Hochschule für Technik und Wirtschaft Berlin

University of Applied Sciences

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Visualisierung von Leistungsdaten (OMB+)

Documentation

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etc.	et cetera (and so on)
e.g.	exampli gratia (example given)
i.e.	id est (that is)
maths	mathematics
uni	university
Mr.	Mister

1. Introduction

As part of the project semester, we as a team had to pick a project that we will work on throughout the semester. This should enable us as students to apply our knowledge in a practical environment. We decided on the project: Visualisation of performance data. In contrast to the other teams this year, an external company was assisting us. The company called integral-learning is represented by Petrus Tan and Michael Heimann, who also serve as our supervisors for this project. Their specialty is mainly in the field of e-learning and web development. This will also be our focus in the coming weeks to work with HTML, CSS and especially with JavaScript.

1.1 The problem

The company has been looking for students who are interested in developing a feature for their website. The website is called OMB+ and is aimed at prospective students who have opted for a STEM major. The goal is to close any gaps in the fundamentals of mathematics and thus to make it much easier for students to start their studies. Furthermore the service can be used to test their knowledge in various fields of maths. To reach this goal the user has to know how high his knowledge is in certain topics of maths and how well his tests on the website have been completed. Results are an important part of progress and self-reflection. In order to grow in a particular field and to learn for yourself, it is important to know whether there are gaps in knowledge. Self-evaluation is feeble-minded and very subjective. The key to this problem is how the representation of results will be displayed to the user. One needs a visual feedback to fully understand what someone lacks and use that information to build on their strengths and work on ones weaknesses. Preparation courses from universities only provide the results, but not the evaluation and advices for improvement. That is why we come into play and tackle this problem.

1.2 The goal

The main task of our project will be the conception of a new visualization and then its implementation. First, a draft for the new feature must be made before anything is done on the computer. Then the implementation of the collected ideas in form of code and finally the implementation to the website OMB+. Our goal as a team is to convince our supervisors of our intentions and, in the best case, to satisfy them with our newly acquired skills. Naturally, this also includes the fully functioning feature: visualization of performance data. However, one must pay particular attention to which target group the visualization is intended for. It aims at aspiring students who want to test their math skills along with ensuring an easy start in uni. That means it does not just have to work, it also has to look good and easy to handle for the user. It will be our job to create a visualization that is user-friendly, efficient and aesthetically pleasing. Our ultimate goal of this project and therefore of this feature is to motivate the user to practice regularly and become much more confident in dealing with math problems.

2. The project Kick-off

The project “Visualisierung von Leistungsdaten” kicked off with the first group meeting on the 10. Oktober 2018 and will reach its end on the 08. February 2019 in form of a presentation at an event called “Showtime”.

Group meeting with our supervisors were decided weekly and the venue will always be within the firm’s facility of Integral Learning which is located in Berlin Charlottenburg. First we were introduced to Agile Project Management which is an iterative approach to planning and guiding project processes. During the first meeting, a brief introduction of ourselves took place and the project was explained to us in more details as well as its goal and the requirements needed from us. We were expected to work with different project management tools and communication platforms such as Redmine and Slack and each sprint shall be made together and designed to be suitable to a timeframe of 14 days.

2.1 Agile Project Management and exploring the environment

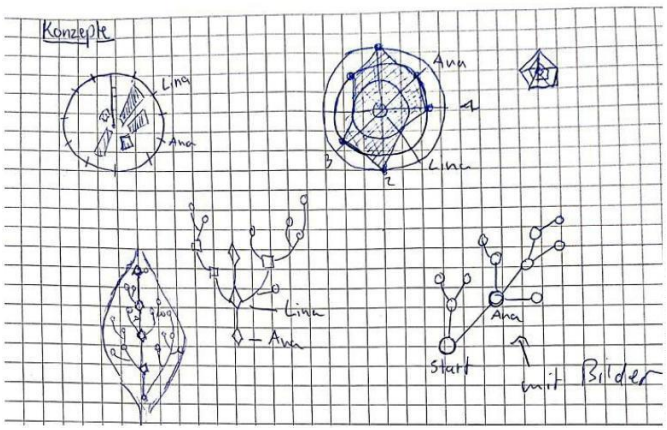
In the first meeting we made the first sprint together and its tasks were due until 31.10.2018 and required us to get to know the website of OMB+ and exploring Mumie which would be our project management tool. Our most important tasks included ideas for a concept for the visualisation performance data, doing researches about some JavaScript frameworks and graphic libraries. One shall be selected to build user interfaces, as well as the most fitting for us to work with. Furthermore we were tasked to build a story mapping, which should help us to envisage our product as a whole.
Besides the meeting with our supervisors, we had team gathering to discuss about organizational matters, the user stories and their corresponding tasks and then we would assign the roles within our team. We tried to assign each task to two persons, this way should ensure that one task would have to go through at least two revisers to minimise misinterpretations and the members were able to receive assistance from each other.
After the group meeting on 17.10.2018 we did not have any team gathering afterwards and we settled on the conclusion that any of us will have to work on all tasks as it was essential for the whole group to collect important data and the exchange would occur through online platforms. Besides Mumie which is powered by Redmine, we also used Trello, as the lecturer of project management requested its usage to demonstrate us other project management tools and its benefits. Project management is a subject which is mandatory, its purpose shall be served as the theoretical foundation to support and further our knowledge about agile project management and aid us in the practice which is our semester project.

