Flow: Contextual Information Exchange

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Contextual Information Exchange

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Theme: Across Realities

Introduction

"The non face-to-face communication of social and emotional experiences between people now happens through phone or other media like e-mail, IM (instant messaging), webcam (e.g. Skype) and other virtual communities such as Second Life. In the communication these experiences the context it has happened in pays an important role. Neither the technology nor our way of describing enables us to communicate this context, in such a way that it can be "experienced" by the others, you can only imagine."

This project is about designing something to tackle this issue. The project was built up of three iterations of three, four and seven weeks respectively. For every iteration, a complete design cycle was done.

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SILHOUETTES

Iteration 1

Introduction

For the first iteration it was important to find out what the project was actually about, since it wasn't clear at all from the start. This meant researching what context actually was and exploring basic concepts to get a feel of the project as a whole. This was the only iteration we did as a group, the later iterations were done individually. It ran for 3 weeks.

Research

We started off by defining some research questions: What is context? What is the value of context? How did the master-students approach the project? Papers were researched to find definitions of context and to get a basic grasp on the subject. The reports of two master students, who had previously done the same project, were read to find out how they took on different parts of the project. Examples of similar existing designs were also researched. This was all summarized for a clear overview of what everyone had researched.
After this literature study, we set out to explore context in a creative way. A collage was made from random photos from magazines. The photos were grouped in categories and were labelled with important values the context can have to people. We also thought of different factors that define the context. All this data was put into a matrix and analysed based on different scenarios. This resulted into an overview of which categories were most interesting to design for, their most important values and which factors influence the experience of that context category the most. Now an overview was made of the most interesting possibilities and a direction was chosen.

	one scenario							
	two scenarios	Factors						
Categories	Values	Sounds	Visuals	Motion	Environmental Experience (sensorial)	Emotional Atmosphere	Personal status/ Activity Awareness	Social load
Family/ Relationship	Love							
	Secure							
	Intimacy							
	Appreciation							
	Support							
Work	Skills							
	Improving							
	Self-actualizing							
	Adapting							
	Controlling							
Leisure	Enegizing							
	Relaxing							
	Enjoying							
	Self-releasing							
Social	Communicating							
	Involving							
	Sharing							
	Bonding							
Home	Living							
	Reassuring							
	Recharging							
	Privacy							
	Central							
	Familiar							
	Comfort zone							
Travel	Freedom							
	Ongoing							
	Exploring							
	Transporting							
	Rejoining & Separation							

Problem defining

Based on the research results of both the literature study and the creative sessions, we settled on the following problem statement:
"How can we share the experience of enjoyment and relaxation of leisure through visuals, motions and environmental sensorial experience?"
From this we began brainstorming ideas.

Ideation

Several techniques from the book *Thinkertoys* were used for brainstorming (Brutethink and Lotus blossom). This resulted in over 50 ideas. We selected the best ones in a voting round based on the research results and intuition. From there we combined some ideas and narrowed it down to a single idea, where people can see what's going on inside the building based on visuals on the outside.

Concept

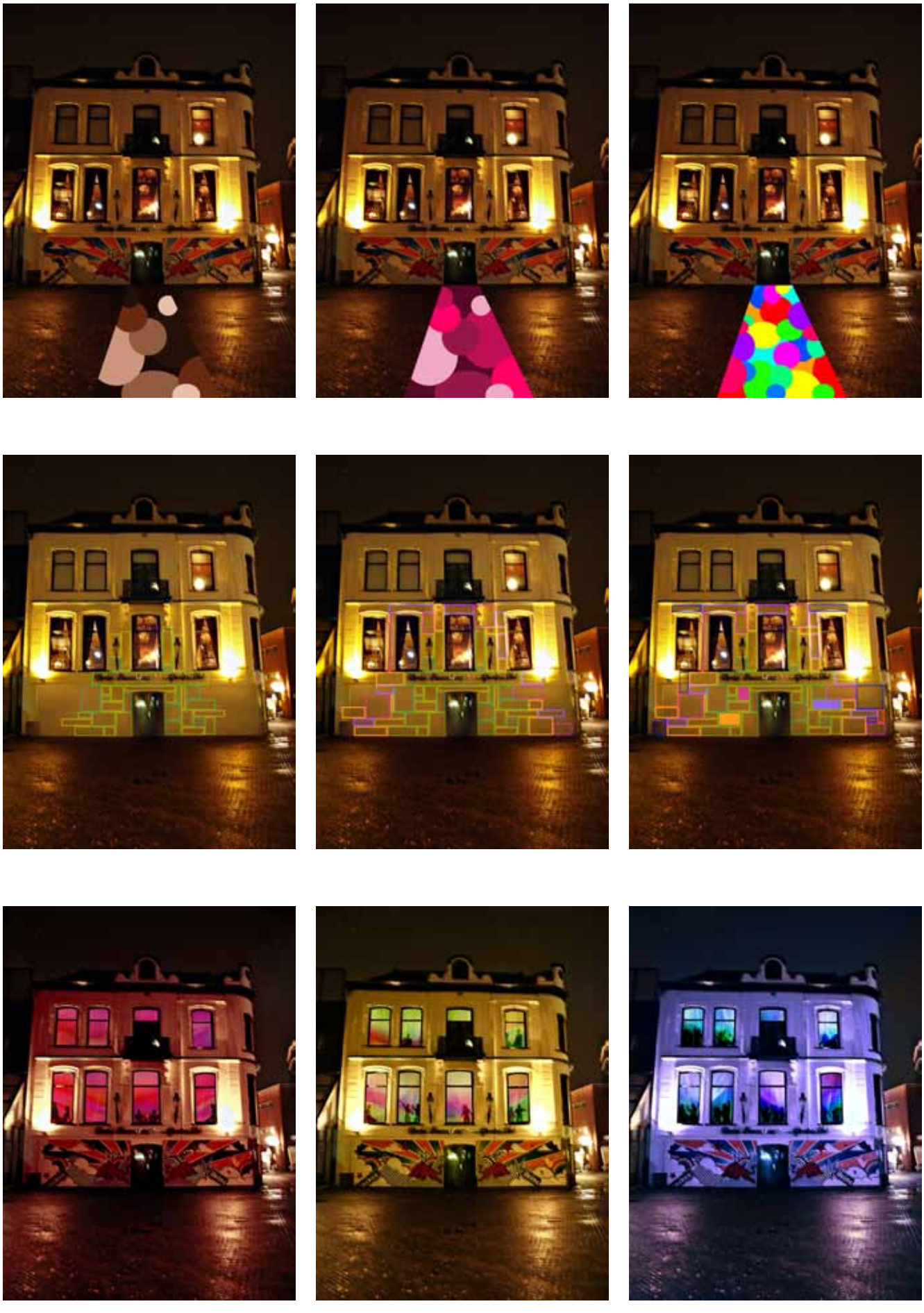
A building (Drie Gezusters) was selected to base the concept on and four variations were made.

Paths
Here a holographic pathway leads towards the door. The activities and movements inside the building are translated into a pattern of coloured circles on the path.

