DPB100 - Project 1 Design

turn up the lights

SOCIAL LIGHT

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INDEX

Index
The report contains several sections.

- Introduction
- Project goal
- Theoretical background
- Process
- Iterations
- Overall results
- Conclusions
- References
- Appendix I t/m IV
- (Individual reflection included)

INTRODUCTION

Our turn up the lights project is about light influencing a simple family conversation during dinner in a restaurant. By the influence of the light, the conversation will be provoked in a positive way. We want to create a good social experience by trying to let people socialize more with their families.
With social experience we mean an experience in which conversations are being enhanced.
Families are being reconnected and rebanded with each other. People are encouraged to have a conversation by unconscious triggers. The dinner members do not have to be in a conversation non-stop but only when being bored. Social experience includes having a conversation about the restaurant visit after families have experienced it. That they talk with each other about it when they are back home or even some while later.

PROJECT GOAL

The aim of this project is to improve family conversations and social interaction between family members during dinner in a middle-class restaurant.

Theoretical background

Because our project focuses on people's interaction with light, we've decided to obtain some more background information on the subject as we could then design a system which can, for instance, be adaptable to the situation, or spark people's interest when giving of certain light levels.
We've tried to do so in multiple ways, including literature research on the scientific influence on people, the sociological aspects of lighting systems and even practical conditions in restaurants (which would be our main point of interest). We also contacted some experts in this field within e.g. Philips to help us with the project and give us insight in some of the more technical and business pieces of it all.

Theoretical background

When lighting a restaurant, or even just a space for that matter, most light designers look at three different layers;

- Visual task: light has to be able to provide enough vision to recognize differences in surfaces so that people can actually see and act accordingly to the situation.
- General lighting or ambient lighting: in restaurants or other social spaces, light has to create a certain fitting mood or feeling across the whole room (e.g. cozy/comfy in a restaurant or professional and sterile in a hospital).
- Visual interest: light can also create a sense of attraction to it, making a room just a tad bit more enjoyable and playful.

The second layer may be the priority in most of the cases for restaurants, however, significant lighting for menu reading, and having an interesting room for guests to talk about are also layers to keep in mind. (Ginthner, n.d.)

Affections that can occur through the influence of lighting;

- Visibility of vertical and horizontal junctions aids orientation
- People follow the brightest path
- Brightness can focus attention
- Facing wall luminance is a preference

Some cases that are important to note;

- Lighting where a horizontal structure meets a vertical one has a strong influence on the navigation through a certain room. E.g. when the difference in lighting between the two isn't comprehensible, a loss of clear vision occurs, especially for elderly people.
- People are attracted to lightened areas, so when a path is lid up, people tend to follow that route rather than walking across a darker path.
- The contrast between an object and its surroundings can be focused on through lighting it up, which creates attention.
- In restaurants for sure, people like to be in habituated at their table, which can be done by lighting an area (for instance a wall) across the customers' faces as people tend to really like looking towards lighted areas, instead of being the focal point themselves.

Specific areas and how to light them:
Spacious: "provide overall high levels of illumination with even distribution of light on the walls and uniform lighting on all surfaces."
Relaxed: "use non-uniform distribution, wall lighting, and lower light levels, typically."

Of course, both these types of areas apply to a restaurant.

Theoretical background

Experts

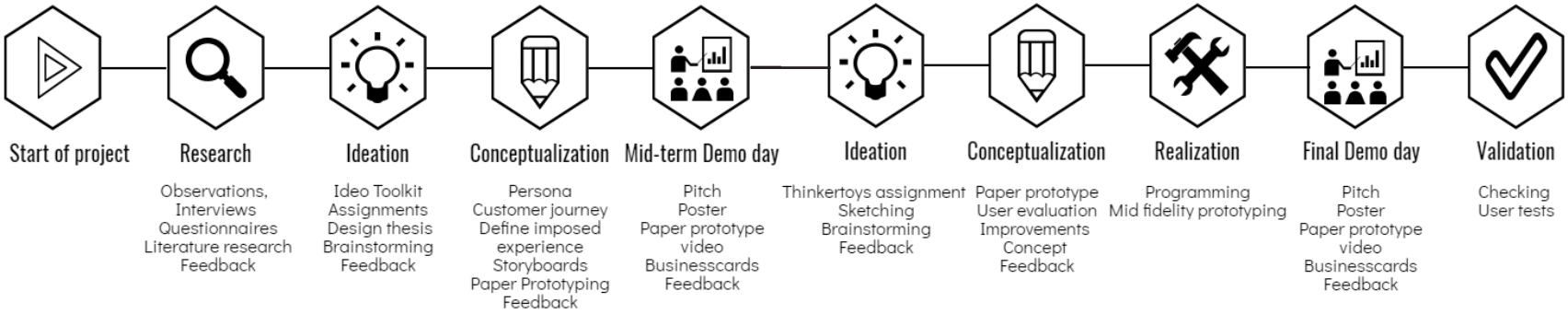
We've contacted an inside person at Philips Lighting Design who is the lead of the department. This contact could give us more information on the typical lighting for restaurants which creates ambiance. He also notified us on the fact that Philips does recognize this to be one of their many primary themes of interest but they do work together with designer studios who do.

He told us that lighting does really play a very important role in the setting the atmosphere in an environment just like a restaurant. Interactive lighting elements for this matter could also potentially help to create ambiance. But, at the same time there is also a risk of the lighting being too distracting for others when the interactivity becomes too present in the room.

There are a lot of interactive systems already on the market (Philips, z.j.) which could really give us an understanding of the appliances and the requirements for such a system to be put into place. Also, the fact that hospitality plays a huge role in restaurants, we have to take into account that the interactivity does not interfere with the accommodation of the restaurant. (Philips, n.d.)

Most of the combination of the technical luminaires and the design is done by external interior designers outside of Philips, but we were given a lot of info on lighting solutions to problems which helped us a lot in deciding on certain choices of lighting (Philips & Taylor, n.d.).

PROCESS


Start of project
Research
Observations,
Interviews
Questionnaires
Literature research
Feedback
Ideation
Ideo Toolkit
Assignments
Design thesis
Brainstorming
Feedback
Conceptualization
Persona
Customer journey
Define imposed
experience
Storyboards
Paper Prototyping
Feedback
Mid-term Demo day
Pitch
Poster
Paper prototype
video
Businesscards
Feedback
Ideation
Thinkertoys assignment
Sketching
Brainstorming
Feedback
Conceptualization
Paper prototype
User evaluation
Improvements
Concept
Feedback
Realization
Programming
Mid fidelity prototyping
Final Demo day
Pitch
Poster
Paper prototype
video
Businesscards
Feedback
Validation
Checking
User tests

ITERATIONS

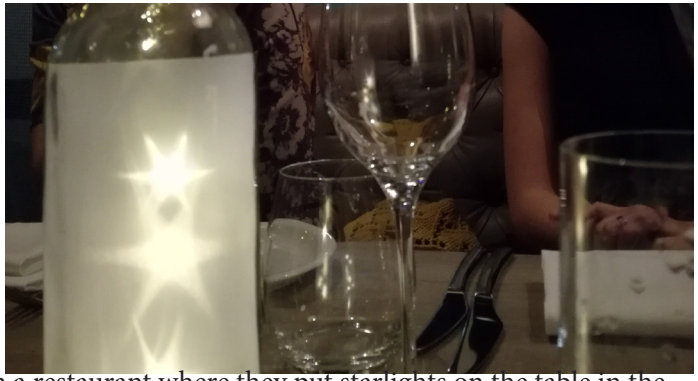
To come to the final concept we went through a lot of iterations during all this the concept and concept goal changed slightly at every step we made.

