall learning path and status to check those employees who have overdue courses. The dashboard also provides a second view which allows manager to get a detail view of each employee learning path. Two usability tests were conducted after the implementation of the dashboard into the platform showing positive results and proving how the new design matched the managers requirements.

RQ2 – *What are the main factors that influence employees' motivation to engage in learning and personnel development in the workplace?*

When it comes to upgrading their working skills, employees do not seem to be engaged with their learning and development process proposed by their companies. Interviews showed that one of the main factors lies in the lack of gratitude felt by the employees. In many companies, most of the times due to a lack of budget, the time spent on learning and development is very little. Sometimes employees take part of few learning courses, but their learning is somehow "left in the air". This result in employees' frustration as they do not feel rewarded from the company and do not see any improvement in their daily work duties. Results from the conducted interviews showed that another key factor that influences employees' motivation to engage in their learning and development process is gamification. Gamification in learning has the power to stimulate employees toward learning. Incorporating games elements into the learning and development process increases employees' motivation and engagement with the result of improving the learning outcome.
After discovering the key factors that influence the engagement of employees toward learning and development, which are lack of gratitude from the managers toward their

employees and the concept of gamification in learning, a solution needed to be designed. The aim was to boost employees' motivation by providing that feeling of amusement and gratification while completing their learning journey. Thus, an employee profile was implemented into the platform. In the profile, the concept of gamification was integrated by rewarding employees with badges and trophies after completing learning courses. The profile provided a view of the learning path showing the competencies gained and the badges collected when completing a certain number of learning course. A percentage of the overall journey was also shown. When reaching the 100%, the employee would be rewarded with a final "trophy cup". Certificates gained when completing courses were displayed in the profile to boost employees' satisfaction showing them what they have achieved along with the new tasks that they were able to do at work. In order to improve that feeling of reward when being on track with their learning and development, a ranking was generated and shown in the employee profile if this one was in the top three learners of the month. This was designed to help employees to engage in their learning by showing to their manager how much they were benefiting from their learning. Also, in order to overcome the issue related to the lack of gratification felt by the employees, the design provided a way for the managers to do so. A manager could "like" courses completed by employees which is then displayed in the profile of the employee. A SUS questionnaire was conducted after the implementation of the profile into the platform. Positive results came out from the questionnaire showing an "excellent" user satisfaction.

7.3 Limitations

Some limitations were faced during the whole development of the research. The case study took place in Germany only which restricted the research environment. Thus, the prototypes were only tested in the national area, which may result in biased results. This is due to the fact that the platform currently focuses only on the national German market. The age range of the user group was limited to adult people (aged over 39s) with low technological skills. This suggests that the solutions designed for the platform can only be applied to this specific user group. The restriction of the age range affected the results of the research, because for example, if the conducted study would have been applied to a younger user group, results

would have led to different solutions. One of the reasons to be considered is the technological skills, which sees younger generations to be more tech oriented than older generations.

In terms of the UX Research, several limitations were faced during the design process. The user group who took part of the interviews and testing were limited for different reason. Firstly, as the focus of the research was in the field of metallurgic industries, only those type of employees was interviewed. Secondly, as the research was conducted in Germany only and the group age involved senior employees, many of them did not speak English, therefore, the language barrier limited the number of people to interview. Also, due to COVID-19 many potential interviews were cancelled as employees were left home for few months.
Another limitation faced during the research was related to the research budget. The budget provided by the company could only allow interviews and testing with those selected user group who work for companies who had already signed a contract with Peers or were in the process of signing a deal for their employees' learning and development. This factor limited the research as a broader user group could have brought more findings to the research.
Limitations were also faced for the conducted user test. Due to limitation in time, the SUS questionnaire was conducted after two weeks of usage of the dashboard for the managers and only one week of usage of the user profile for the employees.
Also, the reuse of participants for the test could have biased the final results of the test as they were previously involved in the process of the research.

7.4 Future work

The conducted research showed that there are different factors that characterise the efficiency of a digital learning platform. In the platform, further improvements will need to be made in the future. The manager portal needs further design of the other views such as company overview, budget spent and organigram.
As for the employee portal, the gamification concept can be extended to a further level. The collection of points could be related on the time spent on learning and the speed in completing learning courses. Quiz could be added after each learning courses, to better analyse the course understanding and to allow employees to collect more points during their learning journey. Currently, in the learning unit detail view, a link is provided to access the

learning course, an idea for future improvement could be to integrate the learning courses directly on the platform. Lastly, the usage of the platform, could be extended to different market segments by conducting research in order to understand different users' group, needs and pain points of companies in different fields. In terms of future work related to the UX Research, as the research focused on designing new contents for only a particular section of the platform, a heuristic evaluation could be conducted for the overall platform in order to identify those bugs that are still limiting the optimal user experience.

The testing conducted for the proposed study was limited to a small user group to the low budget provided for the research. Having a higher budget to assign to the research would help improving the strength of the testing. Platform like UsabilityHub could be used to conduct usability testing, as it provides a considerable number of unbiased users to use as participants, although it is quite expensive to use. Methodology such as eye tracking could be used while conducting usability testing in order to improve the performance of the test itself, although this methodology can be quite expensive too.