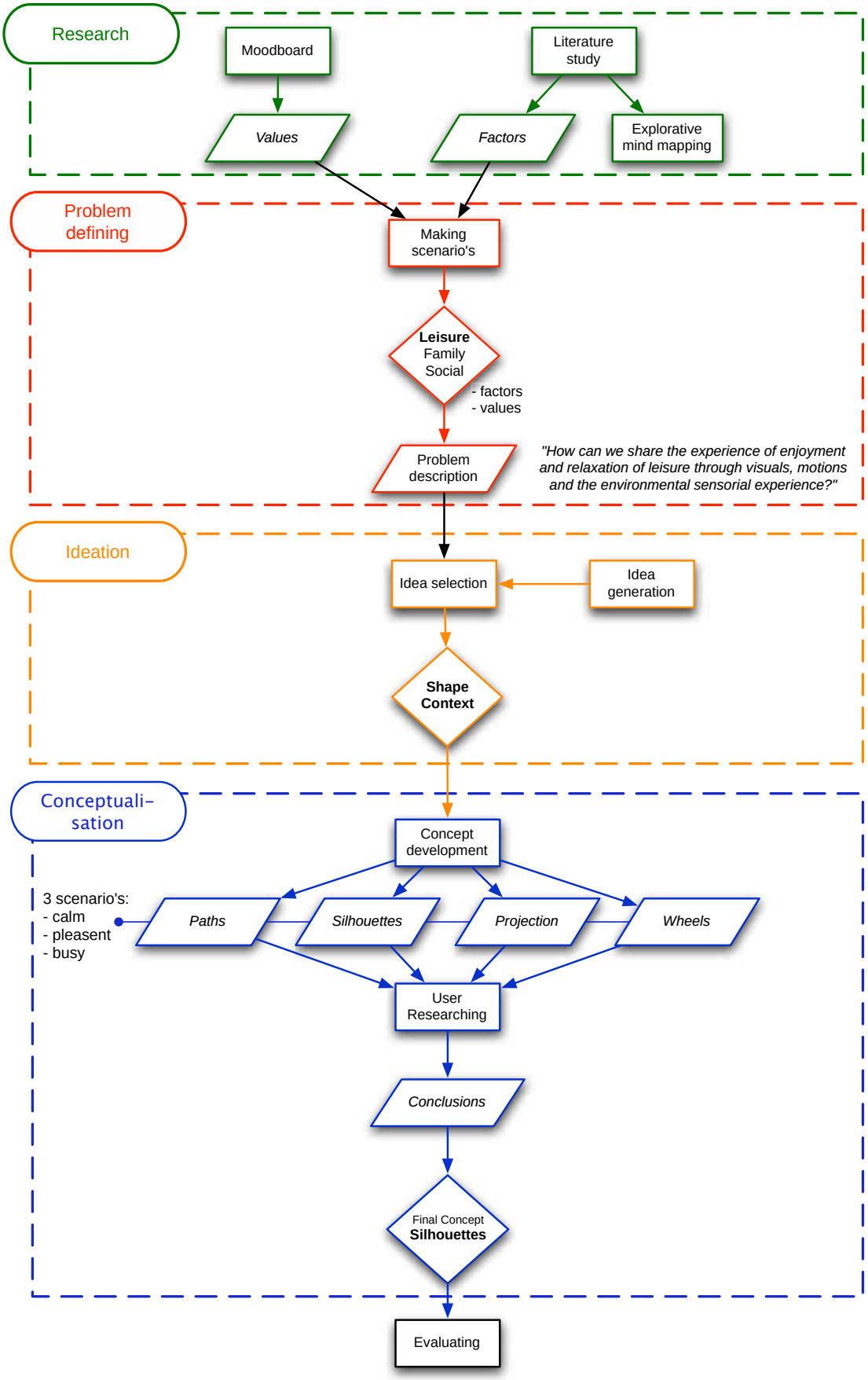
Projection
In this variation the context of the inside is visualized through patterns on the outside walls. A varying amount of coloured blocks make up the pattern that is projected onto the outside.

Wheels
Here physical wheels are used to communicate the type of music played inside. The direction and speed of rotation are the variables in this case.

Silhouettes
In the final variation, the windows of the building are replaced by artificial ones. Moving silhouettes of people are projected onto a dynamically coloured background in the windows. The silhouettes give an indication of the amount of people inside and what they are doing and the colours are linked to the type of music played. The overall lighting colour of the building also changes according to this.
Through a user test, where people were asked to identify what was going on inside the building based on the pictures



Process - Iteration 1



ATMO SPHERES

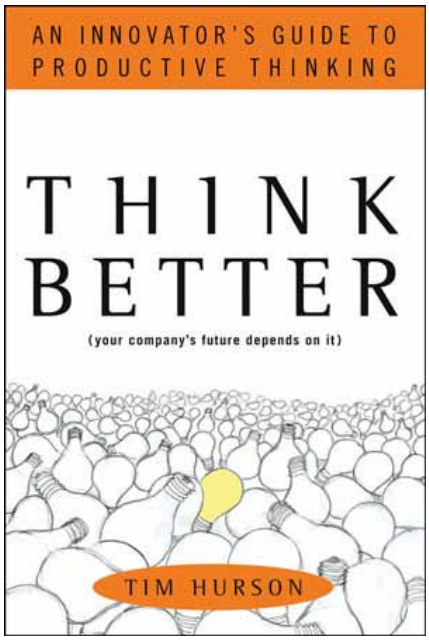
Iteration 2

Introduction

In this iteration, the focus laid more in the research-phase. I also wanted to take a new approach towards the design process, for which the book *Think Better* was used. An extensive brainstorm was also done, for which new techniques were use. However, a fully working prototype was also made in the final week of the iteration. This iteration was 4 weeks

Research

Through the research of the first iteration, it became a lot clearer what context actually is. Therefore, it was easier to find relevant papers on the subject and subjects closely related. It also meant more focused research.
The project *Contextual Information Exchange* was divided into three main subjects: *Context, Experience* and *Communication*. Every main subject was analysed for keywords and papers were found and read on those terms. The most relevant information was summarized visually and clearly into a type of mind map. This way, the links between different terms became clear. It also became very easy to find the information you were looking for. Following is a short explanation of the three main subjects. The papers that were used can be seen in the References.



Context

This subject was actually mainly a summary of the research done in iteration 1. It includes a definition of context, the different *factors* and *categories* we came up with and also a newly researched part on *context awareness* (hardware level).