Iteration 1: Social Bubbles

Social Bubbles is a lighting system that enables families with children aged between 15 and 20 years old to share precious moments with each other while having dinner in a middle-class restaurant. The goal of the project was to improve social interaction between family members during dinner in a middle-class restaurant.

Observations & User feedback

The first thing we had to decide was what kind of place we wanted to improve during the project. With visiting different public places and see how lighting was there. Some of the places we went to were restaurants (picture 2) and because of the bad lighting experienced during those visits and because of the knowledge that the way your food is enlightened has influence on your appetite we chose restaurants to be the mainstage of our concept.



Picture 2: Findings in a restaurant where they put starlights on the table in the restaurant to illuminate the table better and to create a nice ambiance.

ITERATIONS

By going to IKEA (picture 3) to examine their different light systems, doing observation to the lighting in restaurants, talking to experts and by going through a lot of scientific resources about the effect of light on human behaviour we came up with the first concept. All those things where as well to improve our understanding of the importance of light in a restaurant. The goal we made up out of this experience was to keep youngsters from using their phone during dinner. A real concept was not there yet.

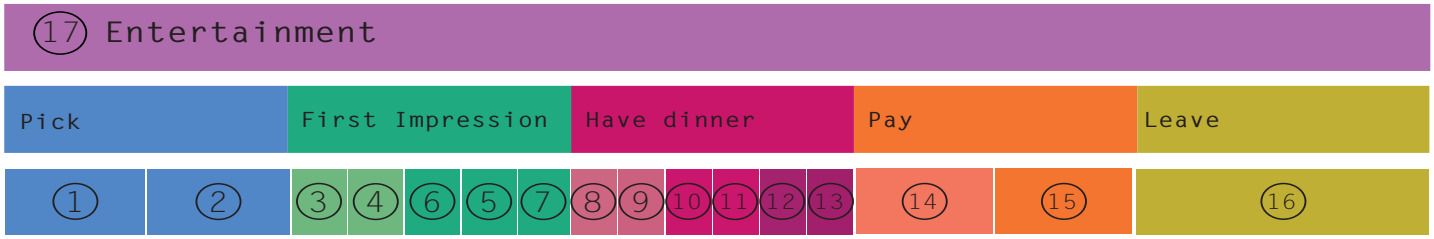
(picture 3) The IKEA lamp that inspired us the most because of the ability for the user to change the light setting in a creative way.

We soon came to the conclusion that forcing people to not use their phone was not going to work. A better plan was to distract people from using their phone by being interactive with the surrounding. The main goal now was stimulating social behaviour of restaurant guests.
We came up with the idea of a table that would adapt to the different sorts of states of a dinner. The dining table would adapt to the choice people made for dinner. For example, when they ordered chinese the table would change in a chinese setting.
With this new concept we specified our user group to families with children aged between 15 and 20 years old. Our user just being youngsters was too broad and we knew that a lot of parents do not like their children to use smartphones during dinner. To make sure we had a user that would indeed needs our stimulating of social behaviour we made a questionnaire and we did literature research which can be found in the section “theoretical background”.

ITERATIONS

Persona & Customer journey

After the questionnaire (Appendix-II) we made, we had a response of 106 people, we could conclude our user group as: 'family with children between the age of 15-20' a user that would like our concept. With this information we made persona's and a customer journey. We also made a scheme of what would happen and when something would happen during dinner time. (picture 4) Because we were not fully content with the idea of the table we decided to the four of us all to come up with 4 new concept ideas to create a new concept.



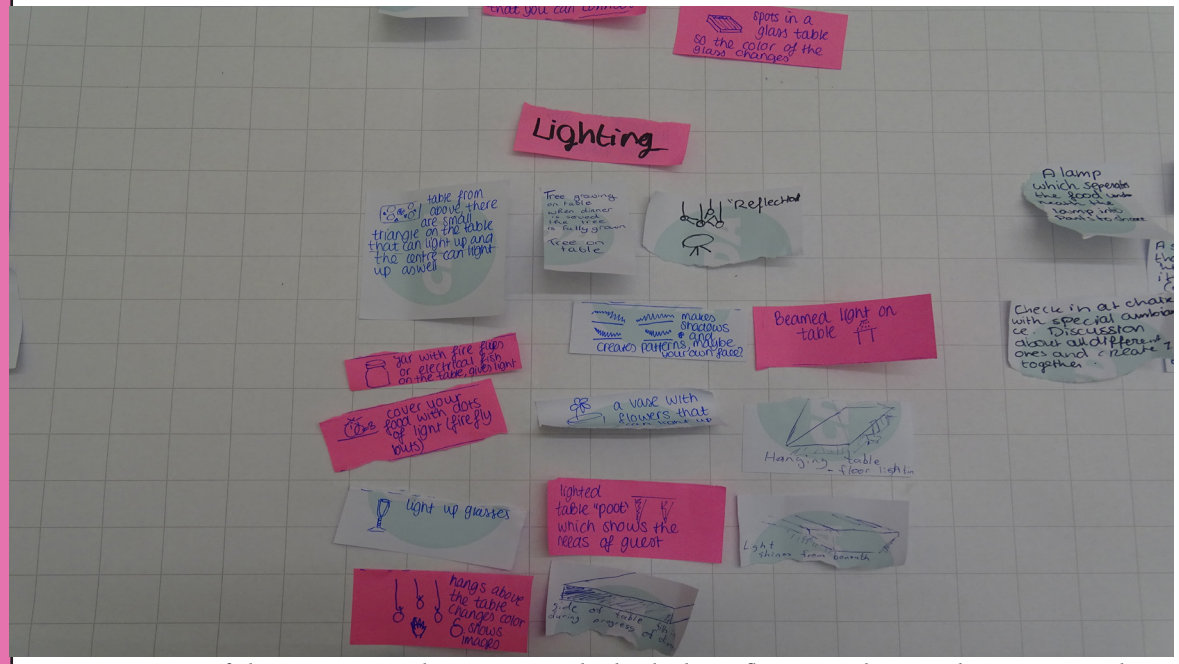
1 Looking for a restaurant.
2 Reserve for a restaurant.
3 Enter the restaurant.
4 Looking for empty or reserved table.
5 Sit at a table.
6 Read the menu.
7 Order meals.
8 Waiting for starter.
9 Have the starter.
10 Waiting for main dish.
11 Have the main dish.
12 Wait for the dessert/order dessert.
13 Have the dessert.
14 Waiting for waiter to ask the bill.
15 Waiting for the bill.
16 Walking out of the restaurant.
17 Entertain or have social interactions throughout dinner.

Picture 4: The scheme with the customer journey

ITERATIONS

Brainstorming & Storyboards

All the ideas were sticked on the wall and categorised (picture 5). Out of those ideas the three best were chosen and written down more detailed. Out of those concepts we chose the light reflection idea. The goal of this concept is still: stimulating social behaviour of restaurant guests, the guests are the user which are chosen to be a family with children between the age of 15 and 20. This was a very original and creative idea where small mirrors would hang above the table. One of the hanging ornaments would be a source of a laser beam and this beam would be reflected by all the mirrors and so follow a path. The idea was to make the guests able to move the mirrors and so create different shapes with the beam. Unfortunately we could not come up with an addition to assimilate this into a game or something interactive. We were stuck and chose to make storyboards of the three best ideas to show the interaction of the potential users in a restaurant setting. A different idea came out of this.



Picture 5: One of the categorised groups, with the light reflection idea on the upper, right corner of the group and the Social Bubble idea on the lower, left corner.