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Appendix

Appendix A

Image 1 – Log in screen

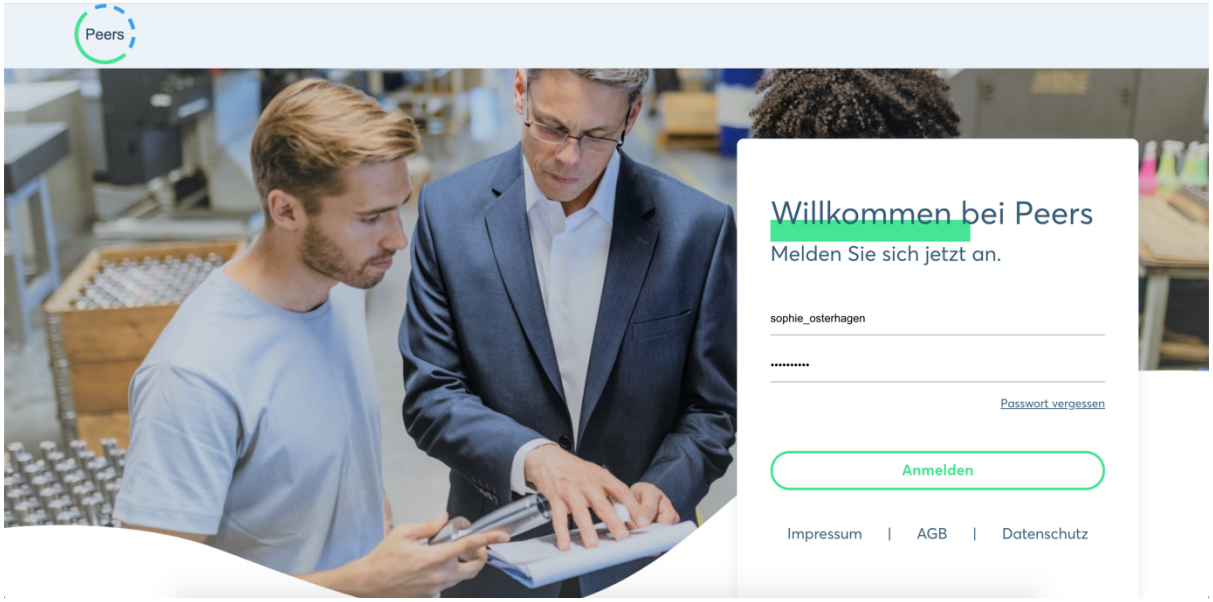
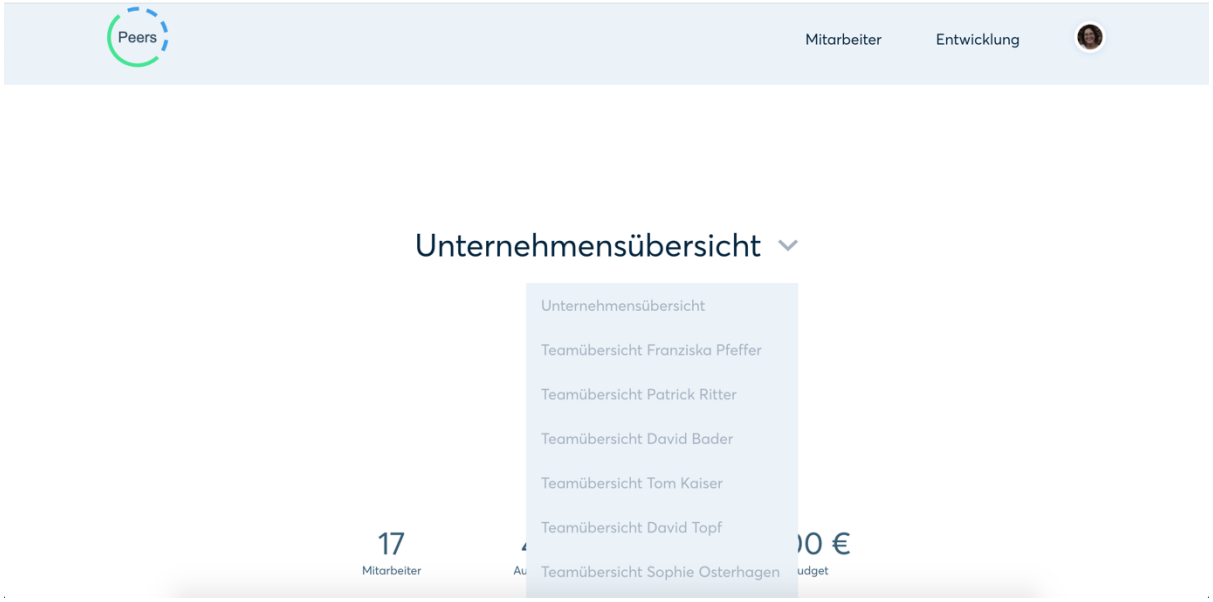


Image 2 – Manager Portal – Budget View



Appendix B

Manager Interview Guideline

1. **Intro Context**

Personal Info:

- What's your name?
- How old are you?
- What do you do for living?
- What is your family set-up?
- What does your typical day look like?
- What do you do in your free time? What are your hobbies?

2. **Warm Up**

Job:

- How long have you been employed at this company for?
- Tell me about your role at your company?
- What interaction do you have in your role with the learning and development in your company?
- What is the best and what is the worst part of your job?
- What has changed in your job over the last few years?
- What is the hardest part of your job?
- What are you currently doing to make your [job/task] easier?
- Have you tried looking for a solution or an alternative?

3. **Main Body**

Learning & Development:

- How does learning and development currently work in your company?
- On a scale of 1-10, how satisfied are you with the learning and development at your company? Why?
- What works well?
- What would you change in your current learning & development?
- How do you think learning & development can affects your job or your employees' jobs?
- Identify biggest pain points:
    - What are the biggest pains/problems related to learning and development?
    - Why are they problems? Why, why, why, why?
    - Rate the problems
    - Who faces the problems?
    - Give specific examples with your employees and your day-to-day life
    - What are people currently doing to tackle these problems?
    - What happens if you do not address these problems?

- What would you like your employees to learn? How?
- What would be the ideal outcome of a new learning and development initiative? In 6 months? In 1 year? In 2 years?