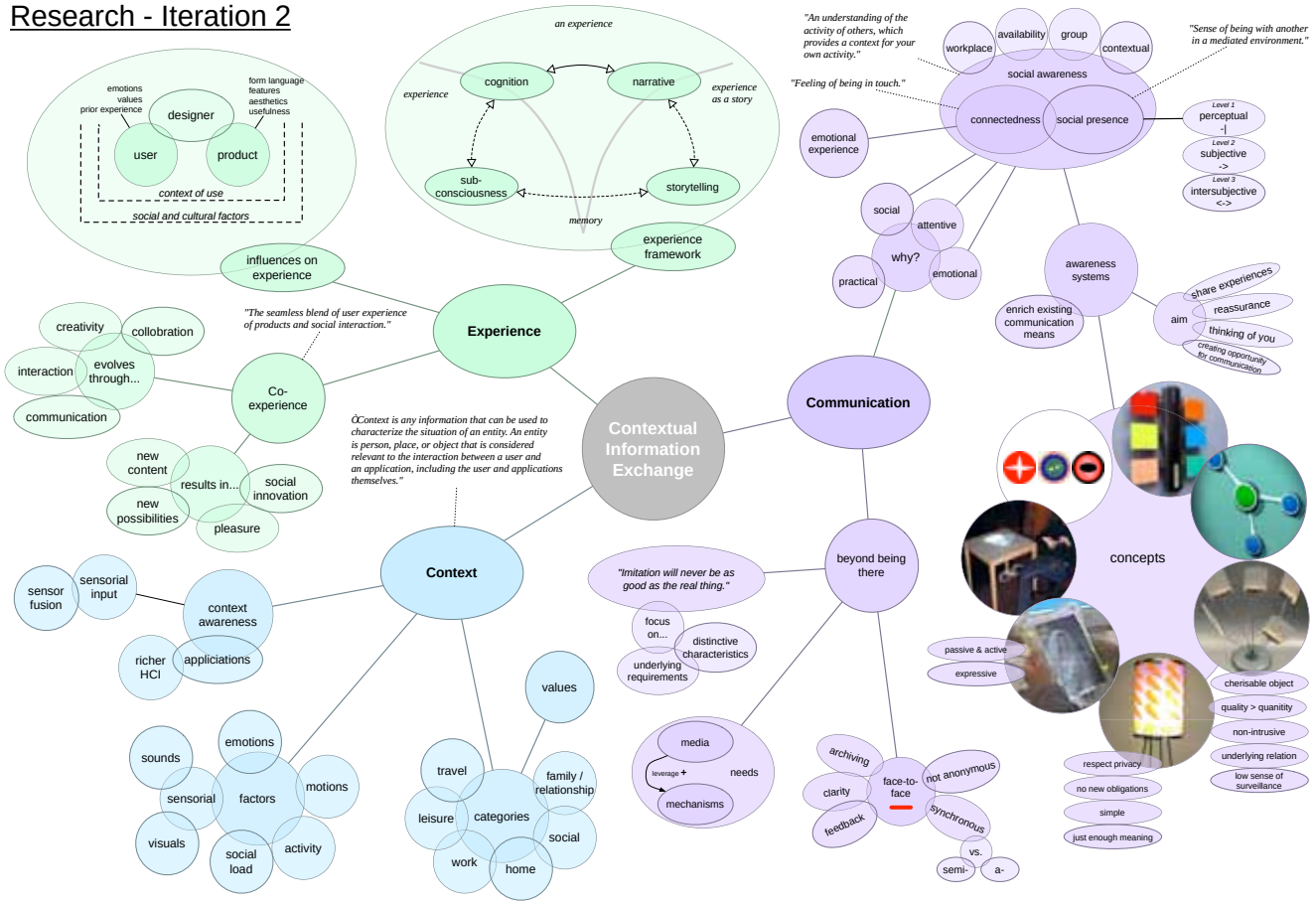
Experience

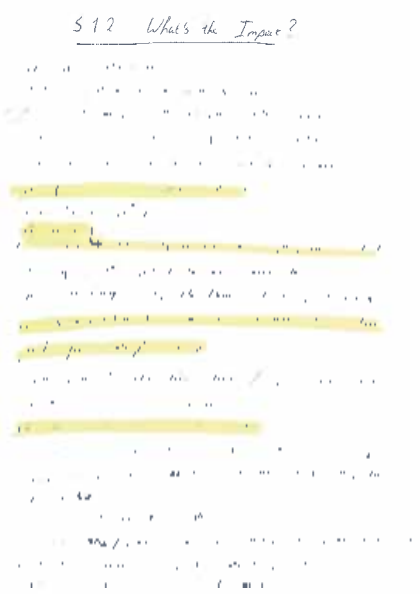
In this subject, it was researched what *influences* the experience someone has. Also, different *kinds of experiences* were analysed and applied to what most fitted this project. Finally, the term *co-experience* was explored, which could be a stepping stone to the creation of a design that stimulates contextual co-experience.

Communication

The subject on communication was researched the most extensively, because it felt important to know for this project why people really communicate with each other. The why was explored through terms as *connectedness*, *social presence* and *social awareness*. Different *awareness systems* that had already been designed and tested were also analysed. The findings of these researchers really helped in defining requirements for the project later on. It also helped for inspiration. The separate subject on *beyond being there* was also extremely relevant for the project. The main point was that imitation will never be as good as the real thing, as in that one should not try to imitate face-to-face communication but rather focus on underlying requirements and distinctive characteristic to successfully design a new communication system.

Research - Iteration 2





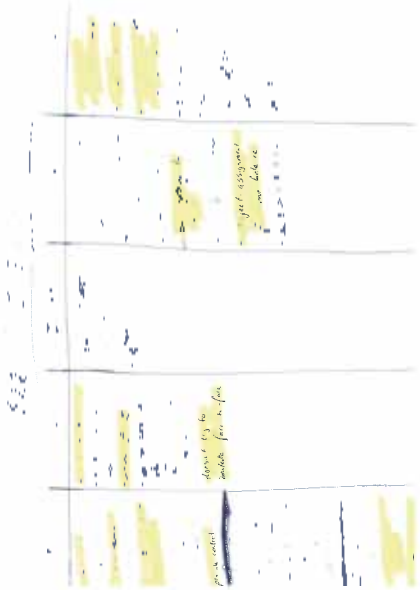
Problem defining

After research, the book *Think Better* was used extensively for what is called problem defining and brainstorming in a 'normal' design cycle. In the process described in this book, these are seamlessly interwoven. The process is divided into six steps. For the project, steps 1 to 5 were completely done. Step 6 was about creating a plan for execution (prototyping), but was only relevant for larger projects. The main concept of the book is that it uses divergent thinking to make long lists of possible solutions, after which convergent thinking is used to make choices. It also stresses the 'magic of the third third', forcing continuation of brainstorming even when it seems inspiration had run dry. Most creative results come in the final parts of a brainstorm session.

Step 1: What's going on?

This step is probably the most important and extensive step. It focuses on exploring the issue in great detail. It consists of five questions:

1. What's the itch? List what needs fixing or improving.
2. What's the impact? Explore how the issue affects people.
3. What's the information? Examine the information known and unknown.
4. Who's involved? List stakeholders and their stake.
5. What's the vision? Creating a powerful Target Future, the goal that is to be achieved.



Step 2: What's success?

This step consists of two substeps. Firstly, one sets a robust image of a future in which the issue is resolved. This can be seen as an ideal scenario of the design in use. Secondly, a tool named DRIVE is used to define success criteria (similar to requirements). DRIVE stands for Do, Restrictions, Investment, Values and Essential outcomes. Lists are brainstormed for every category and the most relevant results are selected.

Step 3: What's the question?

This step can be seen as the forming of a problem statement. The previous steps are used to form the essential question that should be answered to form the Target Future. For the project, the final question that was selected was:

"How can I increase the sense of connectedness through personalizable, unobtrusive contextual communication without added obligations to the users?"

Ideation

Step 4: Generate answers

This step is the idea generation phase of the process. For this, multiple techniques were used from the book *Thinker-toys.* Over 75 ideas were generated and clustered. Ideas of different clusters were combined to form totally new ideas. Eventually, clusters were selected to focus on for further brainstorming. The selections were based on information from previous steps.

Step 5: Forge the solution

In the final step that was done, the ideas with the most potential were extended upon and re-evaluated based on all the information gathered from the previous steps. From this came the basic idea of *atmoSpheres*, which was then developed further into a concept.

Concept

AtmoSpheres is a lamp consisting of spheres that are hung from the ceiling. Each sphere represents a certain room from a remotely located home. The placement and light effects of each sphere communicate the context of its connected room. The point is that the local user knows which sphere is connected to which room and which remote home is used as input, including the people living there. By looking at the lamp, a user can imagine the inside context of that remote home.

For instance, if a sphere is in a lowered position, it means there are people in that particular room. The lower, the more people. The speed of the light-pulse represents the amount of activity in that room (higher speed equaling more activity). The colour and size of the sphere help in identifying a room (it is always the same for a particular sphere).