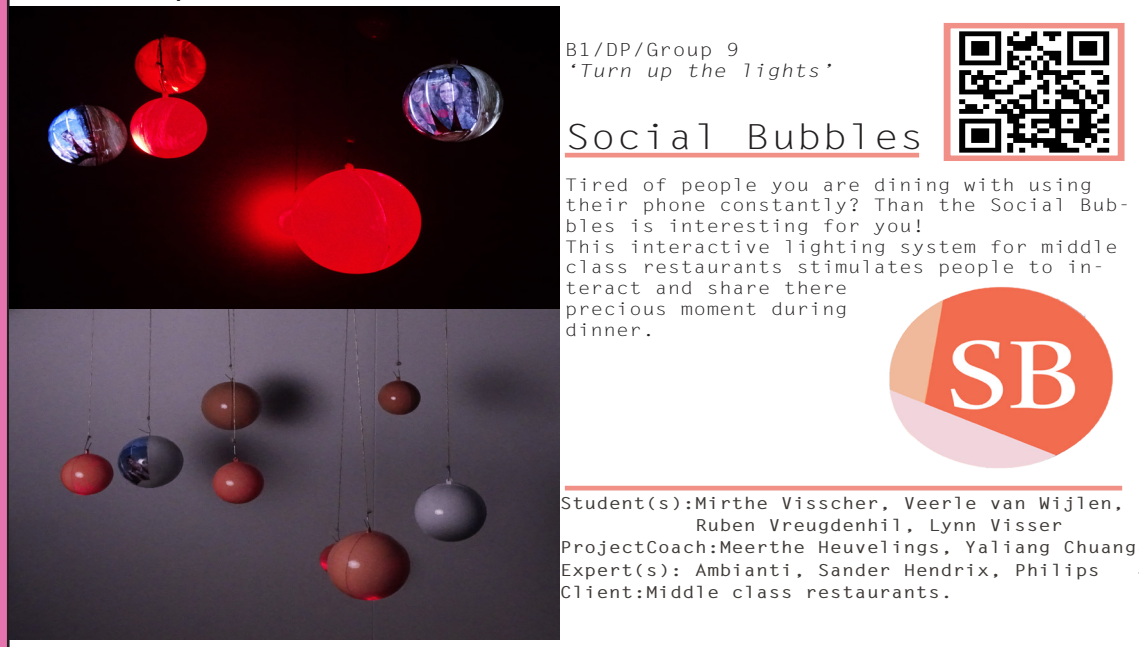
ITERATIONS

Conceptualization

The new concept we chose was 'The Social Bubbles' (picture 5), this is the concept with which we did the mid-term demoday. In this concept the ornaments hanging from the ceiling comes back. Social bubbles was a concept where people could send photos with an app to the light system. All the people on the table could now see the photo appear in one of the bubbles hanging from the ceiling. All the other bubbles get a color based on the colors in the picture to get the feeling like you relive that moment (Picture 6). When all the people on the table can see the picture you can start talking about it and in this way stimulate a conversation. After your dinner you can take the bubble with you and than you have a reminder of your nice dining experience.

Conclusion

The problem with this concept was if it would fit the project goal. Could we distract people from their phone? Why would people send a picture to the bubble instead of just grabbing their phone and showing people? Also taking the bubble home with you would be very difficult to realise, it would be too expensive to replace every time people went by. Still the goal has not changed for this concept.



Picture 6: The poster that came with the 'Social Bubbles' concept.

ITERATIONS

Iteration 2: Social Light

Social Light is a lighting system that enables families with children aged between 15 and 20 years old to increase the social interaction. This by creating a conversation starter when silences fall while having dinner in a middle-class restaurant (Overall results). The goal of the project was to improve the social experience and social interaction between family members during dinner in a middle-class restaurant.

Ideation

Due to the difficulties that we could not manage to find a solution for, we came up with a final idea. We wanted to stay with the 'hanging lamp' concept where something and aswell the goal stayed the same. Several ideas were made with the help of assignments from the book Tinker Toys by Michael Michalko but the ideas were not fitting the project goal as we wanted. A following team brainstorm session lead to the new idea coming from the idea of fireflies flying around in a flock above the table. To reach this we wanted to hang all small LED's from the ceiling down and making them flicker. The idea from this concept is when people stop talking, the lamp can hear this and chooses someone to talk, it does this by flickering above this person's head and giving him/her a subject by changing into a certain color. Where, for example, yellow stands for talking about your favorite holidays.

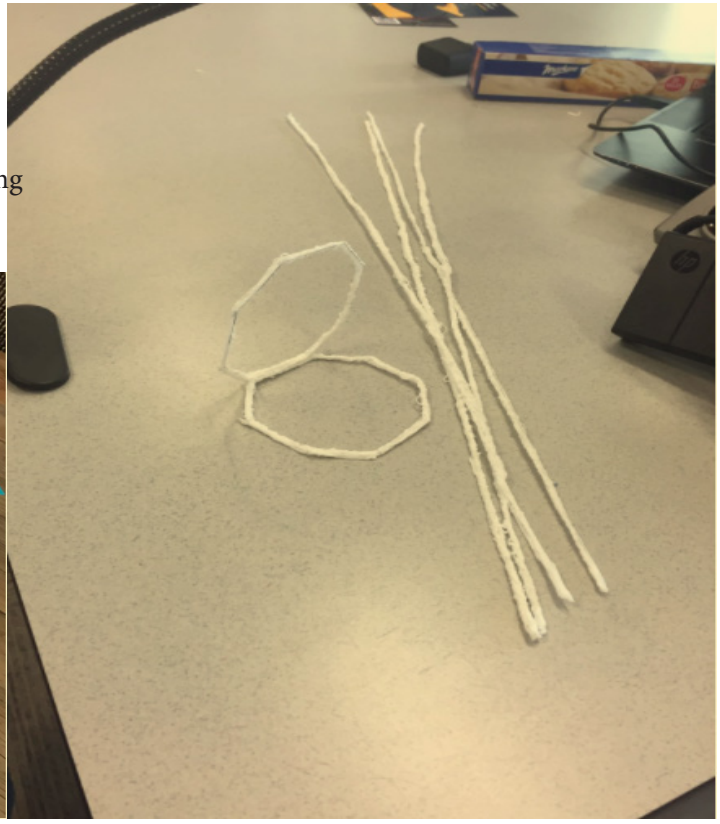
ITERATIONS

User tests , Paper prototype & Conceptualization

After doing user test (Appendix-II) a last change of the concept was made. We made the paper prototype approximately 60 cm wide, we thought this would be too small but working with it people say that this is a good length for a lamp above the table and 4 persons working with it. Another change is because we noticed that the programming of a very large amount of LED's would be a lot of work. The new concept is a tube with a LEDstrip instead of all small lights hanging from the ceiling.The goal is again not changed in any way. Out of this concept a first prototype is made.(picture 8)

There is as well some feedback about designing the prototype so that you could expand a lamp with loose pieces to give room to 6 people instead of just 4 for example.

Picture 7: Paper prototype



Picture 8: Prototype pieces during building process

ITERATIONS

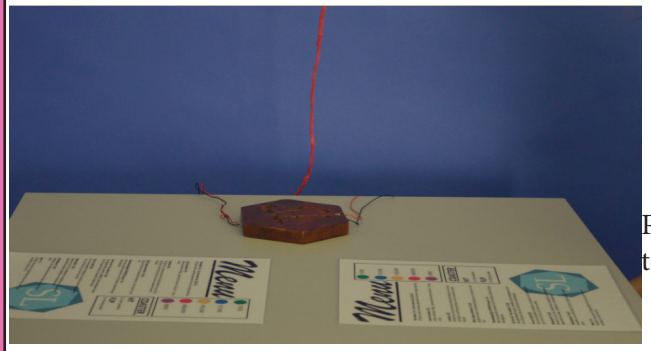
Realisation

3D pen

After the first time of working on the prototype with the 3D pen we thought the plastic that comes out of the pen wasn't sturdy enough. It bended very easily. We had to come up with a new material to use because continuing this way of prototyping could cost us a lot of time, a lot of plastic wires that go into the pen and the risk of the actual prototype being too flexible and would bend when hanging from the ceiling. We did a lot of research to kinds of plastic and what the best material was to use. The criteria we had was that it should be, sturdy, not completely transparent (so you could not literally see the LEDstrip) and should not be very expensive. During one of the coach meetings we saw another group that had the material we thought we needed. They told us that is was vivak so we started using this material.