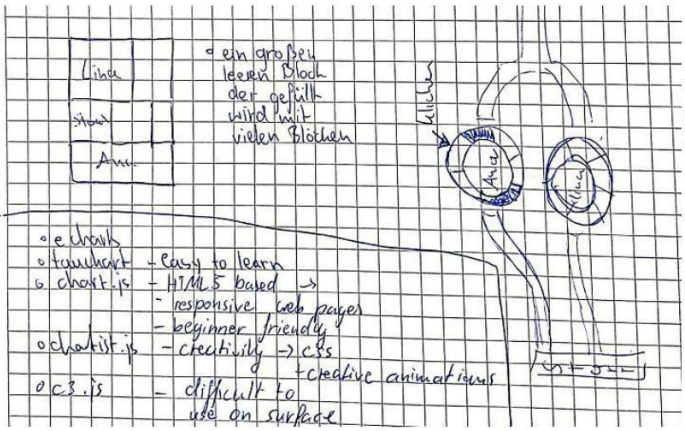
2.2 Understanding the essence of the wished feature

The second group meeting took place on 25.10.2018 and we always started with either project’s related questions or organizational matters. After that we did a task review from the previous week followed by a presentation of the results which then will be discussed and evaluated together. The

story mapping has to be changed entirely as it did not represent our product and our supervisors were able to lend us a helping hand. The task regarding the visual concept was misinterpret as our ideas did not align and we left the main point about the required data completely unconsidered. The unfinished tasks were put onto next week.

At the team gathering, which was shortly after the meeting, we explored the OMB+ website together and made several notes of its structure. Our first story mapping was based on the website as we misunderstood the product and we were unable to grasp the main objective of its existence. While redoing the story mapping we informed ourselves about several well-known frameworks and created a PowerPoint to envision the advantages as well as disadvantages which should help us with the decision. We discussed about the data, which of them would be important for the users and need to be seen and which would be more relevant for the administrators to advise them whether the contents should be improved. Some first visual ideas were drawn manually but our understanding towards the product was still lacking and we found the concept partially abstract as we had a tough time explaining it to our lecturer and other project groups.





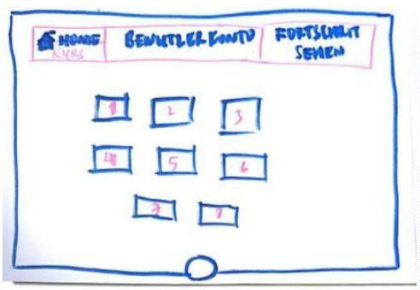
At the third group meeting on the 31.10.2018 we presented the PowerPoint regarding the frameworks and decided on React which is a JavaScript library for building user interfaces. It was developed by Facebook in 2011 and gain massive popularity within the domain of online. One biggest reason for our decision was that there is a shorter learning curve involved in understanding React compared to other comprehensive libraries. On top of that it comes with a good supply of documentation, tutorials and training resources. The time frame for our project had been very tight from the beginning which was a little bit more than 3 months. As we were in charge of the design and all of us had other lectures to attend, there will be insufficient time for us to learn frameworks or libraries more complex than React. During the meeting we delivered our opinions about the website OMB+ and pointed out some of its design flaws for future development. Inquiries about our product were made once again for additional clearance and we showed some of the manually drawn designs to confirm whether we were moving in the right direction. There were no actual criticism or instructions about the displayed designs and we were told to be creative and come up with many different graphical patterns to single out the most suitable ones for the performance data of the users. Three new tasks were added to the first sprint. The first one was to set up a React project on an IDE which enabled us to test out the environment we will be using along with the React library. Subsequently we shall experiment with various graphic libraries as well as developing few

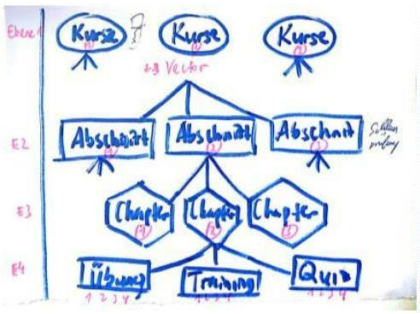
prototypes to have a basic working ground and testable examples for demonstration and feedback. Additionally our supervisors gave us few hints to take the image formats canvas and svg into consideration.

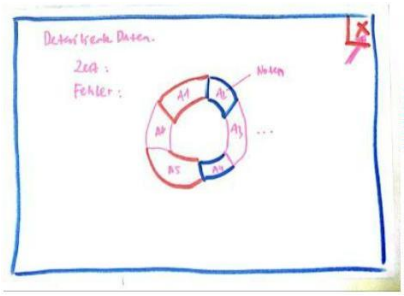
At the group gathering soon after the meeting we inspected any highly well-known graphic libraries such as chart.js, chartist or D3. We distributed the tasks between the members in small group of two people. One group shall set up the React project, the second shall work on paper prototype and the third group shall try out one graphic libraries and develop a digital prototype. Further analysis were made together in regard of graphical displaying the performance data on the OMB+. The online-learning platform offers a total of 13 chapters covering various mathematical fields. 10 chapters out of 13 are mandatory and the remaining 3 are additional courses. Furthermore each course consists many different subchapters which absolute number can reach up to nine. Each subchapter also contains the respective trainings and quizzes. With the paper prototype we tried to envision the whole chapter concept into small layers and drew a fitting diagram for each course tier.

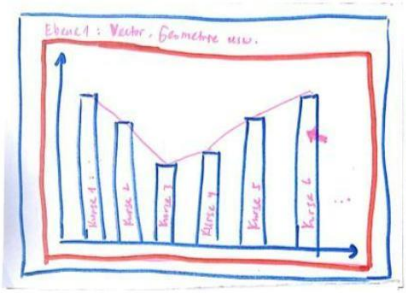
2.3 Trial and error

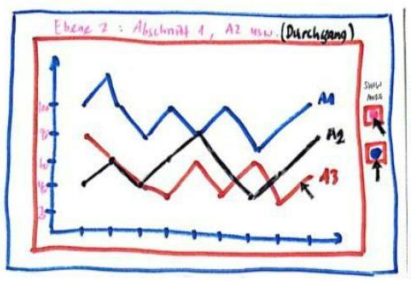
The next gathering (07.11.2018) was held directly after the Project management course. We were discussing other paper prototypes which we partially did at home. We looked at each other's prototype and discussed which feature we should include along with which we should discard. We agreed on one prototype which included all of our ideas. We then drew the paper prototype in a technical flow which we learned in the project management course prior to our team gathering. The idea was to have separate ratings for every level. And every result is tracked in a timeline, the idea was to give the user an idea in which area the skill has improved or declined. The ring in the middle should give the user the opportunity to click on a button which brings the user to a window which gives more detailed information. Additional graphical visualisation in form of bar charts gives the user more insights about his progress at his disposal.