Image 3 – Miro Board – Manager Interview Analysis

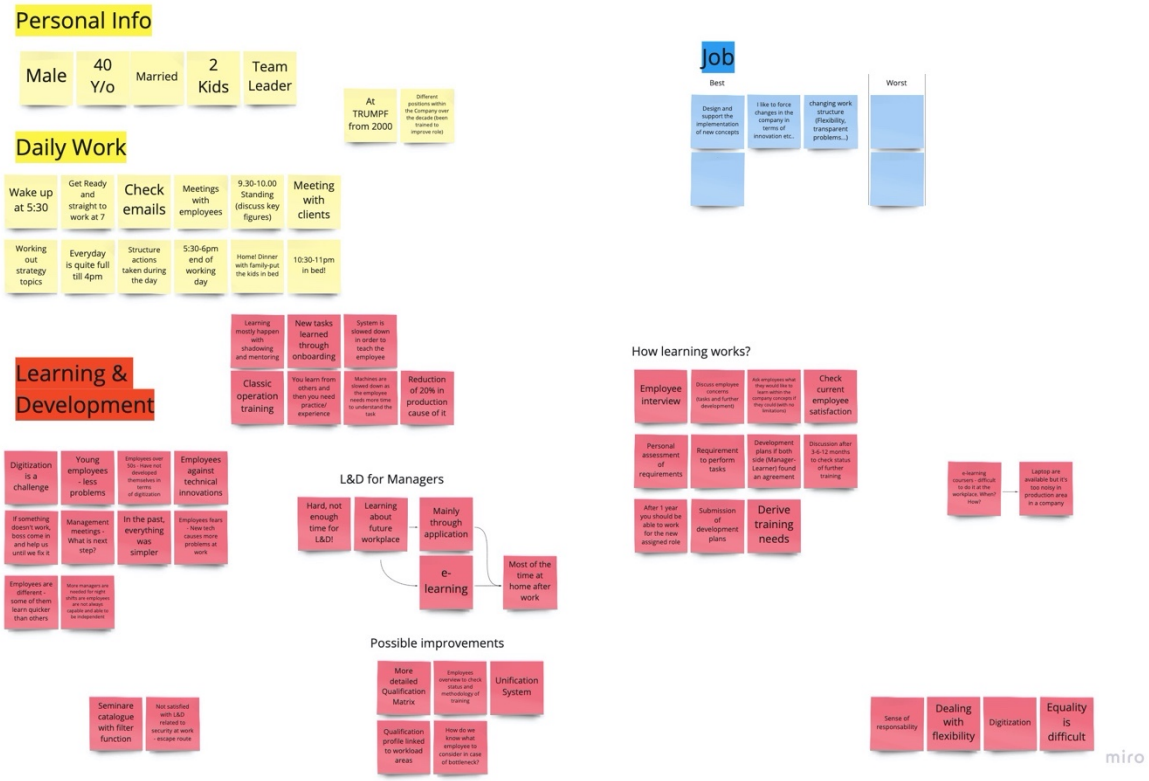


Image 4 – Miro Board – Manager Interview Analysis

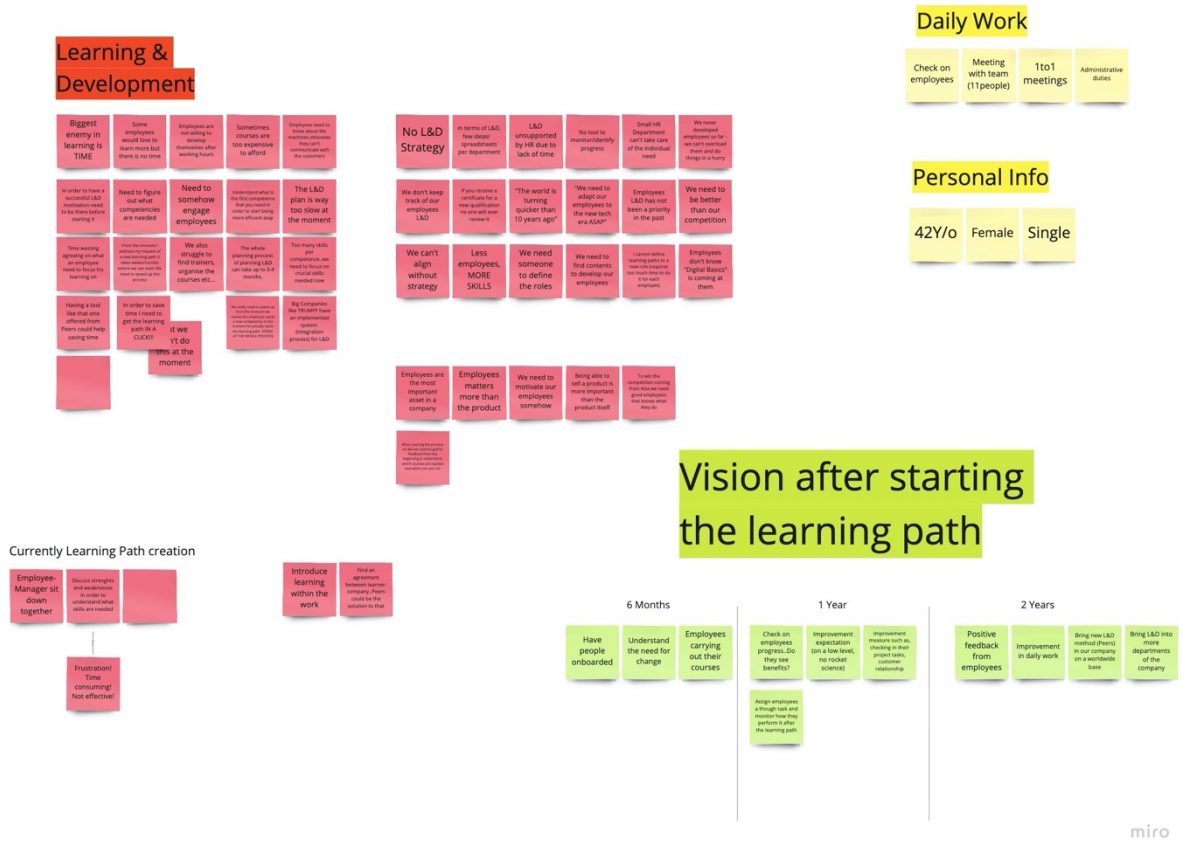


Image 5 – Miro Board – Manager Interview Analysis

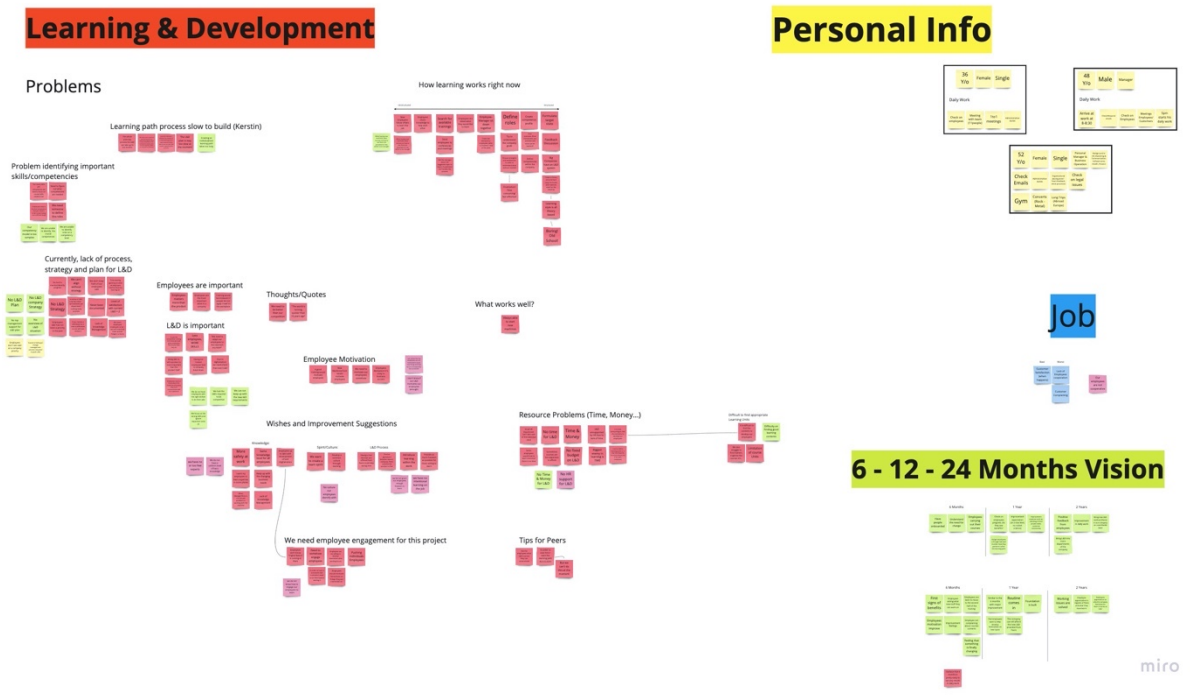


Image 6 – Manager Dashboard – Wireframe

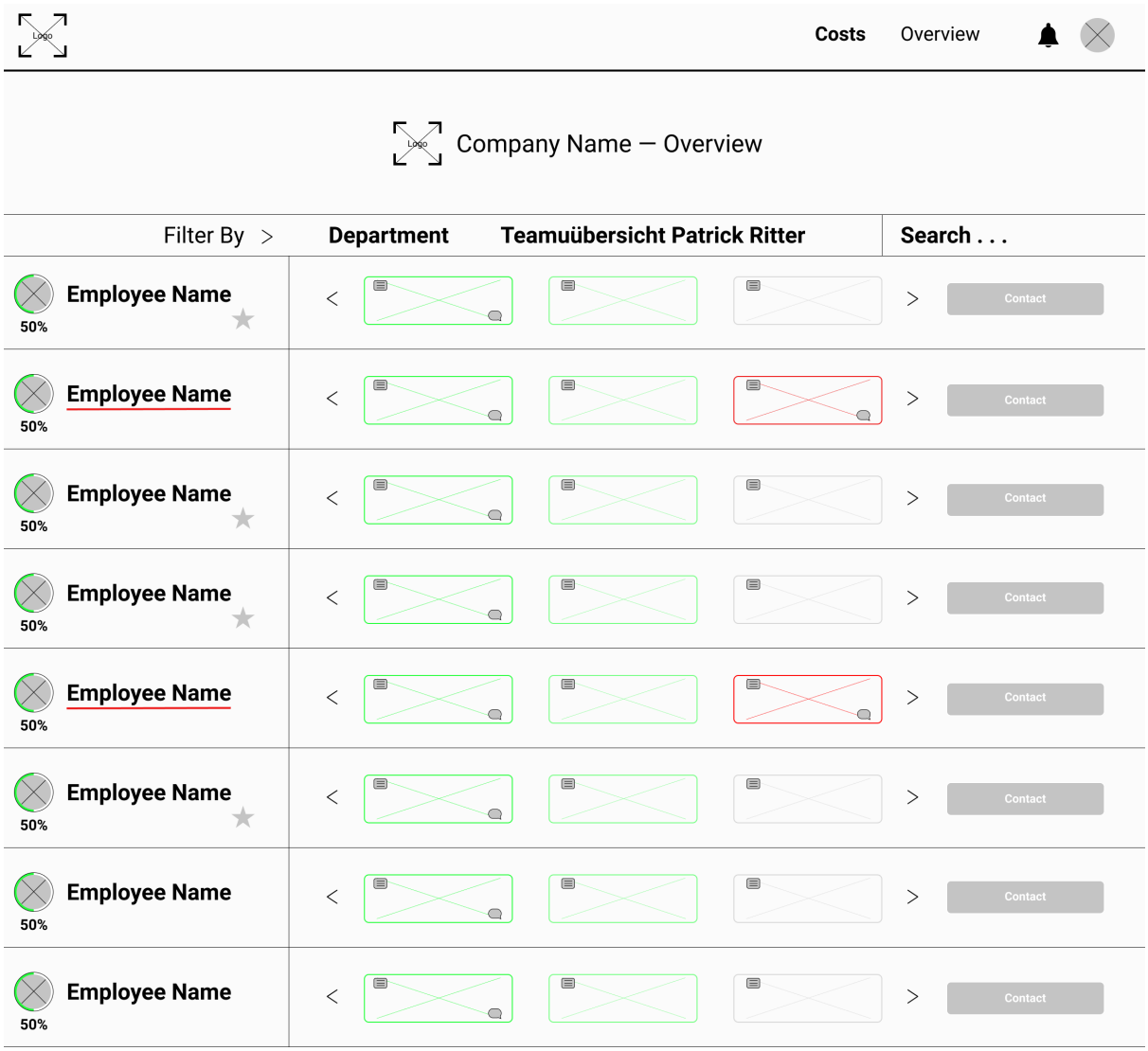