Designing the interaction

After this coach meeting, when we introduced the new concept to the coaches our feedback was that we should come up with something nicer than just a button to control the lamp. So after a brainstorm session we came up with coasters. Every dining member would have its own coaster and with that they could, by hitting it, make the lamp go pick another person and by turning it to the other side you would turn the lamp to dining mode. These gestures should be done by all of the members at the same time.
Because it would be difficult for people to stay focused at all time during dinner and maybe the turning could cause confusion we thought it would be better to only use one coaster in the middle of the table. This would as well save a lot of space on the table. With this we mean that when everyone has its own coaster on the table you would have for example 4 coasters together with plates, glasses, cutlery and maybe a small table which makes the table very full. But in the usually there is an empty space in the middle of the table where no one places something because it feels like nobody's area on the table. We thought this area was a good place for the coaster to lay and with the coaster you could control the lamp.(figure 9)



Picture 9: The coaster of the final prototype

ITERATIONS

Final prototyping

Working with the Vivak went well, it was cut with the laser cutting machine. The cut pieces were sanded by hand because the were transparent but we needed a blurry surface so the light would be spread out and not stay just a dot as a LED. After we had all the pieces (seen on picture 10) we glued it together with hot glue. Afterwards this would have been done different, the glue gave a lot of ugly edges (seen on picture 11) because you could see the glue through the Vivak. A better way had been to make it hot and fold the plastic in shape. To get rid of the glue leftovers we used a Stanley knife and cut it away, this worked fine but was very time consuming.

The last thing we did was cutting holes in the Vivak to make the wires leave the prototype neatly and for the fishing wire to leave hang the lamp from the ceiling. We chose the fishing wire to make it look like the lamp was floating above the table.

During the final prototyping nothing changed within the goal of the concept.

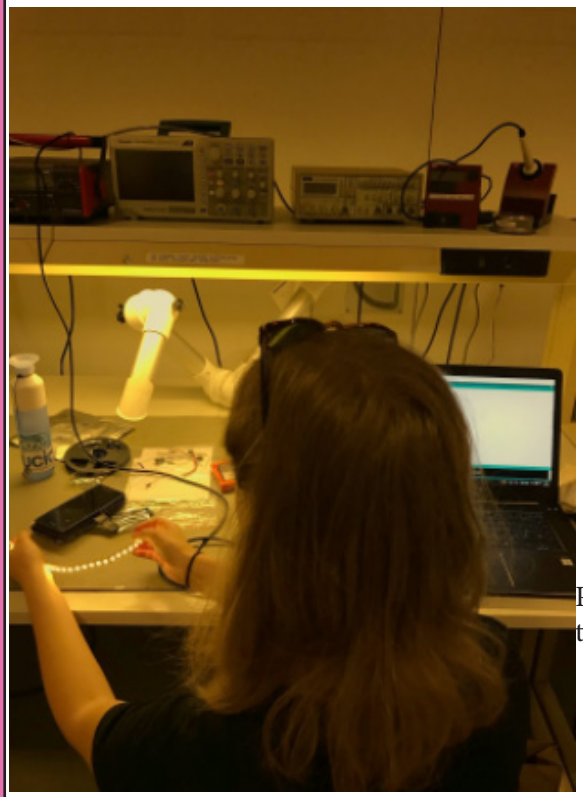
Picture 10:The loose pieces of vivak for the prototype.

Picture 11: glue edges

ITERATIONS

Coding

Simultaneously with the prototyping the technical aspects of the Social Light were developed. An LED-strip was bought to create the light functions we wanted to start up the conversation. We had to start from scratch because none of the coders, Mirthe and Veerle, had much experience with coding an LED-strip. Tom Groot, a first year student who also did a project within Turn Up The Lights, helped us with the structure of the code and some complex variables as “counters”. To improve the functions of the LED-strip and to add some, for example “play mode”, we had to analyze the complex code made by Tom. We managed this by trial & error and asking help from experts at D-search lab and e-lucid.

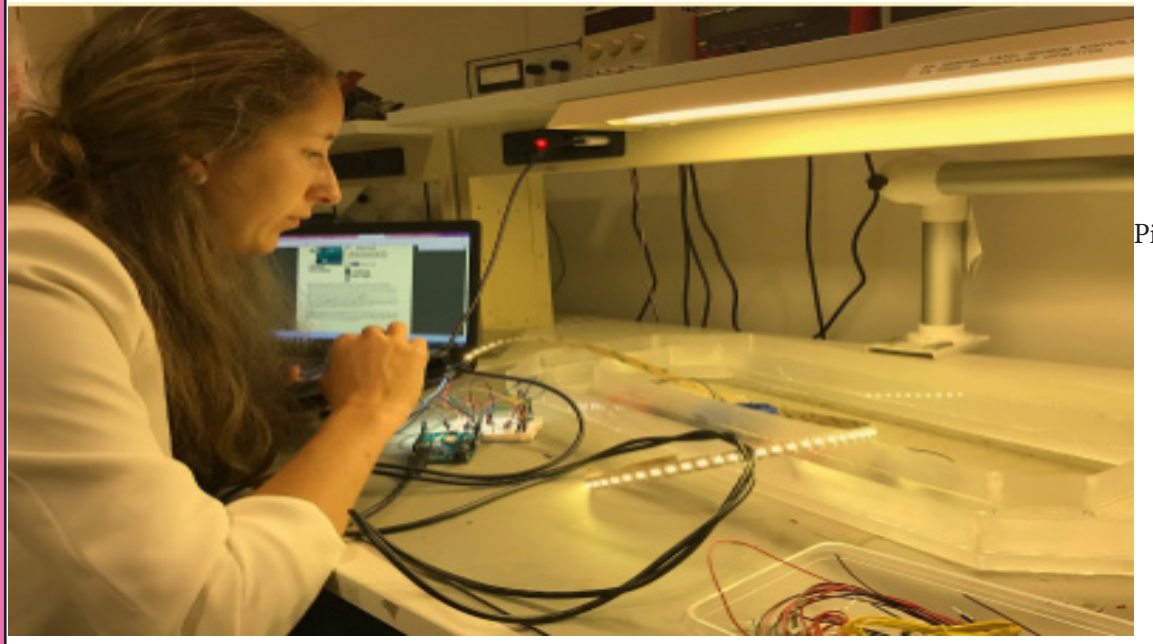


Picture 12: Veerle working on prototype

ITERATIONS

Electronic components

To turn the interaction with the coaster, turning for dinner mode and slapping for play mode, into electronics we used a light sensor and a button. We chose for those components to save time because a lot of time was already spent on coding the LED strip. With the use of these 2 components we would still be able to convey the intended interaction on the Demo Day. The light sensor was placed on one side of the wooden coaster and the button on the other side. When the coaster would be turned by the dinner members, the light sensor would be covered and the LED-strip would go to dinner mode which means all the LEDs having a yellowish color. When the coaster would be slapped the button would be pressed-in and turn on play mode. Play mode means that a walking LED and LED area would be activated by the user itself to choose a new person who has to talk together with a new conversation topic.