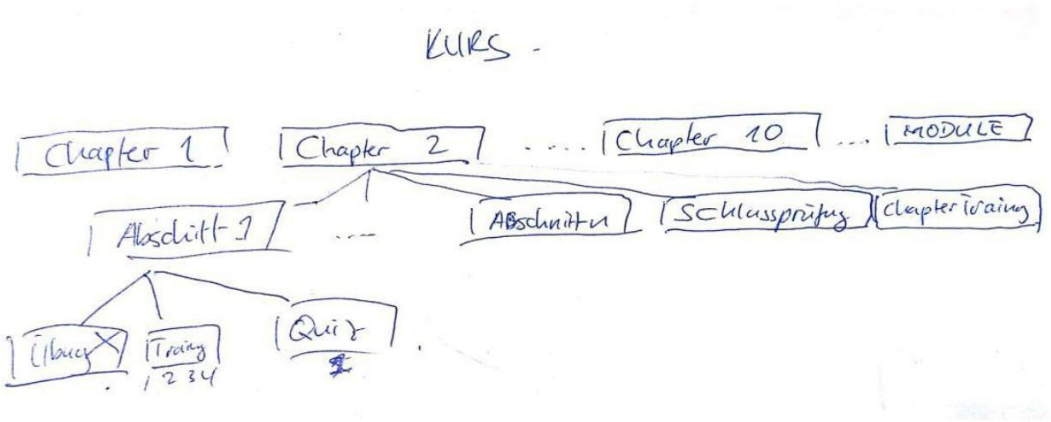




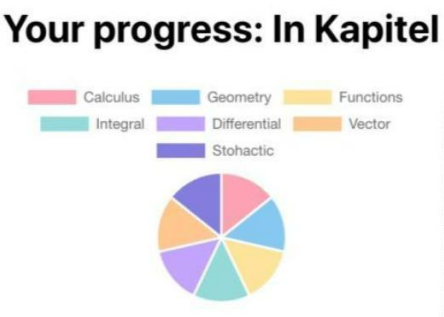


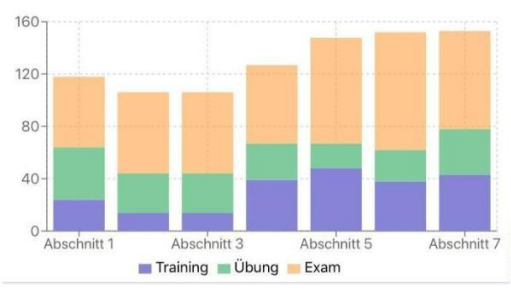


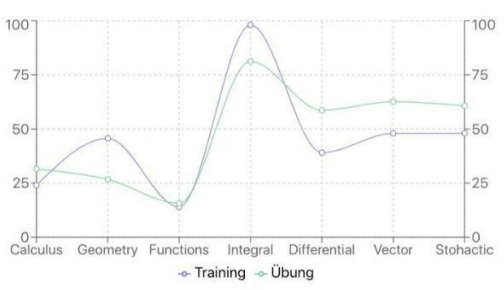
The paper prototypes were presented at the group meeting on 08.11.2018 with Mr. Tan as Mr. Heimann was still on vacation. Unfortunately the concept still had major flaws as the picture above indicates, we used the terms falsely and interpreted the four levels wrongly. This was the problem we encountered multiple times throughout our project. Mr. Tan corrected our prototype and explained the website's content and its level again. That big problem took us a whole week to deal with but it was our mistake for not questioning our supervisors sooner.



After the meeting we studied the structure of the website again to make sure that we understood it thoroughly. Our next task is to learn from our misunderstandings and create a prototype based on the understanding we have now. In the best case scenario we have a visualisation prototype program. Instead of working together on a new prototype, we instead worked independently. We agreed to learn independently to code with JavaScript and learn about the framework React.
Moving onto the digital prototype which was made with chart.js. Our very early ideas were pie and bar charts. The pie chart was designed to have many segments which represented each mathematical theme (linear algebra, analysis etc.) then later it was changed to chapter otherwise it did not match the content on the OMB+. Subchapters were simply displayed as one chart with multiple bars. Besides that we also tried to exchange the layers. Meaning the chapters were bar charts and subchapters a pie chart. Some graph charts were made as well but they were rejected because their curve can be indicated as a decline and our aim was to highlight the progress.

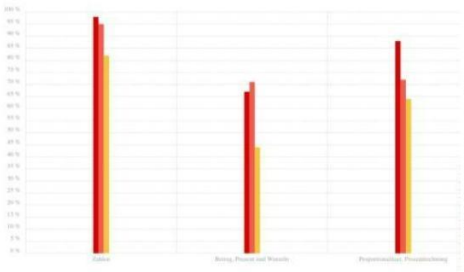


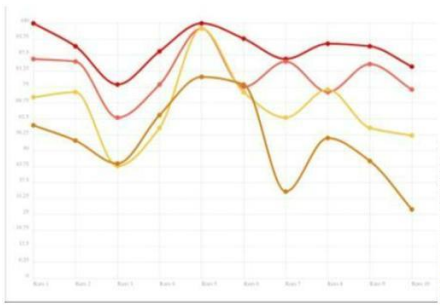




3. The final concept

Over the next two weeks we just created some prototypes in order to have something to show to our supervisors but it was still far from an actual useful concept. Radar charts were taken into consideration but soon after adding some mock data, the chart looked overloaded and unclear. Most ideas were lacking and unfitted but we had to settle on one concept or we would face great trouble of not having enough time for the implementation later on. Finally one of us came up with a design which gave us a solid base to work with and we presented it at the 6th meeting which was on the 28.11.2018.