Image 7 – Manager Dashboard – Wireframe

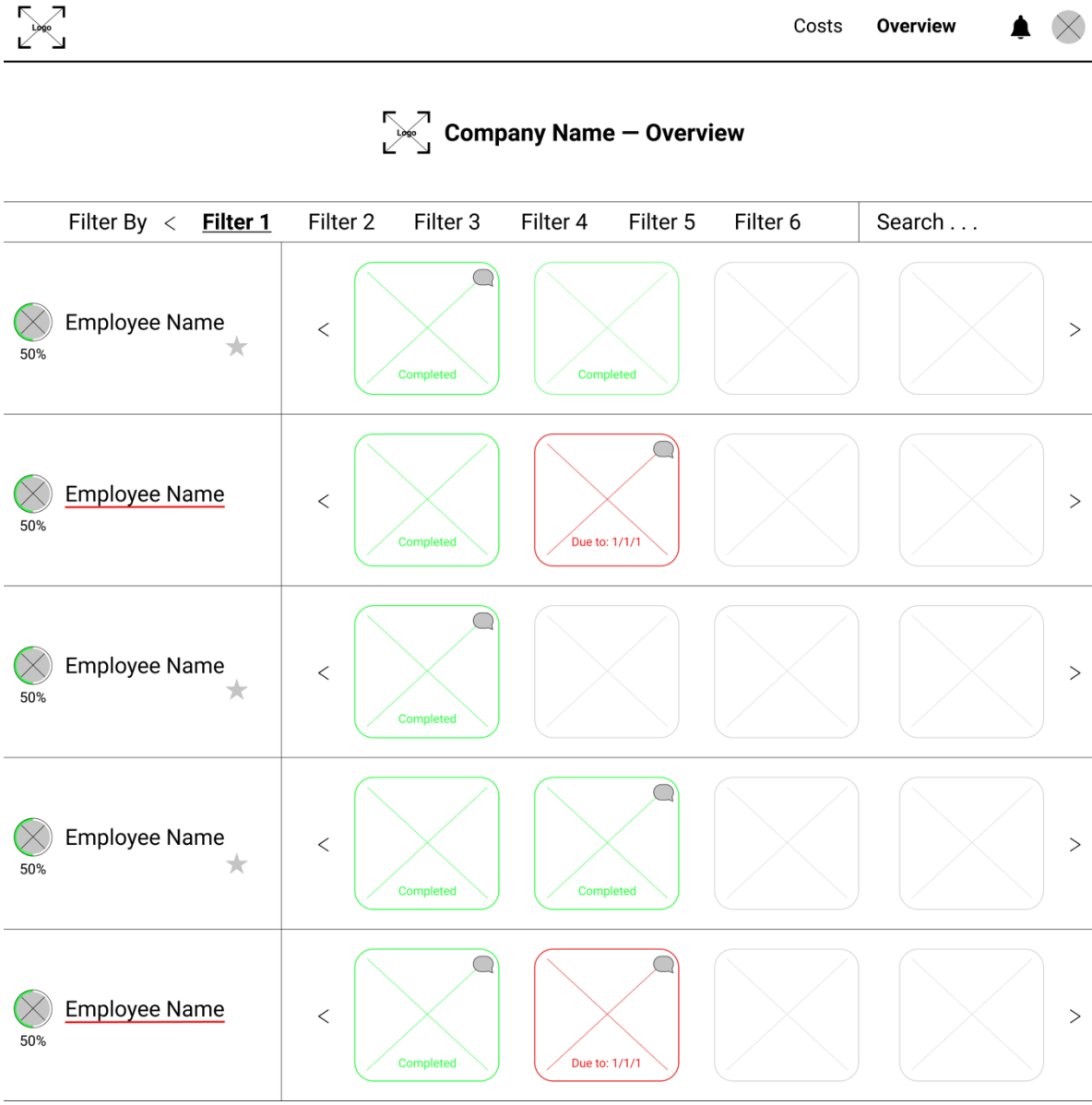


Image 8 – Manager Dashboard – Wireframe

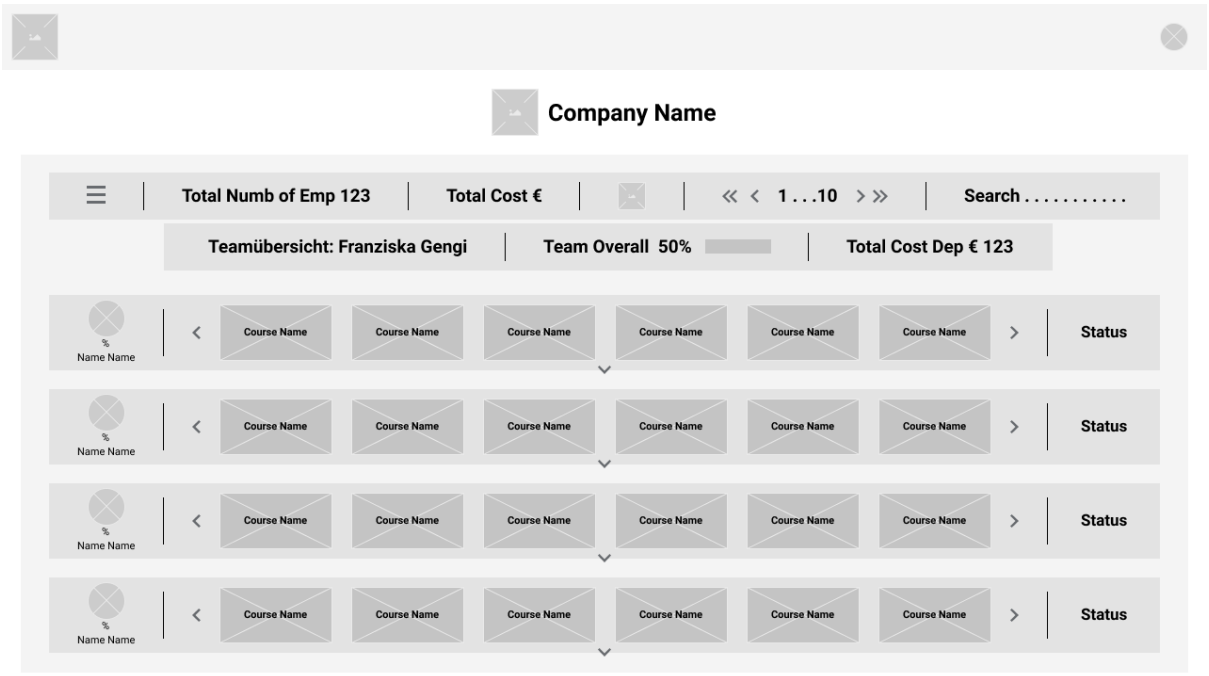


Image 9 – Manager Dashboard – Wireframe

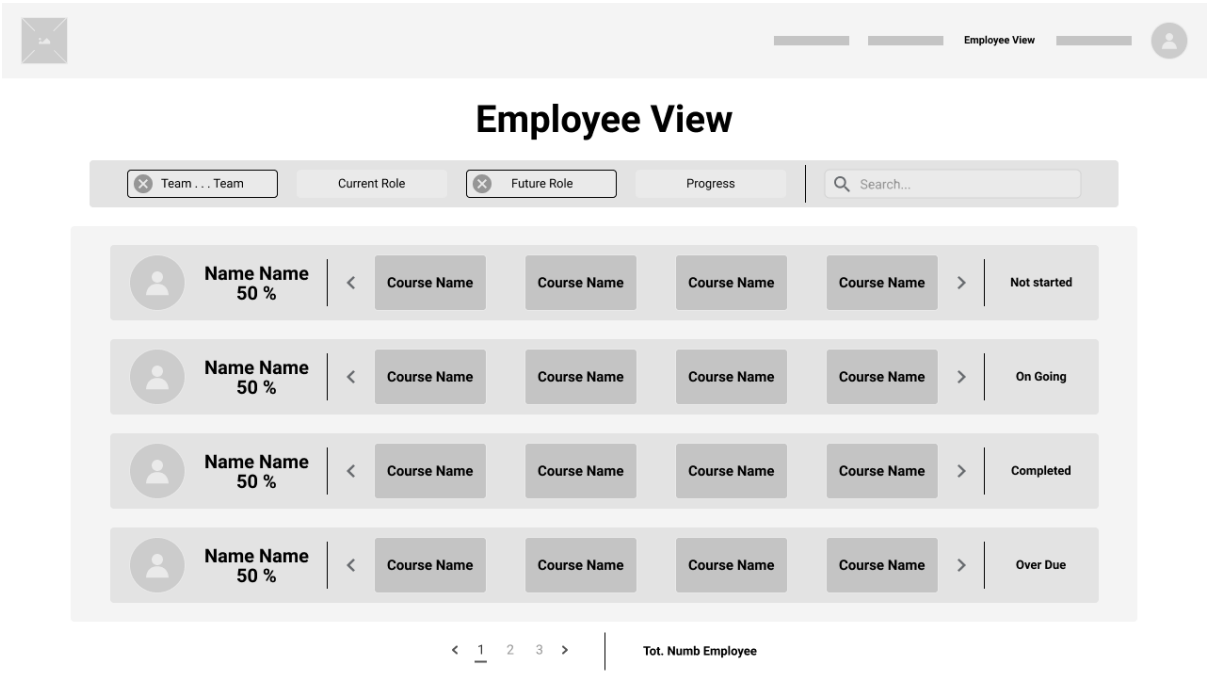


Image 10 – Manager Dashboard – Wireframe

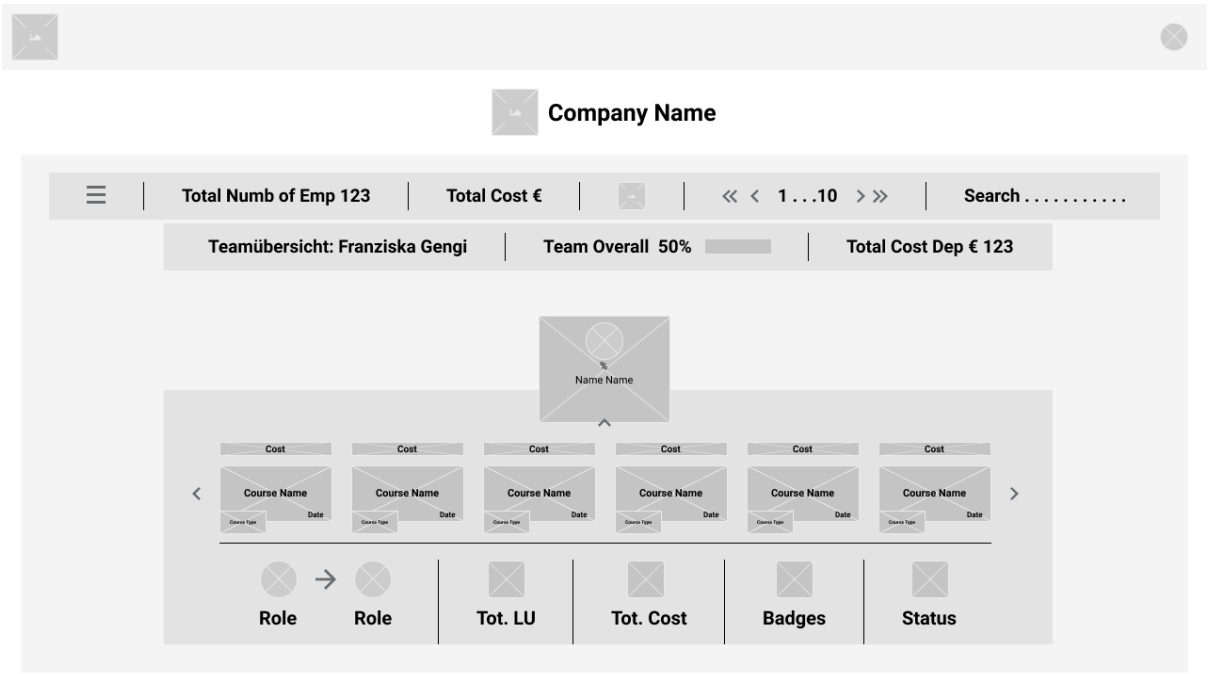


Image 11 – Manager Dashboard – Wireframe