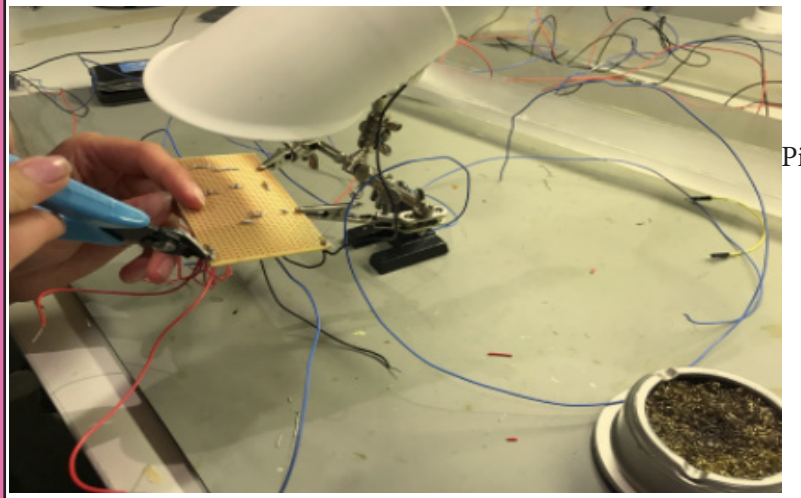


Picture 12: Mirthe doing electronics

ITERATIONS

Soldering

After the code was finalized the components were soldered onto a printboard. This only caused problems with the conductivity of the wires because some were not soldered precisely enough. That is why all the components were taken out the printboard and put into a normal bread board.



Picture 13: soldering components

ITERATIONS

Capacitor & Resistor

Even after this the LED-strip did not function properly. All LEDs turned blue and some more colors simultaneously instead of yellow. After help from experts at D-search lab and e-lucid we added an electrolytic capacitor to the bread board and a 470 Ohm resistor to transport away some current to prevent an overcharge of the LED-strip. That worked.

ITERATIONS

Demo Day

After final prototyping was completed we were able to present a working prototype at the Demo Day. Because of difficulties in the realisation phase no time was left to do final user tests. That was why we created a restaurant setting with Social Light hanging above at the Demo Day to test the social experience with visitors (Appendix-II). Feedback is used in the section “conclusions”.

Conclusion

Feedback obtained and the user tests with some visitors at the Demo Day showed us that Social Light definitely works to start a conversation and to better connect family members. One of the visitors said after trying out Social Light “wow it really works!”. The shape and the material of the lamp was loved by many visitors. They also liked the fact that it looked like Social Light was floating above the table. Some improvements mentioned were adding more colors, so more conversation topics because it happened that the same people had to tell about the same. There was also one complaint about the fact that awkward silences do not always have to be bad and that we could better use the lamp for situations in which you really want people to talk to you. For example, when a project group is brainstorming and there has been no input from a specific person yet then the coaster could be slapped to select that person to give input. So it can be concluded that the concept is positively assessed by the visitors but improvements could be made.

Picture 14: Demo day

OVERALL RESULTS

Overall results

In the sections “process” and “iterations” written above it can be seen that we went from a vague idea into a refined and user tested design. The final outcome of the project is Social Light. A lighting system that improves the social interaction and experience family members have when going out for dinner in a middle class restaurant (see picture).

In this movie it is able to see the functions of the final design: https://vimeo.com/221649224

OVERALL RESULTS

Social experience can be described to us as an experience in which conversations are being enhanced. Families are being reconnected and stronger relationships with each other are created.The dinner members do not have to be in a conversation non-stop but only when being bored. Social experience also includes having a conversation about the restaurant visit after families have been there.

After extensive research was done by means of literature research, observations, user interviews and questionnaires a final target group of youngsters aged between 15 and 20 years old was chosen to design for. These youngsters use their smartphones a lot when having dinner although dinner is meant to be a social occasion.
A questionnaire about a restaurant visit with 106 responds, among them 63.8% youngsters aged between 14 and 20 years old, shows that 75.3% of them uses smartphone while having dinner. 34.2 % of them answers the incoming messages. Mentioned reasons for this are mainly fear of missing something important, parents that use their phones as well, killing the time and a feeling of being available. We want to involve the youngsters more actively in family conversations and getting them into the social moment and out of their phones when having dinner. Feedback from user evaluations with low fidelity paper prototypes and later on with the final prototype leaded to a refined set of functionalities of Social Light.

OVERALL RESULTS

Social Light has a warm orangey/yellowish mood lighting as starting color. This because from the survey about the experience of lighting when dining in restaurants with 62 responds had the result that 74.2% likes ambient lighting in the way of lamps. Also 43.5% would rather have normal lighting and 37.1% would prefer candle light. When it comes to colors yellow and orange light are prefered.

When a silence is registered for about 1 minute Social Light will turn on an LED that walks around for one time above the heads of the dinner members to grab their attention and get them all in the moment. “This will already create something to talk about” according to feedback from Stijn Ebbers during the Demo Day. The color of the LED is already a preparation for the function that comes next.

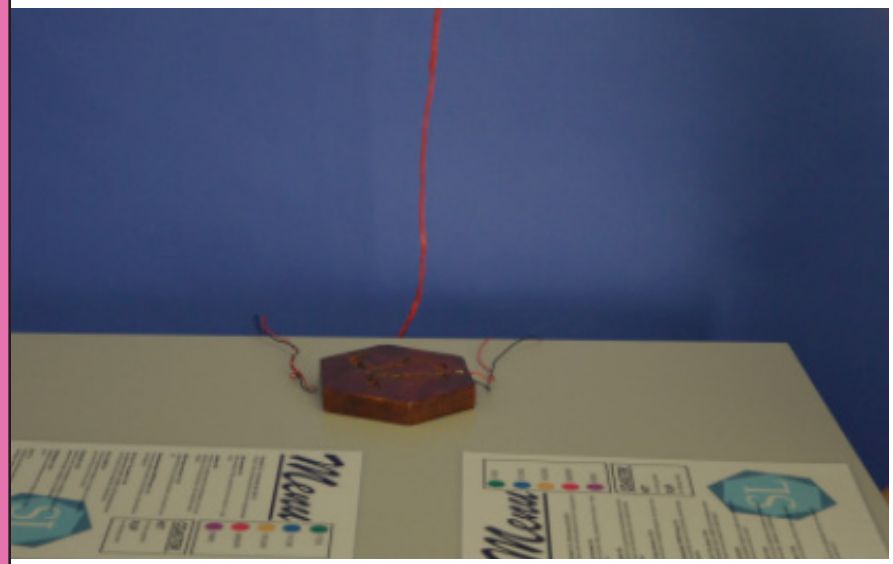
After the “walking LED” Social Light will select a dinner member who has to talk by lighting up an LED area in the same color as the “walking LED”. In this way the conversation can be started again in a kind of playful way. When sound is registered again, so a conversation is started, Social Light will turn back to warm orangey/yellowish mood lighting. Feedback from user evaluations with the paper prototype showed us that it would be good to add a function that enables the dinner members to select someone to talk and a conversation topic by themselves because sometimes a one-minute-silence is too long. “add a function for the fact that a dinner member can take the conversation. If he/she is willing to say something very important” according to Annette van Wijlen (mother,50). “Maybe you should make the user able to control the system maybe with a remote or a button to make the lamp only respond when pushing the button. When your conversation is not nice and give you bad feelings you don’t want to wait awkwardly for a minute but just skip immediately.” according to Lynn’s family members (see picture).

OVERALL RESULTS

That is why we made an interface, a wooden coaster laying in the middle of the table, for the users to switch modes of the Social Light. By slapping the wooden coaster the dinner member selects a new person and conversation topic, which happens randomly, that has to talk. In this way dinner members can be stimulated in a more active way to intervene in conversations or create conversations (see picture).

Not all feedback was positive. “I think you don’t need the lamp that much because I don’t see a lot of children your age using their smartphones instead of conversing with their parents.” according to Ruben’s mother (age). To cover those doubts we added a function that enables dinner members to choose the Social Light to stay in mood lighting the whole time. For this the coaster needs to be turned on the other side. This function can also be used when dinner is served because in that state of dinner silence because of eating is appreciated and there can already be talked about the food.