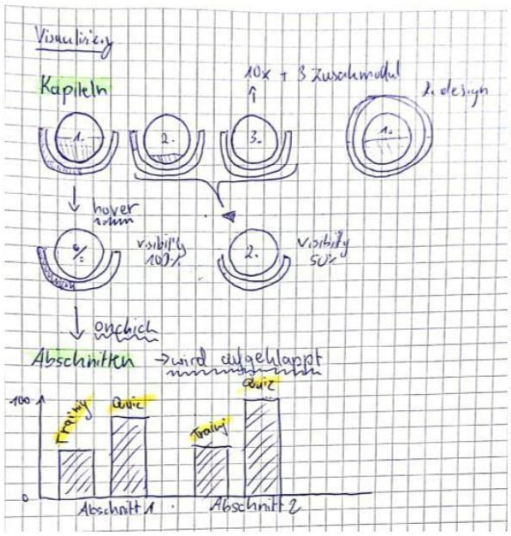


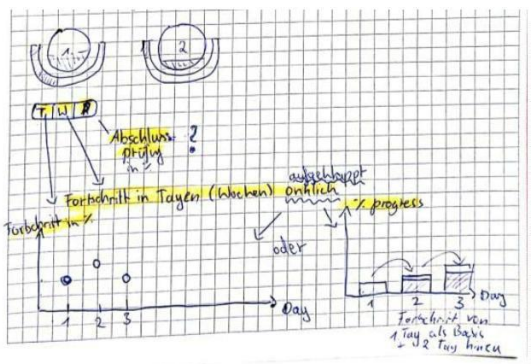


3.1 Firstlevel and Secondlevel

The new version consisted of two level. The first shall show the chapter progresses and the correlated final exam score. The second level shall be revealed with the action “onclick” on the first level and it will display the associated subchapters of each main chapter. The visual of the first level will be a half circle bar or full circle bar and within the circle bar will be another circle which later got changed to a smaller circle bar as well. The second level will contain a bar chart which will show the progresses of the trainings and quizzes. Our supervisors approved of the concept and gave us new tasks to create a timeline as well. We also settled on recharts as our graphic library as it offers the format svg because it lets one increase or decrease a vector image while maintaining its crispness and high quality. Canvas on the contrary is resolution-dependent, images one creates on <canvas> may lose quality when enlarged or displayed on retina screens.

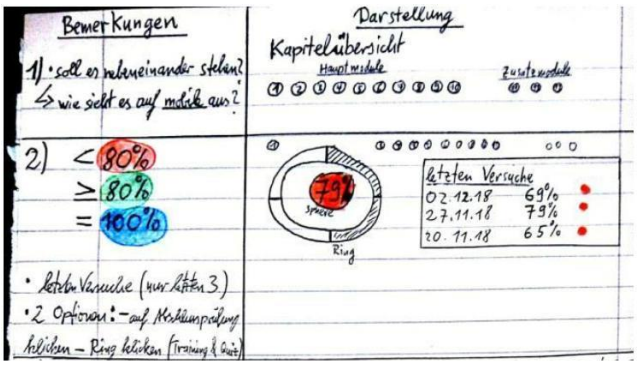
The manually drawn version can be seen below.

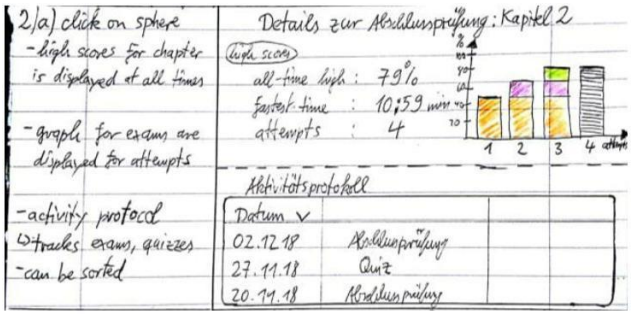


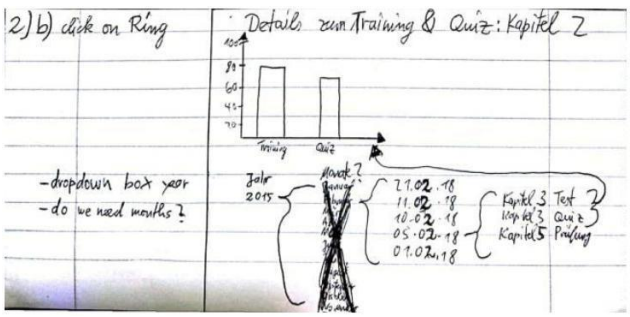


3.2 Adding Activity View and Timeline

At the team gathering shortly after the group meeting, two members tried to realize the concept into a prototype using recharts. Some edits were made on the first level and second level. Two of us worked on the “onclick” function but they encountered some problems. One gathered notes and information for the documentation as well as trying to come up with a timeline visualisation.







The unfinished results were shown at the group meeting on 06.12.2018. The circle bar for the first layer was still in development but the second layer was completed. The function “onclick” had been implemented as well and worked properly. The position of the layers got reviewed and changes shall be made. The supervisors accepted the timeline and a prototype shall be made to that. We should consider a graphical view which tracks the activity of its user. The view should include the period since the registration up to today. Later it was changed to the previous 3 months. The next sprint included new user stories such as creating timeline, activity view and completing the first level.