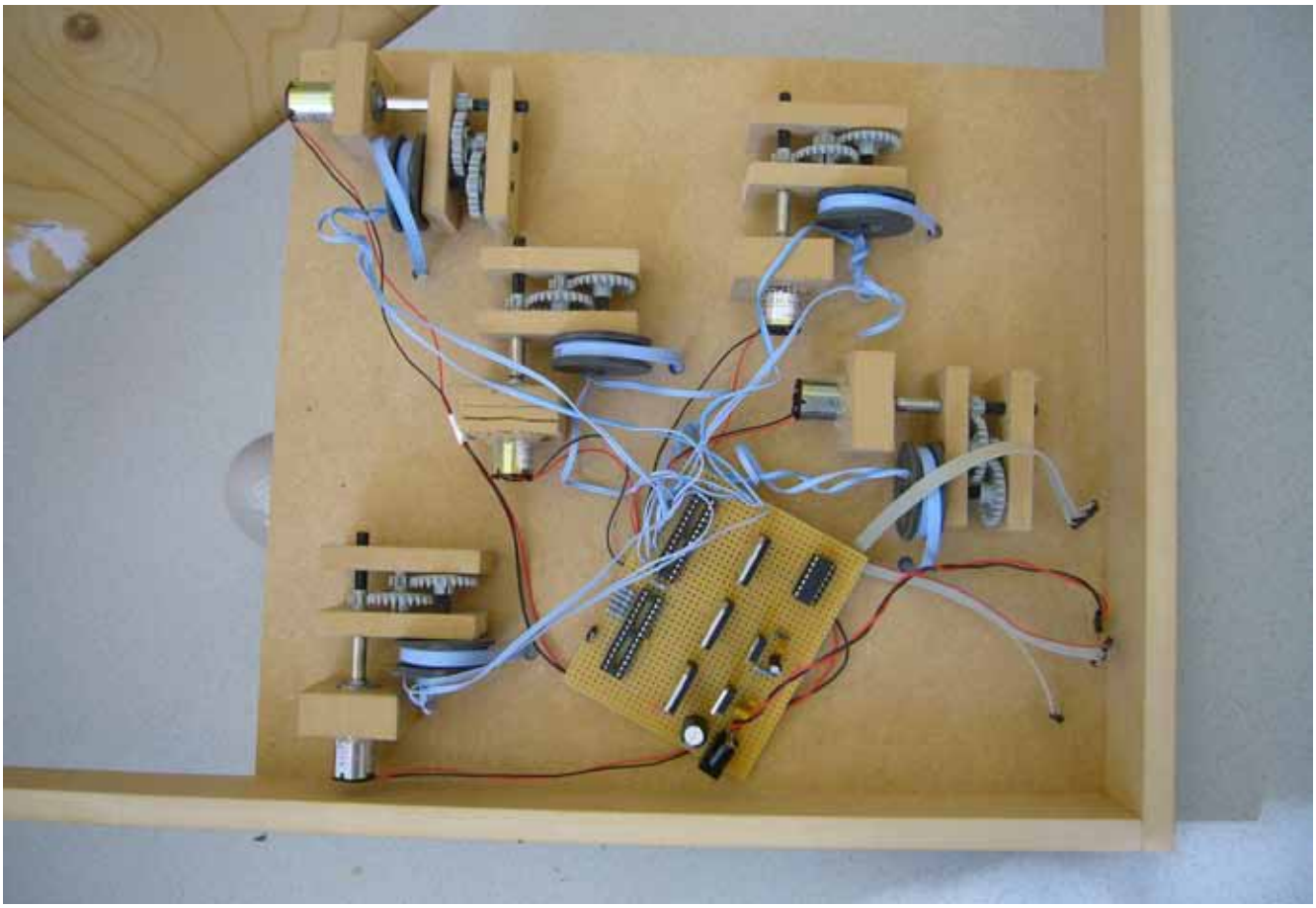
Prototyping

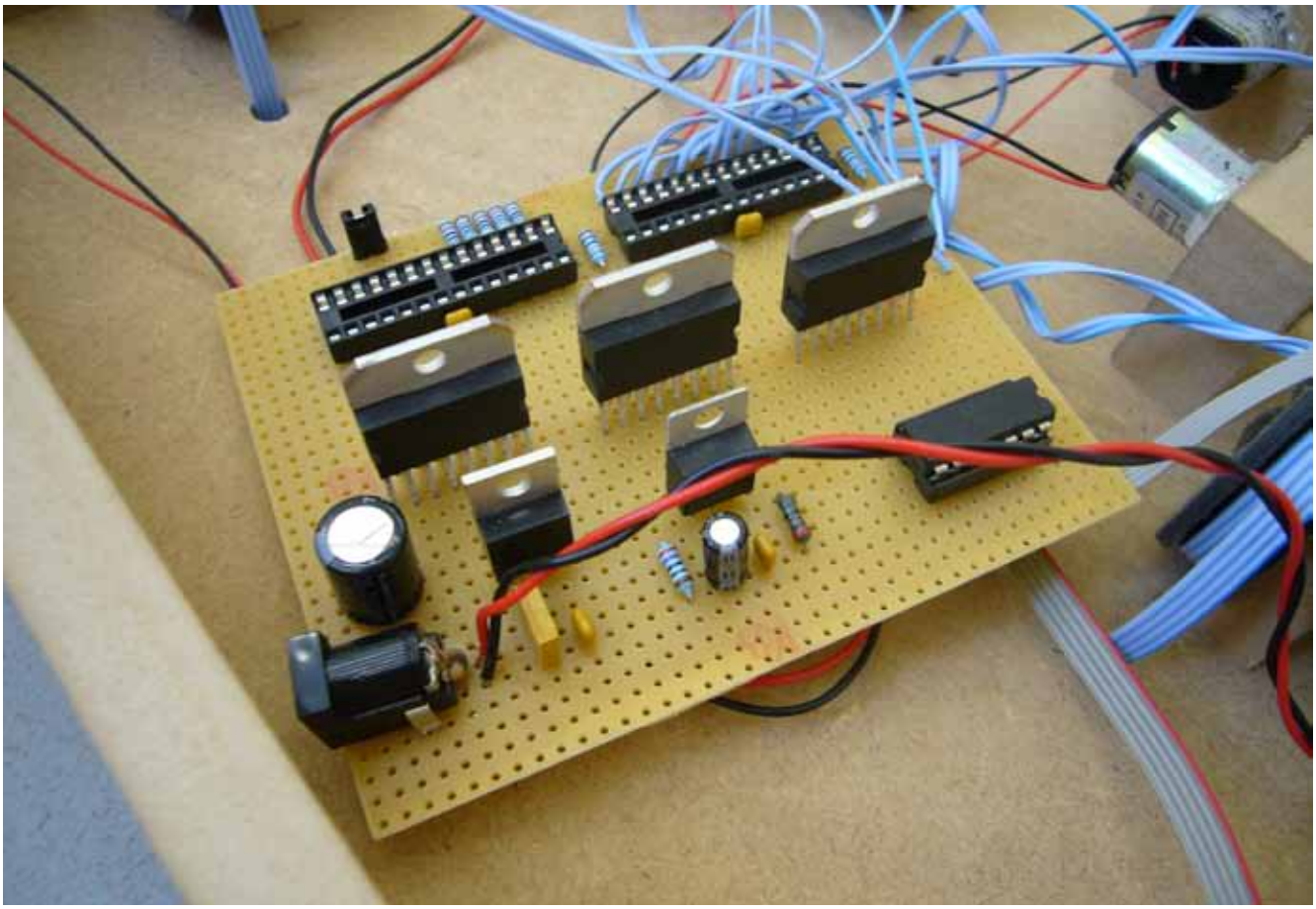
Form

For the spheres, Perspex half balls were used. They were sandblasted on the inside to diffuse the light and give good colour mixing of the leds that would be placed in the middle of each ball. The outside was kept untouched to still have the reflective nature of Perspex. There was no particular attention paid to aesthetics, as it wasn't the focus for this iteration. The wires running down was standard multi-wire and the top was fabricated from MDF.