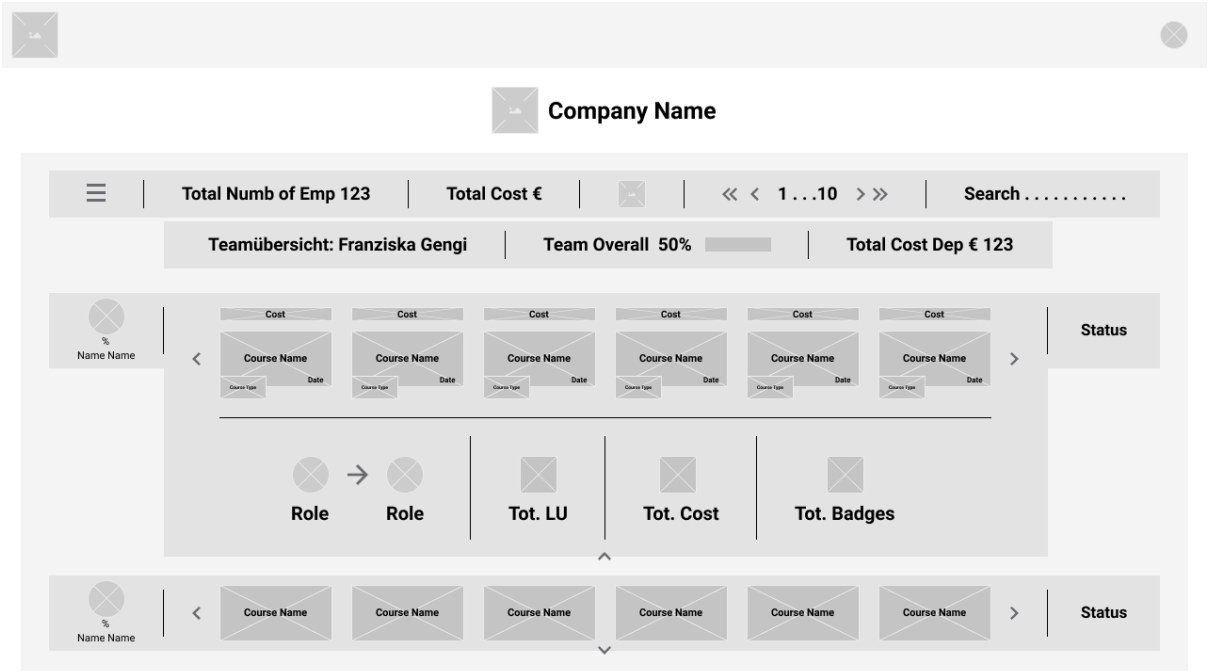


Image 12 – Manager Dashboard – High Fidelity Prototype

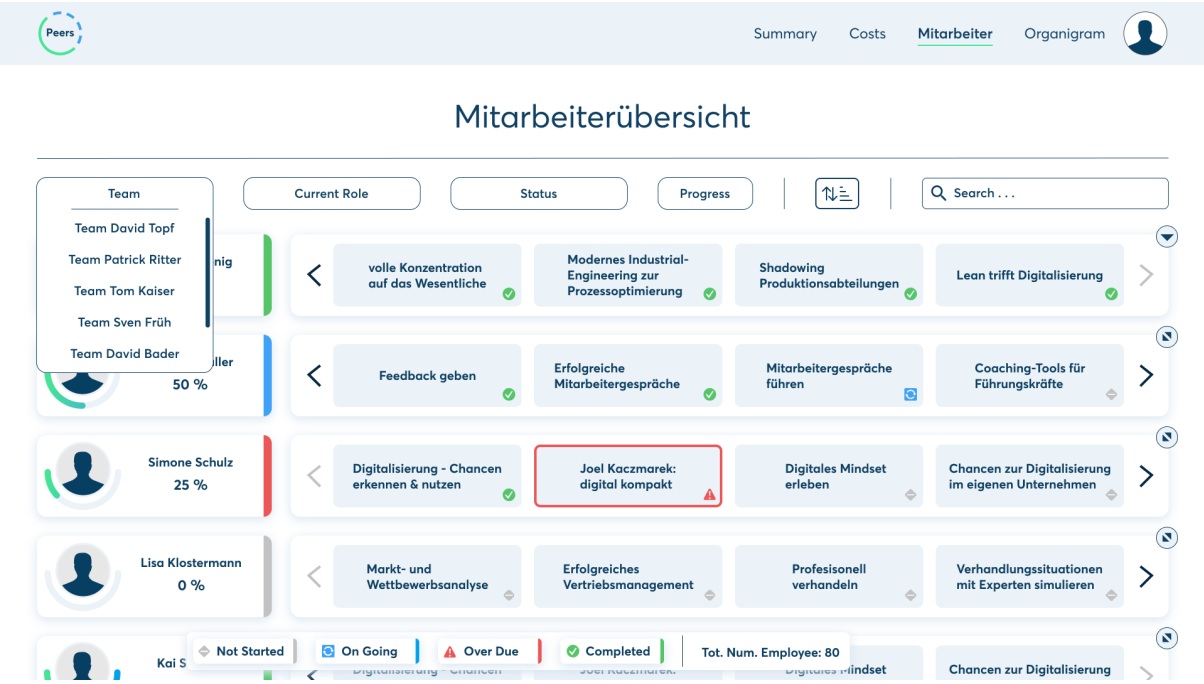


Image 13 – Manager Dashboard – High Fidelity Prototype

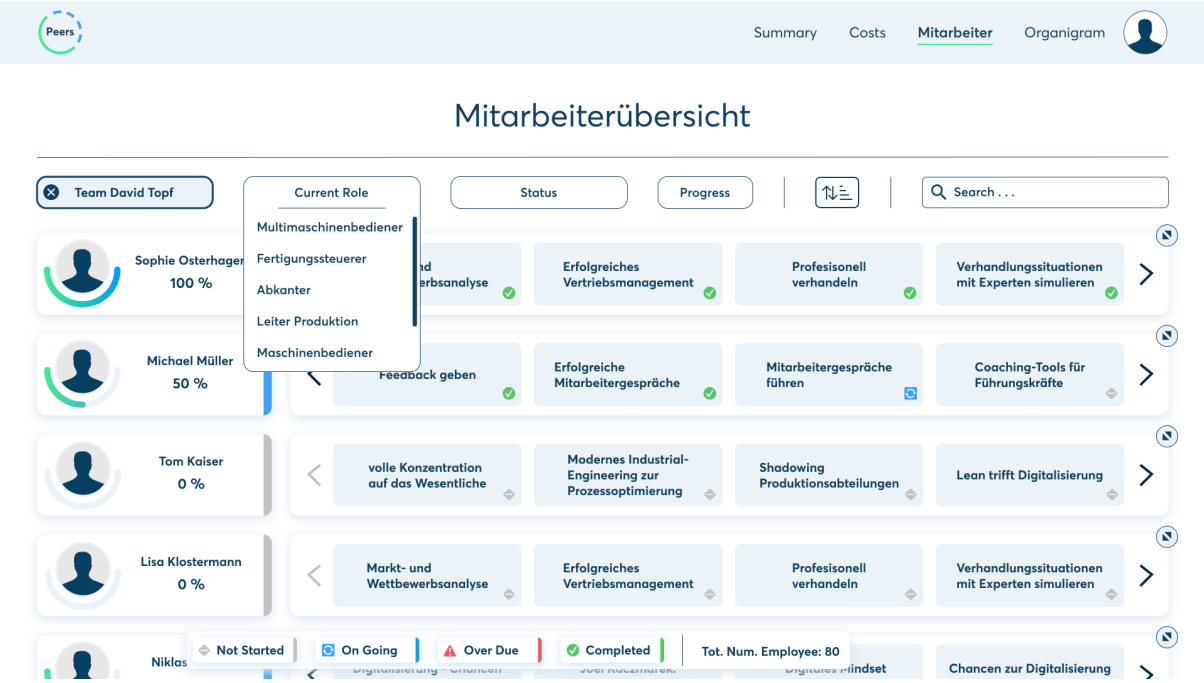


Image 14 – Manager Dashboard – High Fidelity Prototype

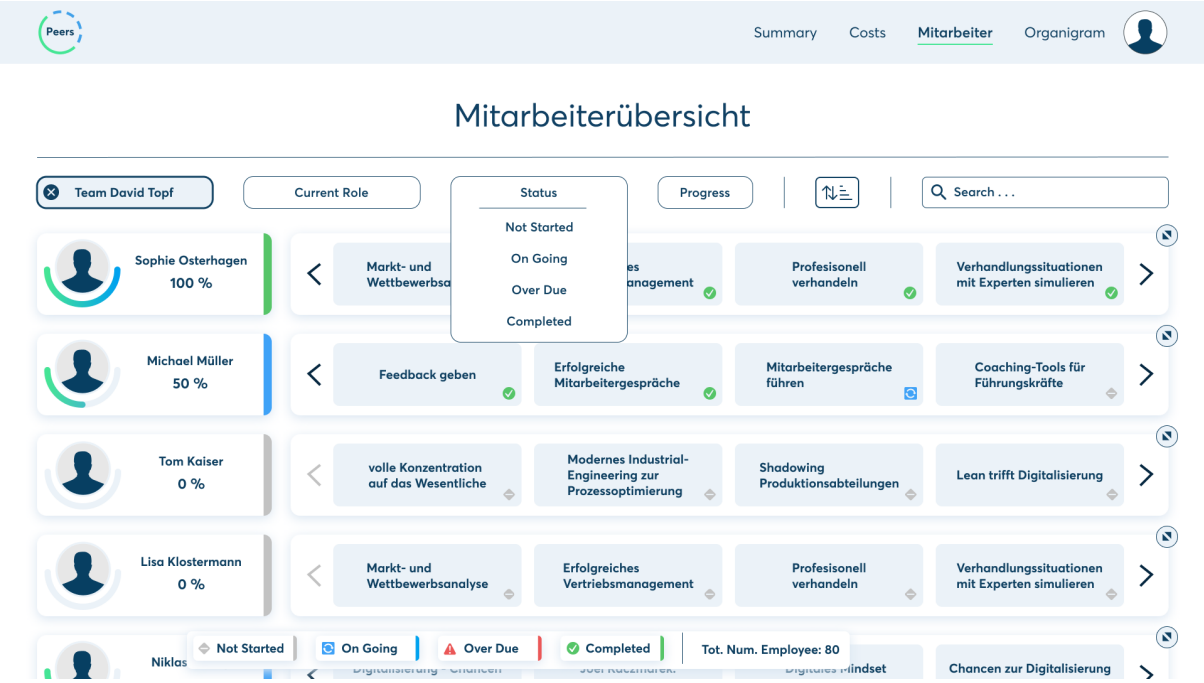
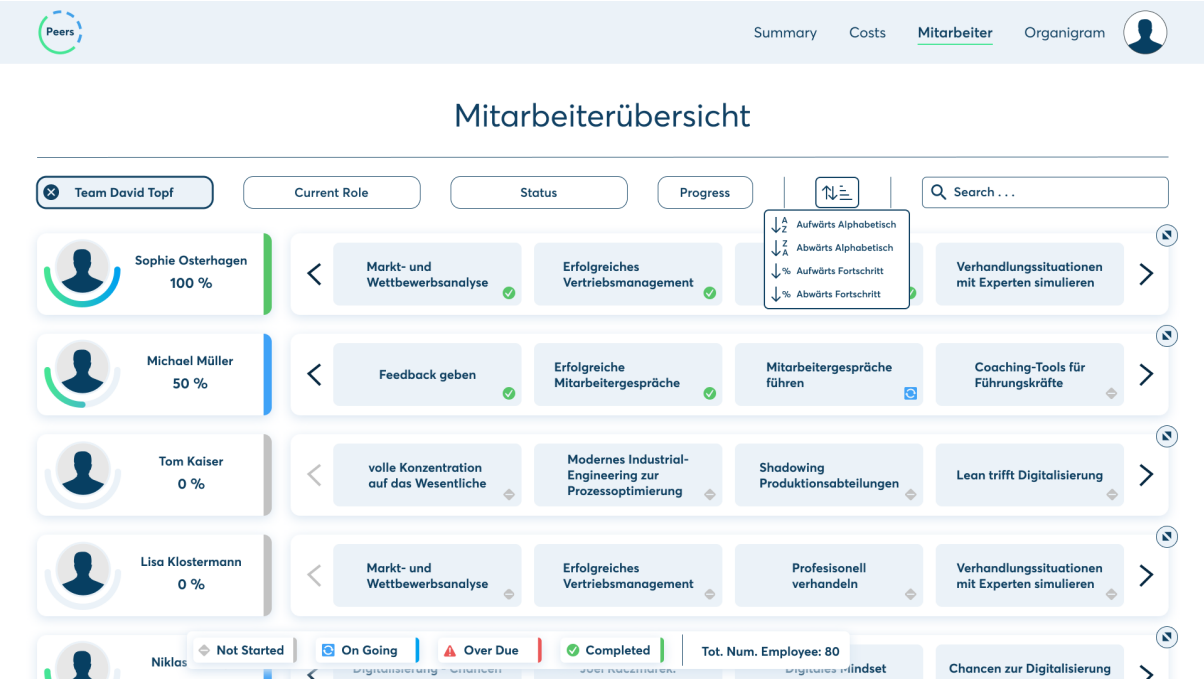


Image 15 – Manager Dashboard – High Fidelity Prototype

Image 16 – Manager Dashboard – High Fidelity Prototype



Manager SUS Questionnaire - Link

https://www.surveymonkey.de/r/Y7QB2P3

Appendix C

User Interview Guideline

4. **Intro Context**

Personal Info:

- What's your name?
- How old are you?
- What do you do for living?
- What is your family set-up?
- What does your typical day look like?
- What do you do in your free time? What are your hobbies?

5. **Warm Up**

Technology:

- What products/apps/services do you use on a regular basis?
- When do you normally first use the internet in a typical day?
- When you are on a computer and the internet, are there any challenges you face accessing information?
- How would you like to be reached? Email? Text message? Etc.