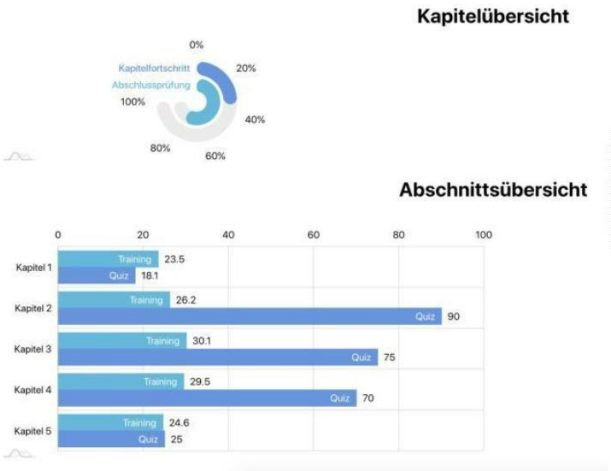
4. Dealing with changes

Sudden changes were made during the team gathering few days after the group meeting. Up until this point we had been working with recharts and our prototypes were based on recharts as well. But one of us discovered a problem while creating the first level with all the circle bars. The problem lay mainly in the visual view and the two members who were responsible for the first level tried to solve it at first. Due to lack of experiences regarding recharts and programming, one of the two members searched for a different graphic library and found amcharts. After discussing about the

problem with the others, we decided to vote for a new graphic library and developed prototypes using it. On the visual scale, all members agreed that amcharts offers much more variety than recharts and fortunately its image format was based SVG too. On the technical side, we found it a bit more difficult compared to recharts as the components have a tighter coupling but maybe the true reason lies in our inexperience in coding. We contacted our supervisors for permission to use the new graphic library and green light was permitted. Amcharts logo has to be included in our chart otherwise copyright strike would hit us. Besides the graphic visual we were handed some mock-up data as we will have to fetch the real data from the server later on and will have to implement it in our charts. For some reason all of us thought that would be the task of our supervisors and left the mock-data unattended, related questions towards them were not ask either.

4.1 The struggle of data mapping and the downfall of team motivation

Tasks regarding the mock-data were explained thoroughly at the group meeting on 13.12.2018. The last two sprints contained the most challenging user stories for the whole group and with Christmas vacation right in front of the door, submissions of other subjects had to hand in as well. The communication within the group got worse, the majority was unreachable and group gatherings were hard to manage since everyone was busy. The motivation took a very deep dive and anxiety made its appearance as we faced more and more obstacles coming from each layer and they got larger the moment we had to deal with the data mapping. Changes on first level and second level were still made weekly, activity view prototype had been done. It resembles one on git and shall display the previous 3 months. The timeline was implemented as the last view and it serves as a progress tracker.

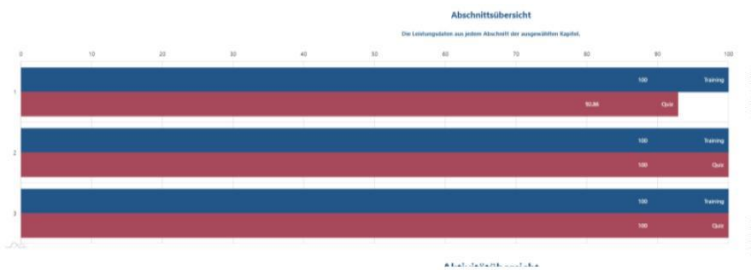


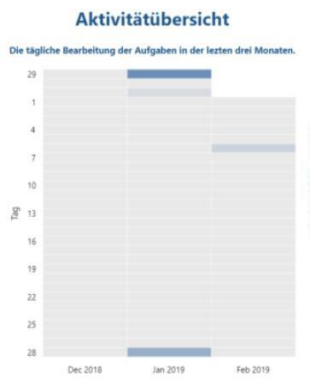
At first it was only one of us who dealt with the data mapping and it was a mistake of us to not offer any assist. Later another member joined the task, they both ended up getting stuck but tried to avoid asking the supervisors for help. Out of despair we posted on Stack Overflow but it was to no avail. We gathered up some courage and decided to ask our supervisors for advice during the group meeting on the week before Christmas as well as an example for us to see. Without the help of our supervisors we would definitely not manage the implementation or understand the concept of

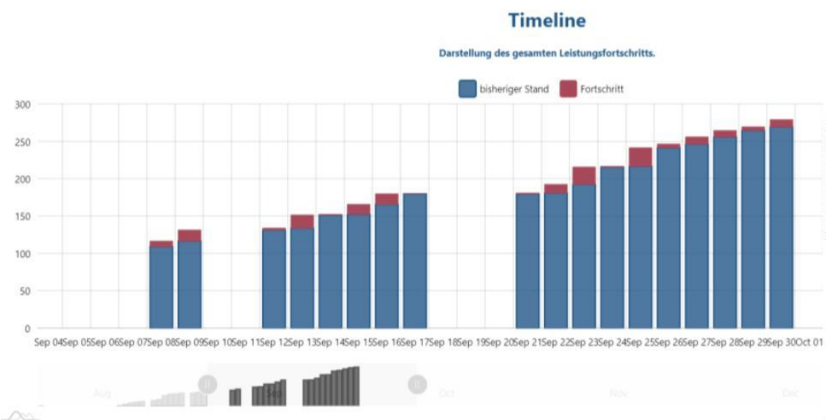
function and class components in React. Even though they gave us multiple hints we were not able to grasp the idea behind it. Our knowledge regarding the concept of object oriented programming has such a large gap that we felt very pressured and overwhelming during the last sprint. We struggled the most during every data mapping we had to make for each graphical view as we could not understand the data the server provided us. The problem already occurred with fetch as we were on the right track but the data could still not be read. The main trouble arose at preparing the data and then transforming them in small steps. During this phase, our supervisors had a lot of patience and offered their utmost help towards us. They explained the structure of the data and the method of how they would process them to us. There are many other solutions but we had barely time and our supervisors have a full-time job which should not be neglected. During January we spent much time in their office as they offered and encourage us to work on the code in their presence. Questions and issues could be resolved faster that way. They both suggested multiple times for us to stay after the group meeting to work on the tasks but unfortunately we tended to decline because of uni related activities or personal issues. The majority of us had been feeling uncomfortable and embarrassed for the reason that our group is still very inexperience and this fact being exposed would put us in a state of not wanting to disappoint our supervisors. At the same time our action resulted in plenty more inconveniences as those problems could have been clear up sooner and better solution could have been think of as well as more time for our supervisors to react and help us during those crucial situations. Regrettably, people only know it better after experiencing them.