Electronics

The electronics consisted of two parts: the driving of the motors to move the spheres up & down, and the driving of the RGB-leds. Conveniently, it was possible to drive the motors with the same IC as the leds, namely the TLC5940. It is a 16-channel led-driver which can drive an almost endless amount of leds from five pins on the Arduino. It is also possible to dim every led individually through PWM. The PWM makes it possible to also drive DC-motors, since the turning speed is defined by the PWM-cycle. However, some additional hardware (L298 motor driver) was needed to be able to choose the direction in which a motor is turning. In the final prototype, 5 RGB-leds (15 leds total) and 5 DC-motors were controlled through the electric circuit.





flow

Iteration 3

Introduction

In this iteration, the focus laid more in the later parts of the design cycle (concept development and prototyping). Relatively little time was spent on the problem definition and brainstorming, and research was only done as part of concept development and prototyping. Instead, aesthetics and electronics made up a big part of this iteration. This was chosen based on the project goals that were yet to be fulfilled (primarily aesthetics). This iteration was 7 weeks.

Problem defining

Based on the results of the last two iterations, it was decided to skip the initial research-phase and move straight to rethinking the problem statement and requirements. The AtmoSpheres concept was analysed to find out what it did and did not include. Based on this, research & experience gained past iterations and my personal focus, new requirements were selected. These were divided into hard requirements (needs) en soft requirements (wishes). A new problem statement was also formed.

Problem statement

"How can I communicate the context of a fixed place through the state of a dynamic object?"

Hard requirements

- always-on input
- does not intrude privacy
- no added obligations to receiver
- no additional effort needed for sender
- unobtrusive

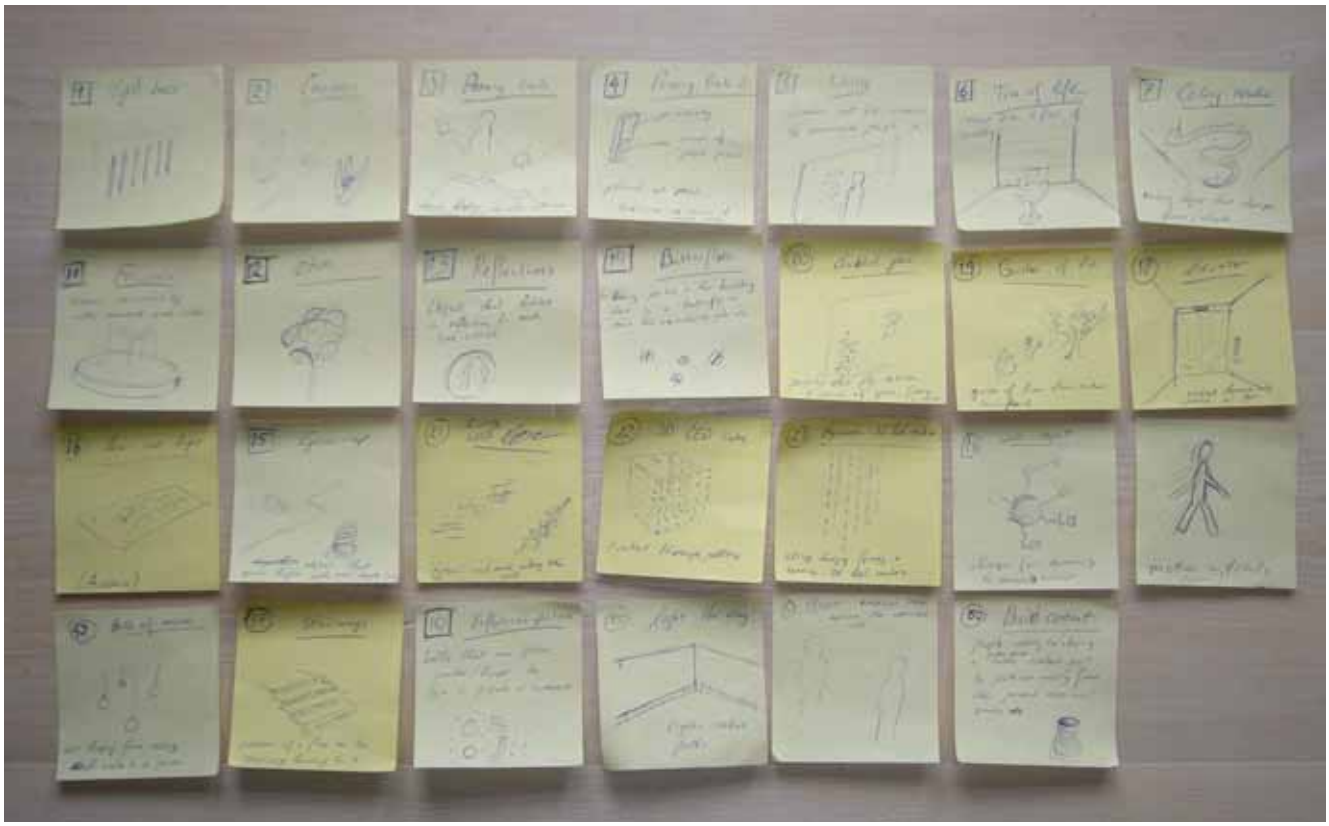
- synchronous
- intuitive; no knowledge needed to understand
- object in itself
- no direct sensorial translations