To conclude, feedback from participants in questionnaires, interviews, Demo Day experiment and so on shaped the realization of the Social Light and its functionalities.



CONCLUSIONS

All in all when looking back at the project goal and when taking the outcome, the project can be said to be successful. After doing user tests at the Demo day we received feedback. This firstly provided the answer that the demo day prototype activated the users to talk about a certain subject and to start the conversation. This also was meant to happen according to our project goal. Secondly we got feedback for improvements as can be found in the second appendix. Based on this we can set points of improvements for the future. These can also be found in the second appendix.

The users gave us feedback through surveys and user test and responded really well on the demo day. This makes us believe that we have succeeded our goal at least partially. Of course our product can still use a lot of improvements but for the short period of time we have gotten it makes a good start to a final applyable product in restaurants.

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APPENDIX I

Lynn Visser

This was my very first big project on the TU/e and it taught me a lot of new things. Not only about a process but also about me as a designer.
I improved some of my expertise areas for example my 'Creativity and Aesthetics' area. I learned making models with InDesign, not the formal ones but the attractive ones with colors and pictograms. I really like that. I also edited the last video, which wasn't a very big deal but even there I can say I improved myself. With taking pictures and looking for the right angle my group members asked most of the time for my opinion, how to make sure everything is seen on a picture because they thought I knew what would be best. I didn't but with a lot of trying and looking, I most of the time figured out what would work best.

Also my 'Technology and Realization' area is improved, together with Ruben I made the prototype. It consisted of a lot of difficult calculations with angles and stuff and I must say that Ruben did a lot of the calculations. But now I know how to laser cut something and how to use some of the machines. I learned about new materials and how to work with it. I learned from making mistakes like the glued edges. And I learned from my fellow students, asking what they would do in our situation. With this new knowledge I hope I can make an even better looking prototype for the next time.

The last improved area is 'User and Society'. I made a questionnaire and kept track on the results. By doing this I could see that a big group (around 100 responds) most of the time have kind of the same opinion. We did a lot with the questionnaire results. A thing I didn't do before was making a very detailed persona. First I did not see the value of it for our concept to improve but now I really think they are useful because they are the average person you are creating something for, you have to get to know them by writing very detailed. I would definitely use this in next projects.
Overall our research process could have been better, more detailed and more content but for now I feel like it was enough, we had the information we needed. For the future I would take more time for a good research process.

My 'Math, Data and Computing' area not improved, this is because I'm a bit scared of this area. Working with codes is something I am not good at and I should improve it but I always think the work given would be too hard for me to figure out. This project I passed the modeling part to my fellow students but in a next project I definitely will improve this area by helping during the process.

APPENDIX I

The design was hard to make, this was because we often got stuck on an idea because it was not realizable or just not what we wanted, we had to do several steps back and start over. This taught me that in a next group I want to brainstorm longer and visualize the ideas better, writing those down more detailed before picking one to go further with. When you don't that you don't know enough and just get stuck.
I really liked making a prototype but I am a perfectionist and wanted everything to be spot on. This is hard, it is our first time, you combine technology with a self-created 'casing' for it and everything has to fit to make it look professional. I really had a hard time with that, especially because of the impossible shape we chose to make and with the glue. I felt insecure about the prototype and even a bit ashamed, it could have been so much cleaner than it is right now. But after the demoday where people told us they really liked the looks of our prototype and the concept and some groups did not even have a (working) prototype I feel more proud about what we as a group has accomplished during the prototyping phase. We made a working prototype and could easily use it to show people our concept.

The collaboration and planning was good in our group. Everyone wanted to help and contribute in the process. Before we started a new week, we made a planning of what should be done that week and all the files are sorted on week number. Everything went very structured and I liked that to continue with next times. We most of the time divided the work equally and everyone delivered their work on time. First we had a little problem with Ruben being late or not deliver work with the best quality possible. I must say that, after we told him he had to contribute more/better, he really did. He did a lot for the prototype and took a lot of work out of our hands by for example helping Veerle and Mirthe with a mistake in the code or wires which they could not solve themselves. We as a group complemented each other, we all had our qualities and we knew each other's qualities so we could give the best fitting work to somebody. In my case I think the 'vision' part of things are my qualities, I made the posters and the prototype casing. I know how I want something to look and I am good with expressing myself. I also consider myself a little as the one that stayed positive in the group and tried to make the others feel less worried by saying that it would be alright and the shouldn't worry too much about it. I am a very optimistic person. Sometimes I did not feel like being on the same page, at these points I become quiet and you can see that I am annoyed, this is a bad property of myself. I should just say calmly what I feel should be different instead of wait until the very last moment. I like working very hard and fast so you can relax a little.

APPENDIX I

For me Veerle and Mirthe sometimes wanted too much. They wanted everything exactly as it should be. In my view they made several things too complicated and therefore spend much more time on something than I think is necessary. They often start to panic when something new is introduced that has to be delivered for example and where Ruben and I felt like this will be okay, they started worrying that we would not finish it in time before we even started. During this they could be very bossy to me and Ruben and and send commands to us which they expected us to follow immediately. I did not always felt like cooperate when they did like this. Although this isn't always a bad thing to have sometimes, you are pushed to work on your things and therefore deliver your things on time with good quality. The girls should not forget to think about themselves and take a little time to relax and do something they like. They will make it, even with relaxing. A last thing to say is that I really respect them of wanting to improve themselves by taking something they knew would be hard. They inspired me to try to do this in a next project as well.

APPENDIX I

Ruben Vreugdenhil

When starting to work on this project, I had a rough idea of what I wanted to create; an interactive, cool looking, useful addition to a restaurants lighting system. When we started thinking of possibilities in the ideation phase, we all came to very different conclusions about a product. I thought that we would stand at the start of a very difficult period as there were lots of discussions on which idea was better than the other. Personally, I found most of the ideas really interesting, only some of them actually grew out of the light concept and became more technological with touchscreens and interactions with that instead of focusing on light. This bothered me as I was quite sure that a part of the group would always try to include a more complicated feature into the easy design of lighting, but in the end I found these features actually interesting to use.

The collaboration in our little group was quite on point in the first few phases, as we all had tasks to complete in before every meeting, which we already held frequently at the start, and we discussed very efficiently about every idea and comment. When we came to the prototyping part before the midterm-demo day, we came across some problems with, for instance, me not appreciating the idea too much so that I would maybe not commit as hard to it as the rest of my team. This all came together in the very end, together with the evolution of our product, as I started liking working on the project and building a working prototype. All the work also became more and more organized as we all handled through our strengths. We divided all the work that had to be done in equal parts, being a physical prototype, electronics and coding the system. Personally I really enjoyed making a physical product as it helped me with my visualization of our final product, which made me more excited every time I went to the workshop
Our planning could have been a tad bit better as we started working on the prototype way too late, only a week in advance, due to unforeseen problems with laser cutting the material for our luminaire. Also, we went from one idea to the other, still in the last few weeks without having a clear deadline for a last idea choosing. Maybe next time I'd like to make that a habit.

I liked to work on the prototyping part as I wanted to improve my creativity and aesthetics competency. I've had some problems with this myself during the last year, so I really liked to make this geometrical shape. Maybe next time I could work on the business part of creating a product as that would really help me to blend into the business world of designing, which is where I am aiming to go at the moment.

Last things last, I just really enjoyed the project, and I am really proud of the end product, as it was truly a group effort to make it work and look great.

APPENDIX I

Veerle van Wijlen

This project is about making a lighting system for in a public space. After observations and user interviews me and my project group chose to design for dining families with children aged 15 to 20 years old in a middle-class restaurant. Social Light was the outcome of the project. A lighting system that improves social interaction and social experience between dining family members by means of creating conversation starters.