4.2 Freezing and cleaning up

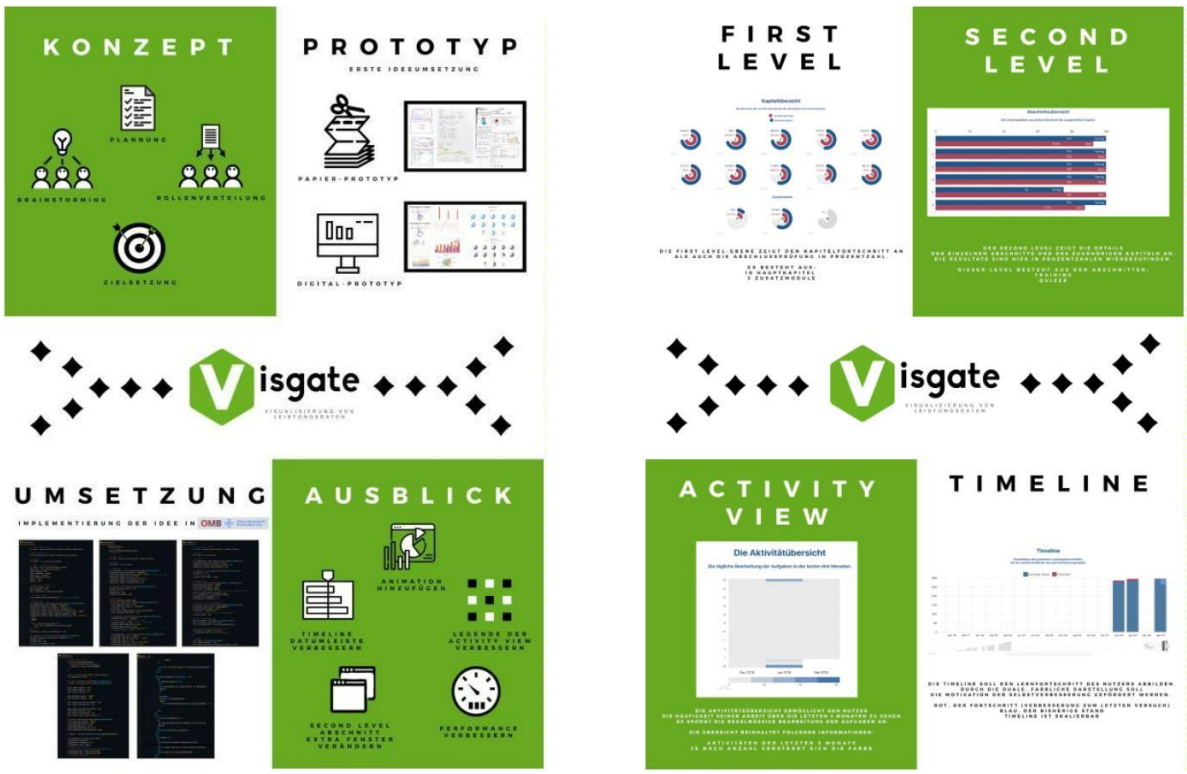
Two last phases such as feature-freeze and code-freeze were introduced and the dates for each of them were set as well. It was very stressful as some of us had been working on other branches in git, any of us had a different version and none of us knew which the latest was. The pushing and merging on git took extra time. Somehow we managed to keep it to the set dates but there were still minor issues which still required fixing but the end results can be presented.







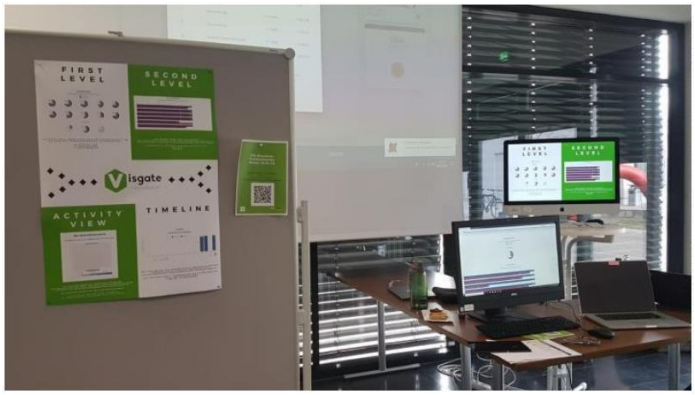
Later we were very grateful such phases exist and for the push from our supervisors in reminding us the set dates. Because of that we had more time for the exams and to make preparation for the ShowTime such as ordering the equipment, creating posters and team logo, printing them, preparing for the speech etc. Further description for the ShowTime can be found on page ….