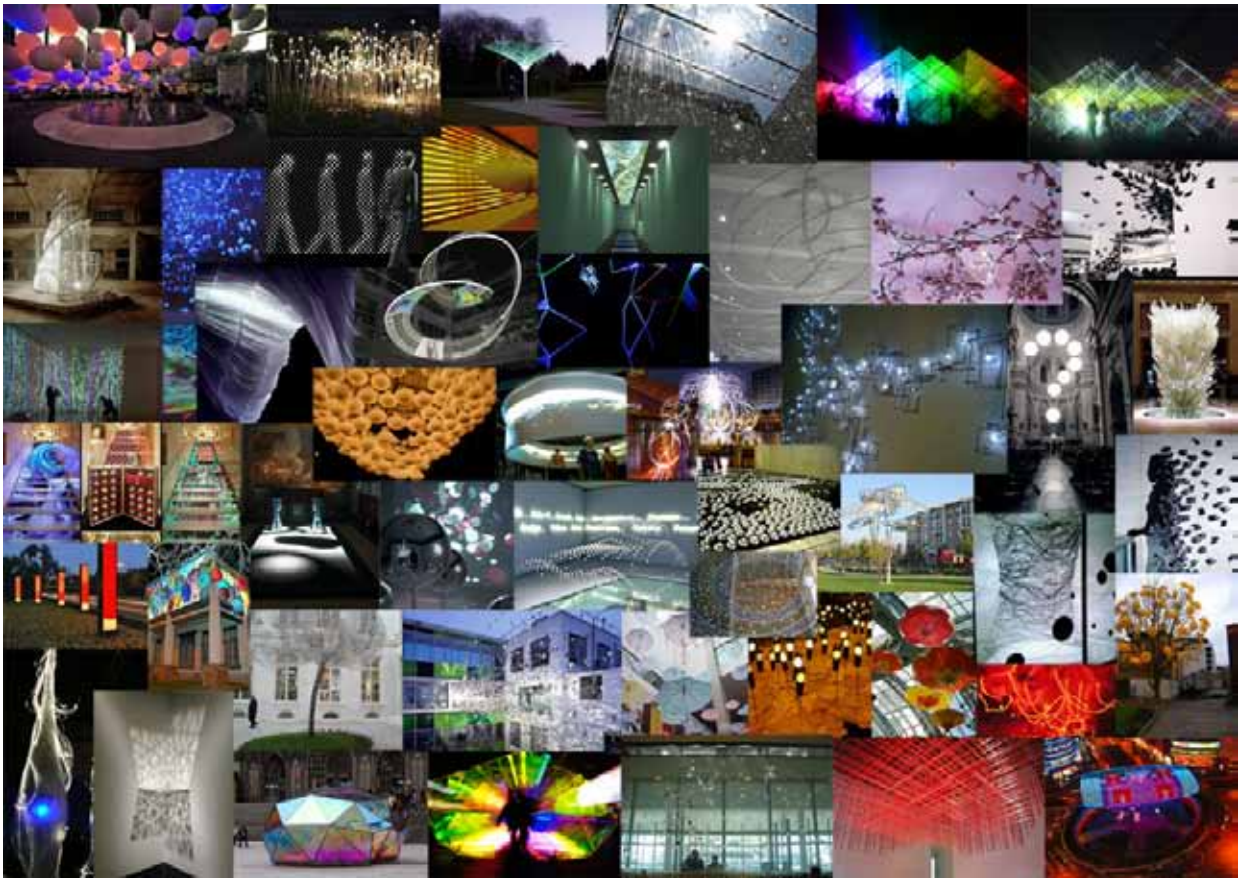
Soft requirements

- short-term history / archive
- two-way
- can be personalized
- allow for expression and creativity
- reasonable technical implementation
- artistic
- scalable
- sense of experience; experience the context

Ideation

Ideas of the previous iterations where selected on relevancy and a new brainstorm was done to generate new ideas more focused towards the new problem statement. From there, ideas and directions were selected and more converging brainstorming was done. As input, two inspirational collages were made. One focused on artistic (light) installations and the other on lamps. These themes were based on the direction that was chosen to go into. Finally, the idea of the 'flowing of light' as a representation of activity was formed. This was translated into multiple forms, of which 'Rain drops' was chosen to conceptualize further.





Concept

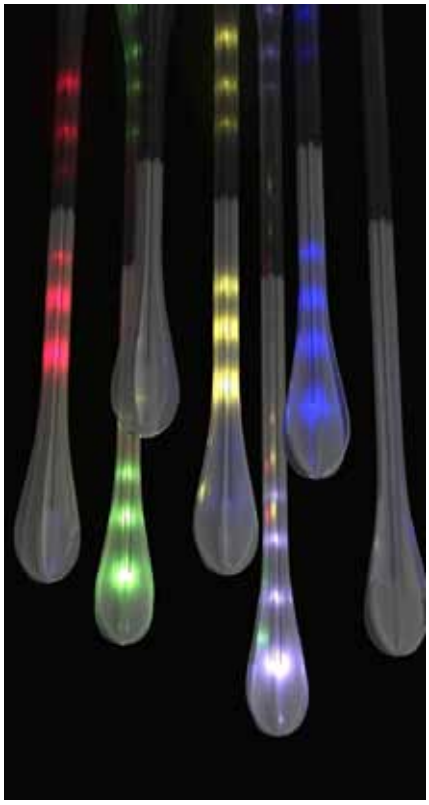
The concept is visioned to be a one-of-a-kind lighting installation that reflects the contextual status of a (public) building or space. One-of-a-kind means that it is not an actual product, but it's tailored and made specifically for a certain place. The actual contextual status it communicates therefore also depends on the placement.
The way it communicates this contextual information was approached in a rather artistic way, as in the metaphorical flowing or raining of coloured light. The metaphor 'flow' as in the flow of people (the context of movements) or being in mental flow (immersed in the activity; the context of activity). Coloured lighting as output was chosen for its attractiveness and diverse capabilities. The lighting is placed inside dozens of glass-formed raindrops hanging from the ceiling, animating the falling of rain in diverse colours, speed and frequency.
It is not an individual drop that has a particular meaning. Instead, it's the total picture the complete installation radiates that gives it its meaning. The different output variables (colour, diversity in colour, speed of falling, frequency of falling, etc) do not reflect different input variables, but change and work simultaneously to give an impression of the contextual status.
It is not expected that people will instantly know what the installation represents the first time they see it. By experiencing it frequently, combined with the different situations (contexts) in which this is done, people slowly begin to understand what factors influence the installation and how they can influence it themselves. Therefore, it is an important of the concept that it is placed where the same people come frequently, for instance an office building or central station.
Following are a few scenario's of possible implementations of the installation.

Scenario 1
The *Flow* lighting installation is placed in the main hall of a central train station. The context factor it reflects is simple and obvious: the lighting becomes more lively and diverse when there are more people in the station. It could also follow the direction of movements that the majority of people are walking into in the central hall. For instance, when a train just arrived and a whole

stream of people is walking towards the exit, the installation follows this stream in its animation of light (drops furthest from the exit light up first and drops closest to the exit light as last, animating a stream).

Scenario 2

The installation is hung in the central hall or atrium of an office building. Different clusters of drops represent the different areas, departments or floors within the building. The clusters are positioned in a way that indicate the layout of the building. For instance, if it is a tall building with a central atrium going through the middle, clusters can be hung at different heights for the different (groups of) floors. Each cluster indicates the level of activity going on in the part of the building in reflects. More activity is a more lively lighting. By looking at the complete installation, one gets an overview of what is going on in the building, but one can also compare areas with other ones. The activity level can be measured based on simple input like amount of people or amount of movement which is instantly visualized in the light. But it can also go a lot further than this. Different clusters can reflect different departments and their performance within the company whole. Different evaluation factors would be needed for each department, but the result is a representation of how each department individually is part of the total success of the company while also being a complete picture of how the company is doing at the moment. Change of lighting would be less instant and fast than the first example. Ideally, it might even trigger some sense of pride when your department is doing best ;)