The design goal was to improve family conversations and social interaction between family members during dinner in a middle-class restaurant.
Me and my team used the Demo Day as a feedback moment to reflect on this goal by doing user tests with visitors to evaluate what their experience was with Social Light. When looking at the feedback (Appendix-II) I think that we reached the design goal. A lot of visitors liked the concept and understood why we made it in this way. Also some of the participants of the user test ended up in deepened conversations because of Social Light. One of my doubting points regarding to the design was that we try to get away awkward silences. But awkward silences do not have to be a bad thing. It can lead to innovative choices like creating a more original conversation topic or to a moment to think. Also the fact that families go out for dinner often in special occasions and already may have something to talk about causes some doubts for me. But overall, also when reflecting on the user feedback, I think the design fits the project goal and fits the needs of our target group which is important to me.

Regarding to my development in the competencies I would like to focus on the ones I developed most during this project.

With respect to the competency of Design and Research Processes I learned a new variation of a user-centered design process. The project coach Yaliang suggested all of us to work according to design process described in the Ideo Toolkit. This process started off with two phases “discovery” and “interpretation” that required me to do extensive user research already in the beginning. Compared to the course user-centered design this was a broader user research phase. After these two phases I made a design thesis even before the ideation phase. This learned me that it is important to clearly state what I want to design and what my project goal is and to reflect continuously on this as basis of the process. I want to take that with me in the next design projects.

APPENDIX I

In the second semester I wanted to deepen my programming skills and knowledge on electronic components. This means development in the area of Technology & Realization. I did that partly by attending the course Creative Electronics and partly by doing the technical aspects of the final prototype of Social Light. During the realization phase of the design project I programmed the functions of the button (play mode) and of the light sensor (dinner mode) to activate the LED-strip. Before I could do that Tom Groot, first year Industrial Design student at TU/e, helped me to code the normal mode of the LED-strip. After analyzing his quite complex code, from which I learned to work with variables for time and iteration steps, I had a structure in which I could add my code. I learned by work of others and trial & error. When the code was finalized and all the components were connected correctly to the Arduino and into the bread board the LED-strip still did not want to work because of a current overload. I learned to always use isolation tape and to read the Neopixel Uberguide for the right connection of a capacitor and a resistor to transfer some current away from the LED-strip. I will definitely take this with me in next projects to make more safe electronic circuits. I also noticed that I still was not able to calculate on complex electronic circuits which I really need to connect components with the right values, a 470 Ohm resistor for example. That is what I would like to learn next year in the course Making sense of sensors and in upcoming projects.

The last expertise area I would like to reflect on is User & Society. In this project I learned to gain insight in a possible target group and a possible design problem by doing observations in restaurants on light experience and restaurant visitor behavior. Together with interviews with other stakeholders as bartenders I gained enough knowledge to set a temporary target group. I used questionnaires to evaluate if the design problem set after the observations and interviews was really there among the set target group. I learned to do extensive user research already at the beginning of the project to have a goal to work towards. Satisfying the needs of the target group. I also learned some new techniques to implement the user into the ideation phase which was making a “customer journey”. With this technique I learned to describe the steps users take into the context I would like to design for. By using this I was better able to make a storyboard and it was more clear to me where gaps were in a certain timeline where the user needed a design. I would like to take that with me in future projects to create a better link between the user and the design concept.

APPENDIX I

The collaboration went well in our group. In the biggest part of the project until the realization phase of Social Light we did a lot of design activities together. For example, we brainstormed together by clustering post-its or by using the ideation techniques from the Tinker Toys book. In the realization phase of Social Light the tasks were divided along the areas of expertise each group member wanted to develop or deepen. Mirthe and I did the technical aspects coming with Social Light. Ruben and Lynn made the case of the lamp. Most of the discussions were caused by the fact that Mirthe and I expected Ruben and Lynn to be pro-active regarding to their tasks which they did not fulfill the way I wanted sometimes. There were also some problems with attendance at meetings. Ruben was in the first halve of the project often not able to attend meetings or somewhat later because of not well-argued reasons, for example. This caused annoyance to me. After taking these issues into discussion the situation improved and the collaboration went smoothly in the second halve.

Planning and organizing was one of the strengths of our group. I consider myself as manager in this project group because I kept an eye on the design process, in which phase we were and if the phase was fully rounded or if iterations were needed. I knew the next steps of the design process and had a full overview. I was also able to dive into detail and to organize meetings with agenda items which had to be addressed. When holding onto the agenda items the meetings went smoothly and were effective. Also because we learned to set a meeting goal, at the workshop “meeting skills”. Often to do lists were made to keep track of the tasks when we were working separately from each other, for example by checking if a team member already marked his/her part green in the to do list.

All in all, I developed most in the competencies of design and research processes, technology & realization and user & society. Collaboration went with ups and downs but planning and organizing was a team strength. In the future I would like to take with me the customer journey, learned programming skills, making a design challenge early in the process and the learned meeting skills.

APPENDIX I

Mirthe Visscher

When reflecting on this project I can say that I have learned a lot about my role in group projects.
First of all, during the project I found out that I am more of a leader than just a participater in the project group. This is because I tend to divide the different parts of the project and because I tend to ask people if they have done their part or not.

This brings me to the second thing I would like to look back to. The collaboration in our group was not always without friction. At one point Veerle and I felt like we were the only participants in the group with motivation let alone the will to get a good grade. Often Ruben en Lynn seemed to be wanting to go home as early as possible. Furthermore Ruben seemed to abolish his work or hand it in really late. This caused tension between the different group members. When reflecting on this I would certainly do it differntly in the furure. This is because Veerle and I only started to adress these group problems half way through the project. In the end we did get the collaboration wanted in a group project.

Some things I would do the same next year is the structure of our group files. Every part of the project and every single assignment was kept in a google drive in different maps. This made it easy to find things later on in the project.
Furthermore I wouuld also divide the group work as we did. With two people making the prototype and with two people doing the electronics. This prevented time stress and kept up our collaboration.
I would also make the big descisions at the beginning and not switch ideas three times as we did. This makes a better product since you can focus and spend more time researching one particular subject or area.

I learned different skills during this project but mostly I obtained knowledge about the process of a project. This includes brainstorming, exploring and doing research etc. Next to this I learned a lot about electronics. What to do with LED strips and how to work with different kind of sensors combined with an LED strip. However I did not develop in the competencies of business and entrepeneurship. I did learn new brain-storming methods and new aspects about users. This will all help me as a future designer to better my prototypes and better my products. Hopefully a future group project will also include a better collaboration from the beginning.