Job:

- How long have you been employed at this company for?
- What type of employment are you? and for how long have you been?
- Tell me about your role at your company?
- What started your interested in this field? How did you get into this career? How long was your education in this field?
- What is the best and what is the worst part of your job?
- What has changed in your job over the last few years?
- Tell me about a situation you got stuck at work because you didn't know how to complete/perform the task/job?
- What is the hardest part of your job?
- How long do you usually spend on [specific task]?
- What are you currently doing to make your [job/task] easier?
- Have you tried looking for a solution or an alternative?

6. **Main Body**

Learning & Development:

- How does learning and development currently work in your company?
- What would you change in your current learning & development?
- How do you think learning & development can affects your job?
- How do you stay inspired?
- How long could you follow a course for? Why?

- How many hours would you spend learning per week? Why?
- If you could learn one thing right now that would make your job easier, what would it be?
- Do you know what informal learning is? If yes, tell me how it could contribute to your daily job?
- How do you feel about your perceived learning gap? Tell me about what you think you still need to learn in order to be able to do the required task… How about your company?
- How would you like to learn? (1to1? E-learning? Books? Conversations?) Why?
- How do you think your company could improve if there was a better learning and development for everyone?
- How do you think this gap can affect/impact other areas of your work?

7. Closing Questions

- Is there anything we haven't asked you today that you think would be valuable for us to know?
- May I contact you if we have any other questions or for possible further research for this project?

Image 17 – Miro Board – User Interview Analysis

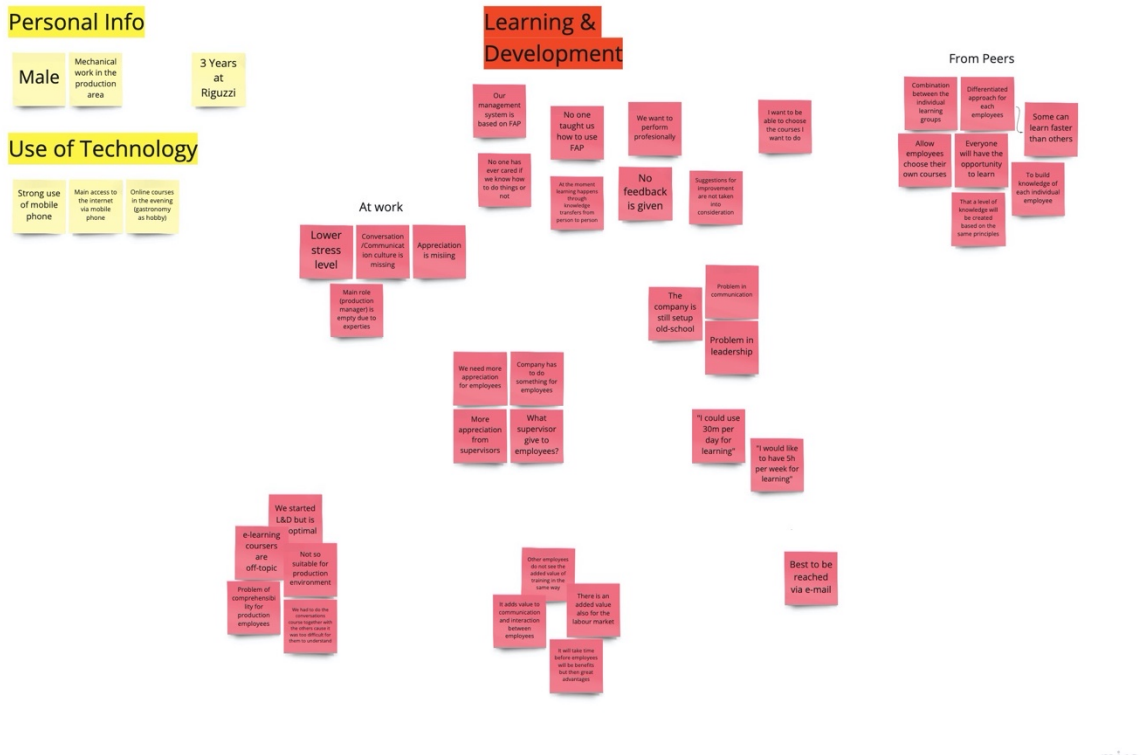
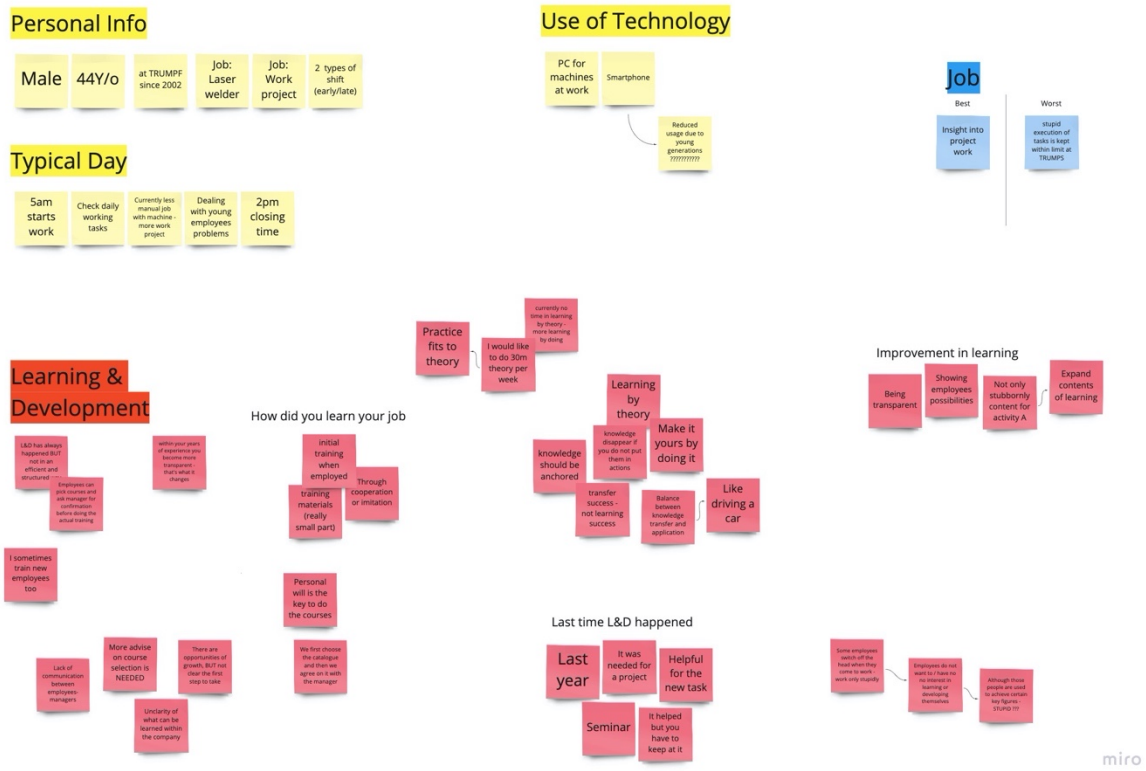


Image 18 – Miro Board – User Interview Analysis



User SUS Questionnaire - Link

https://www.surveymonkey.de/r/Y97QYCQ