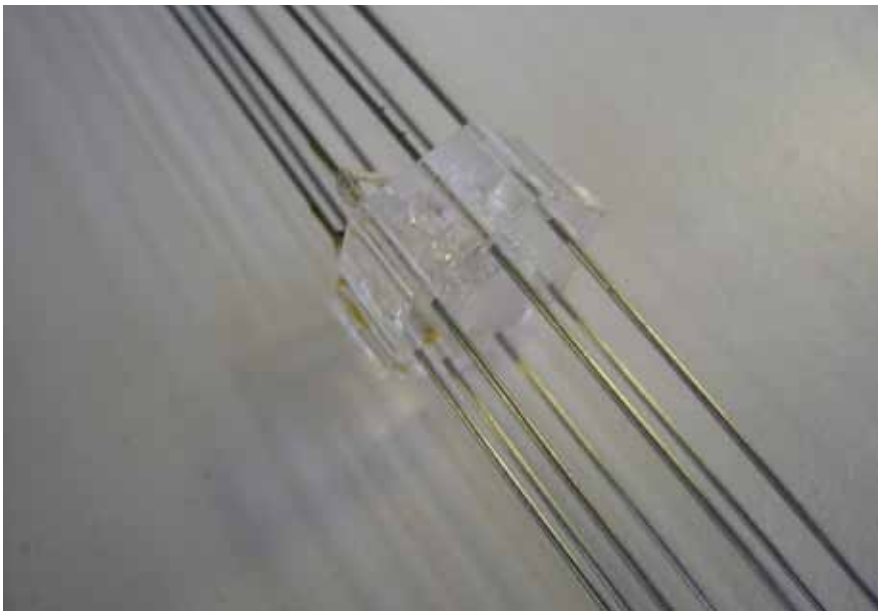


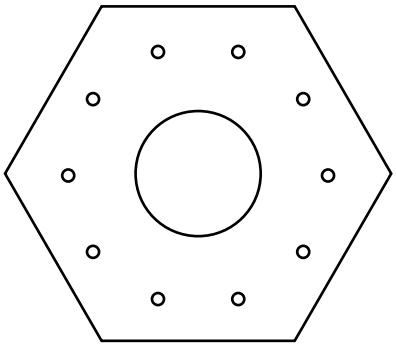
Prototyping

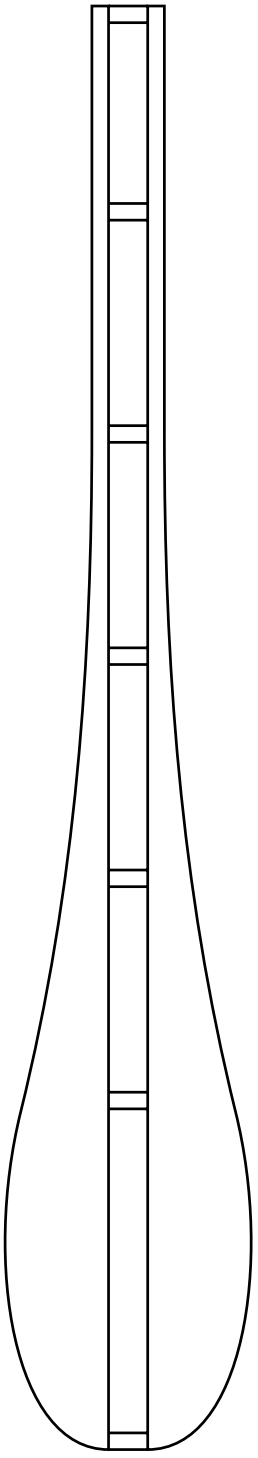
Form

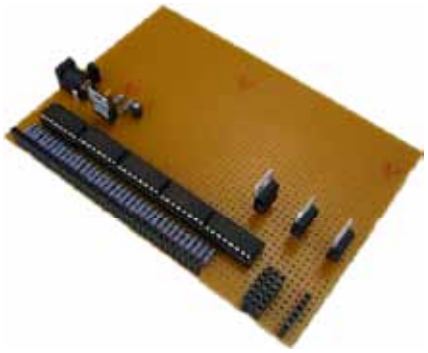
The initial idea for the prototype was to have the glass drops made by a glassblower. However, this proved to be far to expensive and time-consuming to make (based on mailing various glassblowers and talking to lighting expert Jacob Alkema). Therefore, a solution with laser cut Perspex (Plexiglas) was developed. In the final prototype, six transparent, flat Perspex half drops are glued against small 6-sided pieces (hexagons) running along the central axis. This forms the drop form. Each hexagon holds one RGB-led in the middle. The wires run through holes in the hexagon, surrounding the led. Everything is made as minimalistic as possible to make it as transparent possible. The bottom of every drop (the actual drop form) is sandblasted to have it diffuse more light.

A total of six of these drops hang from a top unit that consists of a Perspex plate followed by a black plate directly above it. This way, the drops and lighting are reflected, making the drops seem longer as well as giving a more lively and dynamic effect.