5. Showtime

The time where we had to present our final results from these past 3 months. Our preparations for this day were all going to plan, we felt a little bit nervous but at the same time ready. The downtime right before the Kick-off felt like forever, we waited anxiously for the presentations to start. When the presentation started we listened to what the groups before us are presenting until we as the fourth group were finally called. Our representative Tuan Son was holding a presentation about our project. The mood of the audience was very cheerful after the presentation. Afterwards we listened to the rest of the presentations and then it was about time to build our booth. We hung our 2 self-designed posters, set up the computers and got ready for the audience to attend our booth. It started rather slowly with only the professors attending our booth, we managed to answer most of the questions but some of them were really sceptical of our project and achievements. For example the first professor asked why the first visualization was semicircle and what the numbers on the axis mean. While the second professor asked why the colours in every visualization were the same even though every single of them shows something very different. There were more questions that were extremely nit-picky like the numbers inside the semicircles are not showing which topic it was, the timeline could have been smaller or a ranking system which compares oneself with the rest of the users. They were then disappointed to find out that some of those ideas were not meant to be implemented, because it could have caused demotivation by showing how the users scores have dropped or how bad by comparing the users with each other. But some of them are our own suggested improvements if we had more time for the project, for example to rewrite the x-axis of the timeline to make it more readable. Overall the reaction was rather positive, even students from other unis were saying that the visualization is good and can literally be used anywhere outside of maths in the field of visualization. There was even a business person who was interested in having our visualization. He gave us his business card to contact him after the Showtime. Really surprising and helpful to us were the constructive criticism from the professors. For instance we could implement a function which could take the user to the unfinished tasks, when the user clicks on the main chapter. Other improvement suggestions were to write a topic name to the main chapter because most users would forget which chapter belongs to which topic. Furthermore our posters were perceived very positively, design and the colours were matched perfectly. With the closing of the Showtime all booths had to be take down while the professors and all supervisors were assembling to grade every project. Comprehensively we had a very good feeling about our project based on all the reactions from the professors we got. We awaited our results in the main hall. Meanwhile we talked to the students from the other projects to have an insight on how their project had been going. To our surprise, they struggled the same as we did and did not have that level of professionalism like our supervisors did. Meaning some of them had to work on a new feature one day right before the Showtime. So we were actually glad that we went to work for the company integral-learning. When our supervisor came back he announced our final result and we were really underwhelmed by our grading. We expected a better result and it was disappointing to be precise but we cannot change that. Later the winners of this year's Showtime were announced and another group won the price and was handed the certificates. We were not very cheerful after the event but at least we managed to pull it through. In the end it was a shaky ride but we enjoyed the journey to this point. Sometimes it can end in a disappointment but looking back now it was all worth it. We can only thank both Michael und Petrus for sticking with us to the end.


KONZEPT
PROTOTYP
UMSETZUNG
AUSBLICK
FIRST LEVEL
SECOND LEVEL
ACTIVITY VIEW
TIMELINE
Visgate


FIRST LEVEL
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Set Donation Amount
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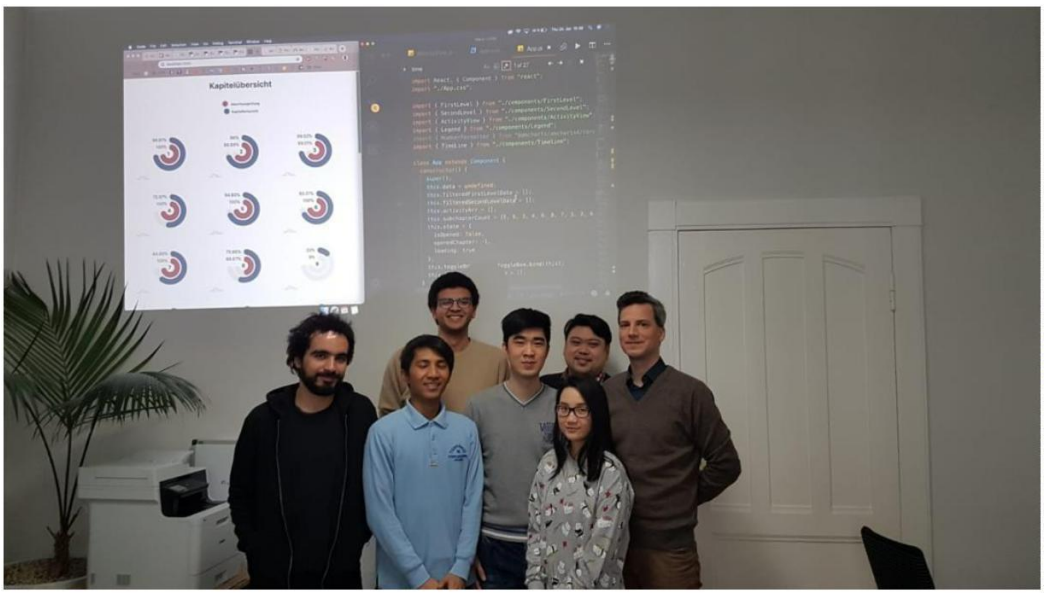
KapitelÜbersicht

6. Group Reflection

In the beginning our group was promising since the most of us knew each other from our study courses. Sadly one member left for personal reasons, but luckily a new member signed up for the project instead, so we did not shrink in our initial group size. Our group was very nice and approachable, it was a very harmonious group performance. We had no instances of toxic behaviours or a big argument with each other. Any confrontations were settled quietly without damaging our overall performance and teamwork. Another good point we achieved as a group was that we always showed up as a team to the weekly meetings with our supervisors (even though late most of the times). But still, the attendance rate of every member is 100% which we are very proud of, even though everyone had a tight schedule we somehow managed to attend every meeting. That was probably all good points we had during the project. Our first main problem was right in the first couple of weeks into the projects, we did not understand the website we were developing for and the project itself we did not quite understand well enough. This led to various complications, for example the paper prototype we build afterwards was flawed to the core since we misinterpreted the levels of the website. A bigger problem was our negligence towards communication within our group as well as with our supervisors. We did not think it was necessary to communicate properly, to speak our mind honestly or just to criticize each other constructively. That was also the main problem with the flawed paper prototype, to not ask even though we did not fully understand. We were too afraid to appear clueless in front of our supervisors since they will grade us. The concept took way too much time, nearly as much as the actual work which was coding. We switched out our ideas too often, which resulted in more wasted overall time. For instance we could not decide on a paper prototype since we barely knew enough about the website so we redrew the prototype countless times. And even when we were programming we switched out libraries in the middle of work. We were incredibly slow at work and that resulted in realizing problems way too late. Also we avoided asking our supervisors for too long. Most of us did not prioritized or were not willing to prioritize the project over their job or rather their private life. Low motivation for the project was also a major issue that was showing in the behaviour. Being late to meetings constantly and leaving early even though our supervisors were sacrificing their private time for us to finish the project on time. A laid-back mind-set was clearly the wrong mind-set especially in the later phase of the project. It was borderline disrespectful behaviour towards our supervisors who spent a lot of time to help us. A thing which was not resolved is how we worked within the team. Additionally we often worked separately or rather things were done without the others knowing. In short, communication issues within the group were never resolved, some tasks were done alone poorly without other members having the chance to look at it and eventually correct it before the next meeting. Without consulting the own team members and doing things on their own resulted often in major issues in the code or misunderstandings between each other. But to be honest we had no leader or outspoken person in our team who could raise the voice and do the role assignment. Everyone had to take the role of a Scrum-Master for a week, but it did not really resolved our problem of aimlessness. The last thing which was prevalent was the lack of programming knowledge we had. There were so many good ideas we had but our knowledge was not sufficient enough to implement those. So we mostly had to settle for a substitution plan. Lastly we did not perform as well as we should have but nonetheless we learned a lot during this project. At least we want to thank our