APPENDIX II

Results from questionnaires performed in the research phase of the design process

Restaurant lighting (Reacties) - Formulierreacties 1

Tijdstempel	Geslacht	Leeftijd	Gaat u wel eens uit eten?
14-3-2017 13:35:18	man	15-20	Ja, 1 keer per maand
14-3-2017 14:25:56	vrouw	15-20	Ja, 1 keer per maand
14-3-2017 20:12:26	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 14:59:52	vrouw	35 en ouder	Ja, 1 keer per maand
15-3-2017 15:02:29	vrouw	15-20	Ja, 1 keer per jaar
15-3-2017 15:02:48	man	20-35	Ja, 1 keer per maand
15-3-2017 15:07:06	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 15:08:17	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 15:12:24	man	15-20	Ja, 1 keer per week
15-3-2017 15:13:17	vrouw	20-35	Ja, 1 keer per maand
15-3-2017 15:16:26	vrouw	15-20	Ja, 1 keer per jaar
15-3-2017 15:16:54	man	15-20	Ja, 1 keer per maand
15-3-2017 15:19:49	vrouw	20-35	Ja, 1 keer per jaar
15-3-2017 15:21:30	man	15-20	Ja, 1 keer per maand
15-3-2017 15:36:45	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 15:37:20	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 15:38:55	vrouw	10-15	Ja, 1 keer per jaar
15-3-2017 15:40:45	vrouw	15-20	Ja, 1 keer per jaar
15-3-2017 15:41:27	man	15-20	Nee eigenlijk bijna nooit
15-3-2017 15:42:05	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 15:45:59	vrouw	10-15	Ja, 1 keer per maand
15-3-2017 15:49:34	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 15:51:54	vrouw	21-35	Ja, 1 keer per maand
15-3-2017 15:59:18	vrouw	15-20	Ja, 1 keer per week
15-3-2017 16:00:45	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 16:01:27	man	35 en ouder	Ja, 1 keer per maand
15-3-2017 16:04:51	man	15-20	Ja, 1 keer per jaar
15-3-2017 16:10:31	vrouw	15-20	Ja, 1 keer per jaar
15-3-2017 16:14:21	vrouw	15-20	Ja, 1 keer per jaar
15-3-2017 16:17:29	vrouw	15-20	Ja, 1 keer per week
15-3-2017 16:17:42	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 16:21:27	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 16:23:02	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 16:23:35	vrouw	15-20	Ja, 1 keer per maand
15-3-2017 16:31:46	man	15-20	Ja, 1 keer per maand

15-6-2017 14:57:23 1

Uw restaurant bezoek (Reacties) - Formulierreacties 1

Tijdstempel	1. Gender	2. Leeftijd
11-3-2017 17:54:43	Man	14-20 (ga verder bij vraag 13)
11-3-2017 17:55:31	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 17:56:30	Man	>21 (vraag 3 is de volgende)
11-3-2017 18:00:06	Man	>21 (vraag 3 is de volgende)
11-3-2017 18:05:27	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 18:05:57	Vrouw	>21 (vraag 3 is de volgende)
11-3-2017 18:11:47	Man	14-20 (ga verder bij vraag 13)
11-3-2017 18:13:32	Vrouw	>21 (vraag 3 is de volgende)
11-3-2017 18:16:58	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 18:28:34	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 18:29:00	Vrouw	>21 (vraag 3 is de volgende)
11-3-2017 18:35:18	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 18:38:18	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 18:44:54	Vrouw	>21 (vraag 3 is de volgende)
11-3-2017 18:50:02	Vrouw	>21 (vraag 3 is de volgende)
11-3-2017 18:51:00	Vrouw	>21 (vraag 3 is de volgende)
11-3-2017 18:53:26	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 18:53:50	Man	>21 (vraag 3 is de volgende)
11-3-2017 18:54:52	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 18:58:06	Man	14-20 (ga verder bij vraag 13)
11-3-2017 18:59:34	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:02:47	Man	>21 (vraag 3 is de volgende)
11-3-2017 19:11:54	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:16:35	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:18:01	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:28:38	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:29:55	Man	14-20 (ga verder bij vraag 13)
11-3-2017 19:30:08	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:34:18	Man	14-20 (ga verder bij vraag 13)
11-3-2017 19:36:52	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:38:07	Vrouw	14-20 (ga verder bij vraag 13)
11-3-2017 19:39:26	Vrouw	14-20 (ga verder bij vraag 13)

15-6-2017 16:02:59 1

Conclusion:

How the results from the questionnaires were taken into account in the functionalities of the design can be read in the section “overall results”.

APPENDIX II

User feedback from user test with paper prototype in the second conceptualization phase

For the paper prototype we used 4 different colours with the following code:

- Colourcode:
- Yellow: Holidays
- Green: Food
- Red: most valuable memory
- Blue: blanc

The tests have a two-minute-silence before the system reacts and gives you a conversation subject.

The following can be concluded from the user tests:

- Maybe you should make the user able to control te system maybe with a remote or a button to make the lamp only respond when pushing the button.
- When your conversation is not nice and give you bad feelings you don't want to wait awkwardly for a minute but just skip immediately.
- The duration of silence before the system reacts is too long. 2 minutes feels like a decade when you are being in an awkward silence.
- Some participants did not know what would happen to the light when they started talking again.
- Add a function for the fact that a dinner member can take the conversation, hoe zeg je dat haha, a kind of cheer function. If he/she is willing to say something very important
- The colors were good idea, but maybe we could add more of them, for more subtopics. Blue could be standing for news, sports or even work.
- One participant said that you would not need it that much because she did not see a lot of children in the age of the target group using their smartphones instead of conversing with their parents.
-

Conclusion:
How the results from the questionnaires were taken into account in the functionalities of the design can be read in the section "overall results".

APPENDIX II

User feedback from an experiment during the Demo Day

During the Demo Day we made a restaurant setting (see picture).
We invited visitors to participate in our user test by eating a piece of cake while the final prototype was hanging above the table. In this way we tested their social experience when the Social Light was in use.

Positive feedback:

- "It looks like the lamp is floating" - visitor Demo Day
- "Nice looking restaurant setting" - visitor Demo Day
- "You can already talk about the fact that something is happening above your head which is nice and could work" - Stijn Ebbers, Industrial Design student at TU/e
- "It really works"- first year Industrial Design student at TU/e
- "The shape really looks nice" - first year Industrial Design student at TU/e
- " A funny concept, really nice" - expert from D-search lab at department of Industrial Design at TU/e

Negative feedback:

- "An awkward silence does not necessarily need to be bad or a problem so why would you try to solve it?" - visitor Demo Day

Improvements:

- Indicate on the coaster which side stands for which interaction with Social Light
- Work still a bit on the aesthetics
- Glue the LED-strip on the top side of the lamp
- Use Social Light in places where people really need to talk, for example when people need to give their input during a brainstorm session
- It would be nice if you could choose your own conversation topics corresponding with the colors
- Better indicate who has to talk
- It would be nice if you could ask Social Light for questions as well
- Add some more conversation topics and thus colors
- The conversation topics may be more concrete. Future is for example quite global.
- Social Light does not need to change from conversation topic as fast as it did during the Demo Day

Conclusion:

There was more positive feedback than negative feedback but there is still a lot that can be improved. This can be assumed as logically because a design can always be improved and every one has a different opinions. One of the most important points of improvement is adding colors and thus conversation topics, make conversation topics more concrete and maybe think about some other contexts in which Social Light could be used better.

APPENDIX III

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:
Families with conversational problems in restaurants	Group 9 "Turn up the lights" ;Ruben Vreugdenhil, Mirthe Visscher, Lynn Visser & Veerle van Willen	13-6-2017	1

Key Partners:

Light developers like Philips, Ambianti, etc.

Restaurant owners who want to introduce a new kind of dining to their public.

Families who experience problems with their social interaction with one another.

Key Activities

The product will enhance social interaction throughout diner by giving users an example and opportunity to speak about topics to their families, which they will have memories about for the rest of the evening and life.

Key Resources

Blurry Vivak (or any kind of plexyglass) does distribute the light of the lamp towards the table and making a connection with the dining members. The other parts consist of electronics like an LED (strong enough to make the light reach the table), Arduino and cables.

Value Propositions

Customer Relationships

The diner members are related to the restaurant owners as they are the users of the products, and the owners supply the it..

Channels

Customer Segments

Cost Structure

The costs for our product consist out of:

Luminar material, Lights, Further electronics to guide the system (sound sensors, tilt-motion sensors, piezo electric sensors, etc.) This will all be affordable for the general public of restaurant owners

Revenue Streams

Our revenu stream will mostly be the sale of the lighting system to either restaurants straight, to distribution companies, or even to companies like Philips for them to improve on the idea and then sell it. This will all outway the costs as the systems will only have to be made on request, so no further costs can stand in the way of revenue.