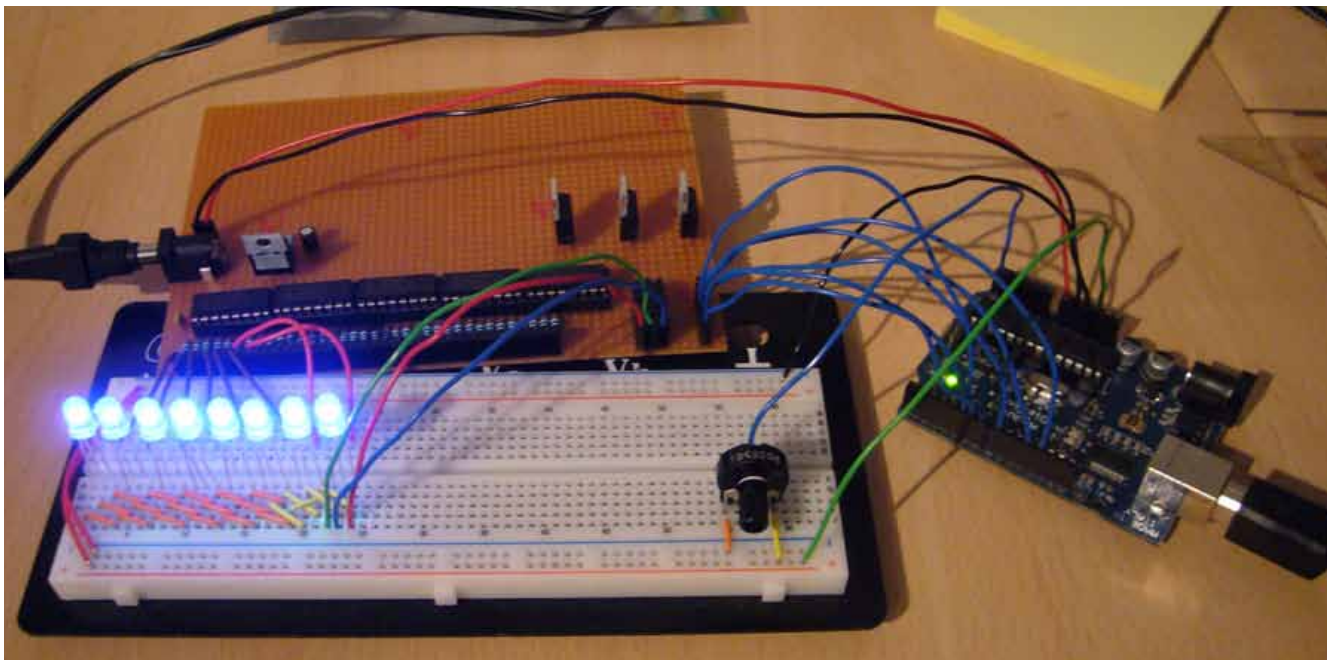


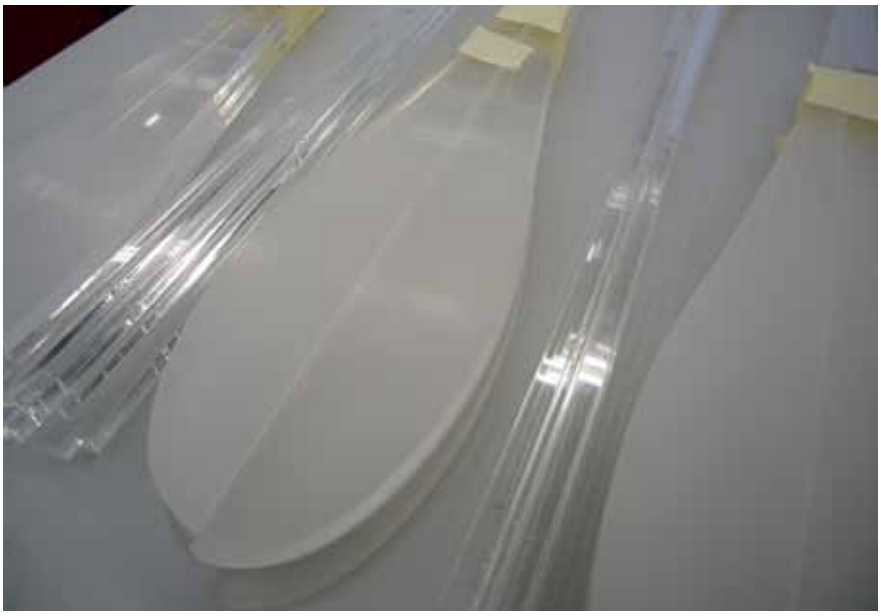
Electronics

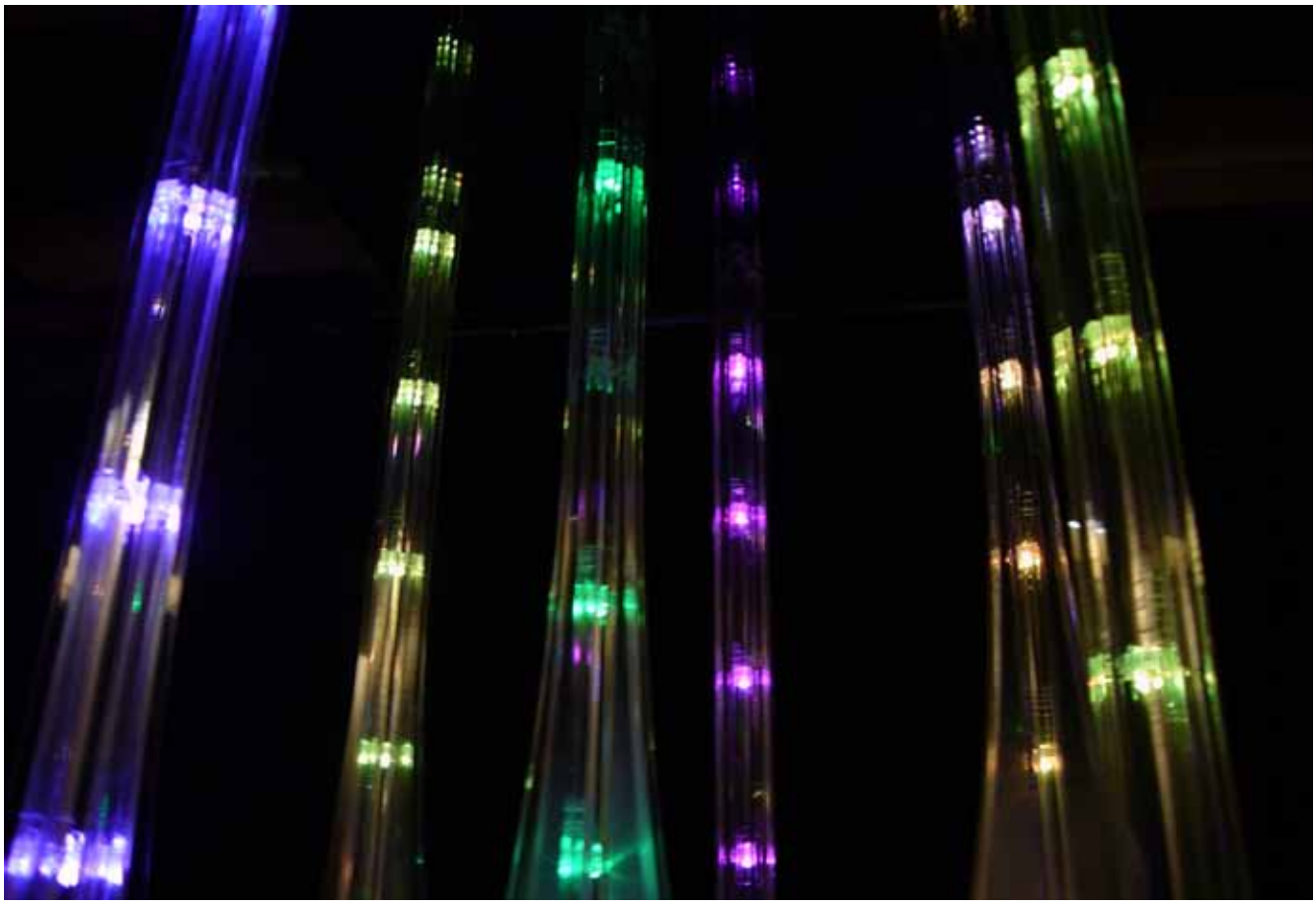
Every RGB-led (actually 3 led's in one: red, green and blue) had to be controlled and dimmed individually, usually resulting in a lot of wires (4 per led). But the drops had to be as transparent as possible, meaning very little wiring and resulting in a technological challenge. The solution was charlieplexing, where up to 20 leds can be controlled with only 5 wires (where 21 wires would usually be needed). However, due to the complexity and time constrains, this technic was nothing more but researched and primitively tested.

Instead, the final prototype uses multiplexing through shift registers (74HC595) to control the led's. Multiplexing can be seen a more primitive form of charlieplexing. With multiplexing, the led's are arranged in a x,y-matrix. Only one row is controlled at a time, turning on/off each individual led in that row. After that, it goes to the next row (the led's in the first row all go off), until all rows have been processed. This is repeated endlessly and extremely fast. The led's actually flicker, but when done fast enough, this cannot be seen by the eye. However, this only turns the led's fully on or fully off. To dim the light, each led also needs to be turned on/off in a cycle. More on during that cycle means more light, less on means less light. So for instance if every row is processed 20 times per cycle and every led is on 5 times and off 15 times, the light is dimmed at 25%. This was a huge programming challenge, because very efficient (fast) code and hardware data transfer from the Arduino was needed to succeed in not seeing the light flicker.

The amount of wires is different per drop (8-10). Wires used are steel wires of 0,5 mm in diameter, the minimal thickness needed for the current running through them. The end result thus shows barely any wiring running down the drop.







Reflection

During this iteration, I once again got stuck in the idea selection phase. I always have the feeling I can think of better ideas than I already have and I'm generally afraid to choose one because I know it will greatly influence the end result. However, from iteration 2 and 3 I did learn that whatever idea is chosen, the concept development is what eventually makes or breaks the idea. I think almost any idea can be turned into a viable concept, if enough effort is put into it. So essentially, it is not the idea which determines the success of the end result, it is the quality of the concept development. I will keep this in mind for when I need to select ideas in the future, forcing myself not to brainstorm even further, but choosing the best one of what I have at that moment.

Other then that, I feel this iteration went quite smoothly. There were the usual hick-ups during the build and programming of electronics, but nothing unexpected. When it became clear glassblowing was not an option (2 weeks before the deadline), I was quickly able to restyle the form for another material and manufacturing technology. Maybe I should have done some user testing, but I also think this concept is so hard to grasp initially and is so dependent on the setting in which it is placed, that useful user testing became almost impossible and maybe even irrelevant. Furthermore, this was not my focus for the project.

I really liked approaching this project in three iterations. It was also very fitting for it because of the abstract and vague nature of the project. Each iteration was a complete design cycle, but still did have different focuses. The first iteration really helped in making the whole context concept (what it actually is) a lot clearer. Iteration 2 was more about the research and exploring how to apply it into design. The last iteration was all about concrete results and an end product. I clearly used knowledge gained in previous iterations to build further upon. It also gives you a better idea of what still lies ahead.

Overall, this project learned me to combine both abstract and concrete thinking to form a design that extends upon the current forms of one of human's most basic needs: communication. I now know how hard it is to successfully design something in a field that is barely understood by people themselves (contextual communication) but is such a huge part of our lives. Design in these fields truly changes the way we live our lives.

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