supervisors at this point for having so much patience and leniency towards us, even though we were not the most experienced team. It was a pleasure to work for them.

7. Self-evaluation

Ahmed

It was by far the most challenging step in our studies to work on this project with the small experience we had gathered before, definitely an experience that we all learned a lot from, and for me personally it was a decisive phase in my academic life, I have realised that there is still so many things to learn and skills to grasp, and despite the fact that I have already learned a lot from this project, either it was the working with different JS graphic libraries and frameworks, organising the work in real professional agile way or understanding the values of teamwork, but it is only fair to acknowledge that this was only the beginning, and I hope I'm speaking for all our group members when I say that by carrying on with dedication and hard work we can reach our goals and overcome the different issues we had encountered working on the project. I also would like to give both our project carers a big thank you for providing us with a positive working and learning atmosphere and being real supporters of us.

Habibi

I learned how to deal with the real customer, and what exactly they need. It was a little bit stressful, especially when it came to arranging our schedules, in order to fit in our weekly meetings with each other throughout the week. Furthermore, I learned about ReactJS and how to use the graphic libraries such as amcharts. It took a lot of energy and demanded tons of time for me to understand how it works. To my way of thinking, we have done our best to give everything we can do. Patience and hard work were the most important things we did. Thank you for guiding us as a team!

Hatem

Working on this project has been very beneficial for me. Of course it had its ups and downs, but I can confidently say that I have learned a lot coming out of it. Not only did I learn much about the process of designing for the web and how much it takes for a group of five people to reach a final decision regarding the design. But I was also able to take a glimpse of the life in a firm doing something I would be interested in in the future. All of us started this project with almost no experience at all. We had a lot to learn regarding group communication needed in a project like this one. We were given a lot of freedom as soon as we started, which we did not know how to work with. As students doing this for the first time, choosing our own UI Library and Graphical Library was kind of challenging to us. But this was noticed quickly by our supervisors who guided us in the right way while still allowing us to make the final decision by ourselves. At the start of the project we were a bit hesitant when it came to making decisions regarding the project. We were working week to week without having a big picture. But as time went on we developed our own voices and perspectives in relation to our peers and supervisors. We were able to understand how big the project was and were able to break down bigger tasks into parts and steps. The first couple of month we were not really grasping that the main difficulty would be lying in the data extraction process. But with the

help of our supervisors we were able to jump that hurdle and deliver a decent end product. In the end all of us were able to learn a lot whether it is in group work or independently. I learned to never shy away from questions and to ask as soon as I get stuck with a problem.

Truc Linh

Despite multiple warnings about the required time and inputs regarding the project, I was unable to capture the full picture of it and underestimated its size. Creating a concept has never been easy but I would have never thought it would take us as the whole group so much time and effort to come up with a solid idea in order for us to work with.

This long-term project showed me that it requires regular and planned meetings to exchange information, discuss and work out the problems together. Up until now I have not been part of any project this size and any group projects were doable with just a handful of meetings, if not even less.

I made the mistake in the beginning of not suggesting enough or accepting any team gatherings and I just relied too much on any other members for each of us to do our share of the project. At one point I felt abandoned at dealing with the problems and I believe all of us had been feeling the same. Because of that the communication within the group suffered severely and our motivation started to drop. We had major misunderstandings regarding the concept which were not addressed properly in the first place and I realized that there was not enough initiation coming from myself. I often avoided asking for help which resulted in great time loss and bit by bit all small problems gathered up to a giant one. Now I have learned that seeking advice is not a sin but it is important that I have the will to learn new things and the ability to think independently as well. Honestly, the thought of failing this project had crossed our minds several times, even during the ShowTime, as we realized our lack of experiences is too great regarding programming and working as a team.

Even though each of us lacked the know-how and some soft skills, all of us tried their best to contribute to this project and it was a very stressful but also a unique experience for me. This project taught me a lot about how to approach certain problems and showed me my weaknesses. But the main reason for our success lay in our supervisors who had been very cooperative as well as having a lot of patience towards us immature students. To both my supervisors I want to express the sincerest gratitude for your guidance and support throughout the project. Without your assistance we properly would have not that much of a “smooth” process and it could have ended up way worse.

Tuan Son

It was the most valuable experience for me to work for this company. It sounds a bit cliché, but I have learned a lot about coding and of course how a team should be working together in order to be more efficient. I learned from my mistakes and that is what I took from this project and hope to improve in the future. At this point I have to thank our supervisors for their patience and leniency. But maybe guide the students who have no experience of doing projects would be more helpful, especially by applying more pressure in the beginning to get the project going. But overall it was a pleasurable time to remember.